WCPEC-9
& GPVC 2026
DAEJEON

The 9th World Conference on Photovoltaic Energy Conversion
& Global Photovoltaic Conference 2026

Joint Conference of

PVSEC-37
The 37th International Photovoltaic Science and Engineering Conference

56th IEEE PVSC
The 56th IEEE Photovoltaic Specialists Conference

44th EU PVSEC
The 44th European Photovoltaic Solar Energy Conference

2026.11.15.(SUN) – 11.20.(FRI) | DCC, Daejeon, KOREA

Program book

Host Ministry of Climate, Energy and Environment DAEJEON KPVS Organizer DAEJEON Tourism Organization

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Welcome Messages

Welcome Messages



Dear distinguished members of the PV community,

It is my great honor to warmly welcome you to WCPEC-9 in Korea.
This marks the first time WCPEC will be held in Korea in its 36-year history.

The Organizing Committee is preparing the ultimate festival for the PV community with the spirit of the "Olympics." Our technical program will feature discussions on the roadmap for developing ultra-high-efficiency tandem solar cells and the future direction of convergence PV systems. To expand solar energy's role as a key technology for achieving carbon neutrality, we will present prominent directions for PV R&D and deployment in emerging countries, alongside diverse supporting programs. Special attention will also be dedicated to student researchers from these regions through tailored academic programs.

Daejeon, often referred to as "Korea's Silicon Valley," is an exceptional venue boasting an extensive network of research institutes, universities, and enterprises. Participants will also have the opportunity to explore the city's natural beauty and historical treasures, including Gyeryongsan National Park and the UNESCO World Heritage sites in Gongju.

The members of the Organizing Committee look forward to welcoming you to Daejeon in November 2026.

Thank you.

Sincerely,

Chang Sik Son
General Chair, WCPEC-9 Organizing Committee

Dear Colleagues and Friends,



On behalf of the Korea Photovoltaic Society (KPVS), it is my great pleasure and honor to welcome all participants to the 9th World Conference on Photovoltaic Energy Conversion (WCPEC-9) & Global Photovoltaic Conference 2026 (GPVC 2026), held in Daejeon, Republic of Korea.

WCPEC is the world's most prestigious conference in photovoltaics, bringing together leading scientists, engineers, industry professionals, and policymakers to share the latest advances and explore the future of solar energy. As the host society, KPVS is honored to organize this landmark event in collaboration with the Korean government and the Daejeon Metropolitan City. We are also proud to host GPVC 2026, providing another valuable opportunity to promote international exchange and collaboration in photovoltaic science and technology.

As the world accelerates its transition toward a sustainable, carbon-neutral future, photovoltaics plays an increasingly important role in the global energy landscape. Advances in high-efficiency silicon solar cells, perovskite and tandem photovoltaics, and next-generation materials are opening new opportunities for the widespread adoption of solar energy. I am confident that WCPEC-9 & GPVC 2026 will serve as an excellent platform for exchanging innovative ideas, fostering international collaboration, and shaping the future of photovoltaic research and industry.

Finally, I would like to express my sincere gratitude to the International Advisory Committee, the Technical Program Committee, the organizing committee, our sponsors, and everyone who has contributed to making these conferences possible.

Welcome to WCPEC-9 & GPVC 2026 in Daejeon, Korea. I wish you all a fruitful, inspiring, and memorable conference!

Min Jae Ko
President, Korea Photovoltaic Society (KPVS)

Welcome Messages



Dear colleagues, friends, and PV enthusiasts,

It is a real pleasure to welcome you to the 9th World Conference on Photovoltaic Energy Conversion. On behalf of the European organizing committee, and as European Co-Chair, welcome to Korea!

I would like to warmly thank our Korean colleagues and the entire local organizing team. Their dedication and hospitality made this conference possible, and we are grateful to them for hosting our global community in such a vibrant and welcoming country.

Photovoltaics has become one of the most transformative technologies of our time. What was once a niche application is now the fastest-growing source of electricity worldwide, bringing clean, affordable energy to billions of people. Solar power can help decarbonize our economies, strengthen energy security, and create new opportunities for sustainable development in every region of the world.

This success is the result of close collaboration among industry, research, policymakers, and society. Only by continuing to work together can we meet the challenges ahead, from sustainability and circularity to storage, grid integration, and equitable access to energy.

Diversity is at the heart of this collaboration. As in our devices, the most interesting things happen at the interfaces: the interfaces among backgrounds, cultures, generations, and disciplines lead to better questions and more creative solutions. WCPEC is a truly world conference, bringing together the global PV community from Asia, the Americas, Europe, Africa, and Oceania around a shared purpose: the sun is the same for everyone, and so is our commitment to harnessing it for the benefit of all. Let us make this an open and welcoming space where every voice is heard, from students at their first conference to leaders who have shaped our field.

Conferences like WCPEC are where ideas meet, new partnerships are born, and our community grows stronger, in the sessions but also in the corridors, over coffee, and at the evening events.

I invite you to share your work, ask questions, and build new connections at the interfaces between disciplines, regions, and generations. Together, we can show how photovoltaics can help shape a more sustainable world for generations to come.

Welcome, and enjoy WCPEC-9 in Korea!

Sunny regards,

Delfina Muñoz

Co-Chair, WCPEC-9 Organizing Committee
EU PVSEC

Dear Colleagues and Friends,



It is my great pleasure to welcome you to the 9th World Conference on Photovoltaic Energy Conversion (WCPEC-9), held in Daejeon, Korea, from November 15 to 20, 2026. WCPEC brings together three of the world's major photovoltaic conference series: the IEEE Photovoltaic Specialists Conference, the European Photovoltaic Solar Energy Conference, and the International Photovoltaic Science and Engineering Conference. It is a special honour to gather in Korea for the first time.

The program reflects the breadth and momentum of our field, from fundamental materials and device physics to tandem, silicon, perovskite, and thin-film technologies, and from modules and systems to the role of photovoltaics in the global energy transition. It also highlights emerging frontiers such as artificial intelligence- and data-driven innovation, solar-to-X technologies, and photovoltaics for space and extreme environments. Plenary, keynote, invited, oral, poster, tutorial, and special sessions will offer many opportunities for discussion and collaboration among researchers, industry partners, and policymakers.

We are especially pleased to welcome students and early-career researchers, whose ideas will shape the future of solar energy. I encourage you to attend sessions beyond your own specialty, meet new colleagues, and explore Daejeon, Korea's science and technology hub. I thank the authors, speakers, reviewers, sponsors, and volunteers who made this conference possible, and I wish you an inspiring and productive week.

Warmest regards,

Karin Hinzer

Co-Chair, WCPEC-9 Organizing Committee
IEEE PVSC

Welcome Messages



Dear Colleagues and Friends in Photovoltaics and Sustainable Energy,

On behalf of the Technical Programme Committee, it is my great pleasure to welcome you to the 9th World Conference on Photovoltaic Energy Conversion (WCPEC-9), which will be held jointly with GPVC 2026 in Daejeon, Korea, from November 15 to 20, 2026.

WCPEC-9 is jointly organized by the three major international photovoltaic conference series — the IEEE Photovoltaic Specialists Conference (IEEE PVSC), the European Photovoltaic Solar Energy Conference (EU PVSEC), and the International PV Science and Engineering Conference (PVSEC). As one of the world's most important global gatherings in photovoltaics, WCPEC-9 aims to provide a comprehensive platform covering the entire spectrum of photovoltaic science, engineering, manufacturing, system integration, and energy-transition technologies.

The technical programme is organized into seven major areas encompassing 24 core topics and nearly 100 sessions, spanning from fundamental materials and device physics to large-scale deployment, sustainability, and future energy systems. The programme includes Tandem Solar PV Technology, Silicon Solar PV Technology, Perovskite Solar PV Technology, Thin-Film and Emerging Solar PV Technology, PV Module and System Engineering and Integrated/ Applied PV, PV Expansion: Frontiers in Photovoltaic Science and Technology, and PV in the Energy Transition.

In addition to conventional photovoltaic technologies, WCPEC-9 places strong emphasis on the expanding role of photovoltaics in broader energy and societal systems. The programme therefore includes emerging frontier areas such as PV-driven energy conversion and hybrid concepts, Solar-to-X technologies, AI- and data-driven PV innovation, PV applications in space and extreme environments, resilient energy systems, circular pathways, sustainability, and global energy-transition strategies.

The conference will feature five plenary lectures delivered by internationally renowned leaders representing academia and industry, including Prof. Nam-Gyu Park, Prof. Martin Green, Prof. Henry Snaith, Dr. Xixiang Xu, and Dr. Danielle Merfeld. Their contributions have significantly shaped the evolution of modern photovoltaics, ranging from fundamental scientific breakthroughs to industrial-scale deployment and commercialization.

In parallel, WCPEC-9 will host keynote, invited, oral, poster, tutorial, outreach, and special sessions designed to encourage active discussion and collaboration among researchers, engineers, industrial partners, policymakers, and global stakeholders across all sectors of photovoltaics and sustainable energy.

We believe WCPEC-9 will serve not only as a forum for presenting scientific and technological advances, but also as an important opportunity to discuss how photovoltaics can contribute more broadly to future energy systems, industrial transformation, sustainability, and global society.

We warmly welcome you to Daejeon and look forward to your participation in WCPEC-9.

Jae-Joon Lee

TPC Chair, WCPEC-9 Organizing Committee

WCPEC-9
2026 DAEJEON

Conference Overview

About WCPEC

Capture the Sun, Charge Tomorrow

WCPEC-9(World Conference of Photovoltaic Energy Conversion) is the world's largest international academic platform leading research and development in photovoltaics. It brings together researchers, industry experts, and policymakers from around the globe to share the latest technological achievements and future visions, serving as a hub for global exchange and collaboration.

In particular, WCPEC unites the world's most prestigious PV conferences— PVSEC(International PV Science and Engineering Conference), EU PVSEC(European Photovoltaic Solar Energy Conference), and IEEE PVSC(IEEE Photovoltaic Specialists Conference) under a single event held on a four-year cycle, further accelerating innovation and cooperation across the photovoltaic sector.

PVSEC EUPVSEC IEEE PVSC

Key Objectives and Methodology

- Strategy for the progression of next-generation SCs: Outstanding invited speakers & special programs
- Pathway for Integrated PV systems: BIPV, floating PV, agri-PV, green H2, energy & AI, etc.
- Advancement & distribution of PV technologies in up-and-coming countries: Lowering budget barrier
- Boosting & backing for future leaders in PV R&D: Networking & supporting programs for young scientist & students
- Increasing the embracement of PV by the World: Global outreach programs, PV festival, etc.

WCPEC History

Edition	Year	Region	Host Nation	Host City
9th	**2026**	**Asia**	**Republic of Korea**	**Daejeon**
8th	2022	Europe	Italy	Milan
7th	2018	Americas	United States of America	Hawaii
6th	2014	Asia	Japan	Kyoto
5th	2010	Europe	Spain	Valencia
4th	2006	Americas	United States of America	Hawaii
3rd	2003	Asia	Japan	Osaka
2nd	1998	Europe	Austria	Vienna
1st	1994	Americas	United States of America	Hawaii

About GPVC

History of the Global Photovoltaic Conference (GPVC)

The Global Photovoltaic Conference (GPVC) was first launched in 2011 as the Korean Photovoltaic Conference, together with the 6th Korea-China-Japan Joint Symposium on Photovoltaic Power Generation, held in Busan, Republic of Korea. Following the successful inaugural conference, the Korea Photovoltaic Society (KPVS) was officially established in 2012, marking an important milestone in the advancement of photovoltaic research and technology in Korea.

Since its establishment, GPVC has served as an international platform for researchers, engineers, industry professionals, and policymakers to share the latest scientific advances, technological innovations, and industrial developments in photovoltaics. The conference has been held regularly across major cities in Korea, including Busan, Daegu, Gwangju, Daejeon, and Jeju, fostering collaboration and knowledge exchange among the global photovoltaic community.

Over the years, GPVC has strengthened its international presence through collaborations with major international photovoltaic events, including DSC-OPV 8 in 2013, ISP 2014 in 2014, PVSEC-25 in 2015, and PVSEC-30 in 2020. These joint events have provided valuable opportunities to expand international research networks and promote cooperation across diverse areas of photovoltaic science and technology.

In recent years, GPVC has continued to grow as a major international photovoltaic conference, bringing together experts from academia, research institutes, and industry worldwide. Through its annual gatherings, GPVC has contributed to the advancement of photovoltaic technologies and the transition toward a sustainable, low-carbon energy future.

A significant milestone in the history of GPVC will be marked in 2026, as GPVC 2026 is held in conjunction with the 9th World Conference on Photovoltaic Energy Conversion (WCPEC-9) in Daejeon, Republic of Korea. This joint event represents an important opportunity to bring together the global photovoltaic community, strengthen international research collaboration, and facilitate the exchange of groundbreaking advances across the full spectrum of photovoltaic science, technology, and applications.

WCPEC-9 Overview

The World Conference on Photovoltaic Energy Conversion (WCPEC-9) is the world's largest platform for PV research and development, providing a unique opportunity for international exchange by bringing together the three most prominent global PV conferences: PVSEC, EU PVSEC, IEEE PVSC

Title	The 9th World Conference on Photovoltaic Energy Conversion & Global Photovoltaic Conference 2026
Date	November 15(Sun) - 20(Fri), 2026 (6 Days)
Venue	Daejeon Convention Center (DCC), Daejeon, KOREA
Host	Ministry of Climate, Energy and Environment · DAEJEON · KPVS
Organizer	DAEJEON Tourism Organization
Support	KETEP · KOREA ENERGY AGENCY · KOREA INSTITUTE OF ENERGY RESEARCH · KOPIA 한국태양광산업협회 · KOREA TOURISM ORGANIZATION

WCPEC-9 Organizing Committee

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WCPEC IAC

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	Marta Victoria		

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WCPEC-IAC

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Ulrike Jahn	Deren Yang	Tyler Grassman

Program at a Glance

DAY	Day 0 (Pre-Conference day)		DAY 1 | Monday, 16 Nov.						DAY 2 | Tuesday 17, Nov,							DAY 3
ROOM	Session Room 6 (204-205)	Session Room 7 (301)	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 7 (301)	Session Room 1 (101-102)
08:30-09:00									2B0.3 A2-1	The 2nd Asia-Africa (A^2) Joint PV Symposium	4B0.3 A4-1	5B0.3 A5-1	3B0.3 A3-1	6B0.3 A6-2		2C0.6 A2-2, 2-4
09:00-09:30		Tutorial PV Modules and Systems														
09:30-09:50																
09:50-10:00									Break							Break
10:00-10:30		Tutorial Tandem Solar Cells					Opening Ceremony		2B0.4 A2-3	The 2nd Asia-Africa (A^2) Joint PV Symposium	4B0.4 A4-1	5B0.4 A5-1	3B0.4 A3-1	6B0.4 A6-2		2C0.7 A2-2
10:30-11:00																
11:00-11:20							Exhibition Opening Ceremony (DCC2)									
11:20-11:30									Break							Break
11:30-12:00													Plenary Session 2			
12:00-12:30			Break													
12:30-13:00									Break							Break
13:00-13:30	The 10th Korea-China-Japan Joint Workshop on Photovoltaics	Tutorial Tandem Solar Cells					WCPEC Awards Ceremony									
13:30-14:00									2B0.5 A2-2		4B0.5 A4-2	5B0.5 A5-1	3B0.5 A3-1	6B0.5 A6-3		2C0.8 A2-3
14:00-14:30							Plenary Session 1			The 2nd Asia-Africa (A^2) Joint PV Symposium					Daejeon Speacial Session: Powering Daejeon's Future with Solar Energy	
14:30-14:50	The 10th Korea-China-Japan Joint Workshop on Photovoltaics															
14:50-15:00			Break						Break		Break					Break
15:00-15:30			2A0.1 A2-1	IEA PVPS Workshop: Asia in Focus - Market & Policy	4A0.1 A4-1	5A0.1 A5-3	3A0.1 A3-1	6A0.1 A6-2	Next-Generation BIPV Forum		EU-Korea Cooperation : PV R&I Challenges	5B0.6 A5-1	3B0.6 A3-1	6B0.6 A6-3		From Belgium to Beyond Europe : How Does PV Innovation Move from Lab to Industry?
15:30-16:00	The 10th Korea-China-Japan Joint Workshop on Photovoltaics									The 2nd Asia-Africa (A^2) Joint PV Symposium						
16:00-16:20																
16:20-16:30			Break		Break							Break				
16:30-17:00	The 10th Korea-China-Japan Joint Workshop on Photovoltaics	Tutorial PV Modules and Systems	2A0.2 A2-2		4A0.2 A4-1	5A0.2 A5-3	3A0.2 A3-1	6A0.2 A6-2				5B0.7 A5-1, 5-2	3B0.7 A3-1, 3-2, 3-3			
17:00-17:30																
17:30-17:50																
17:50-18:00			Break						Break							
18:00-18:30			Poster Session (DCC 2, Exhibition Hall)						Poster Session (DCC 2, Exhibition Hall)							
18:30-19:00	Welcome Reception (1F Medium Conference Room Lobby, DCC1)															
19:00-20:00									Conference Dinner (3F Convention Hall, ICC Hotel)							

Wednesday 18, Nov.							DAY 4 | Thursday 19, Nov.							DAY 5 | Friday 20, Nov.					
Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 7 (301)		Session Room 1 (101-102)	Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)		Session Room 1 (101-102)	Session Room 2 (103)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	
7C0.1 A7-1	4C0.6 A4-2	5C0.8 A5-2	3C0.8 A3-2, 3-3		1C0.1 A1-2		2D0.9 A2-2	7D0.4 A7-1, 7-2	4D0.11 A4-3	5D0.13 A5-3	1D0.6 A1-1	Asia-Europe Emerging Materials for Thin Film Solar Cells		2E0.14 A2-4	7E0.9 A7-3, 7-4	5E0.18 A5-3, 5-4	1E0.11 A1-1	6E0.11 A6-1	
Break				Special Session (Closed Session)	Break		Break							Break					
7C0.2 A7-1	4C0.7 A4-2	5C0.9 A5-2	3C0.9 A3-2, 3-3		1C0.2 A1-2		2D0.10 A2-3	7D0.5 [Industry Forum I] A7-3	4D0.12 A4-3	5D0.14 A5-3	1D0.7 A1-1	Asia-Europe Emerging Materials for Thin Film Solar Cells					Plenary Session 5		
Break					Break		Break												
			Plenary Session 3								Plenary Session 4						Closing Ceremony		
Women In PV	Break						Break							*Technical Tour: November 18 (Wed), 14:00-18:30 - Please arrive at tour desk in the lobby by 14:00 (DCC 1, 1st floor)					
7C0.3 A7-2	4C0.8 A4-3	5C0.10 A5-2	3C0.10 A3-2, 3-3	6C0.7 A6-3	1C0.3 A1-1		2D0.11 (KOR-IND) A2	7D0.6 [Industry Forum II] A7-3	Asia-Europe Emerging Materials for Thin Film Solar Cells	5D0.15 A5-4	1D0.8 A1-1	6D0.9 A6-1							
Break							Break												
The 4th Korea-Singapore-Malaysia Joint PV Symposium	4C0.9 A4-3	5C0.11 A5-2	3C0.11 A3-2, 3-3	6C0.8 A6-1	1C0.4 A1-3		2D0.12 (KOR-IND) A2	7D0.7 A7-4		5D0.16 A5-4	1D0.9 A1-1, 1-3	6D0.10 A6-1							
Break							Break												
The 4th Korea-Singapore-Malaysia Joint PV Symposium	4C0.10 A4-3	5C0.12 A5-2	3C0.12 A3-2, 3-3		1C0.5 A1-2, 1-3		2D0.13 (KOR-IND) A2	7D0.8 A7-3	IEA PVPS Workshop: Task 12 - PV Sustainability	5D0.17 A5-3, 5-4	1D0.10 A1-3								
							Break												
							Poster Session (DCC 2, Exhibition Hall)												

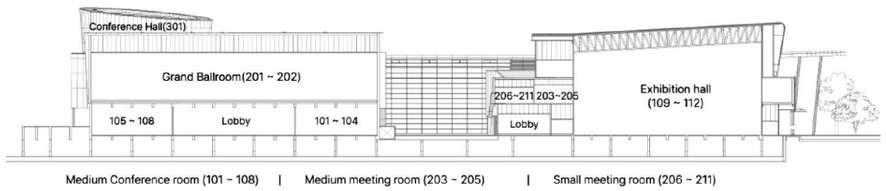
Venue

Main Venue DCC(Daejeon Convention Center)

- The largest professional convention center in the central region
- Consists of DCC 1 and DCC 2

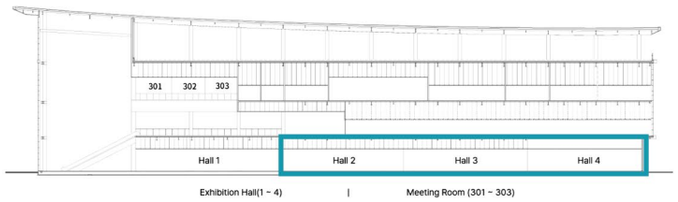
DCC 1 All Conference Rooms (1F-3F)

Opening • Closing • Awards Ceremony, All sessions, Welcome Reception



DCC 2 Exhibition Hall 2-4

Solar & Green-Energy Show(Exhibition), Poster Session



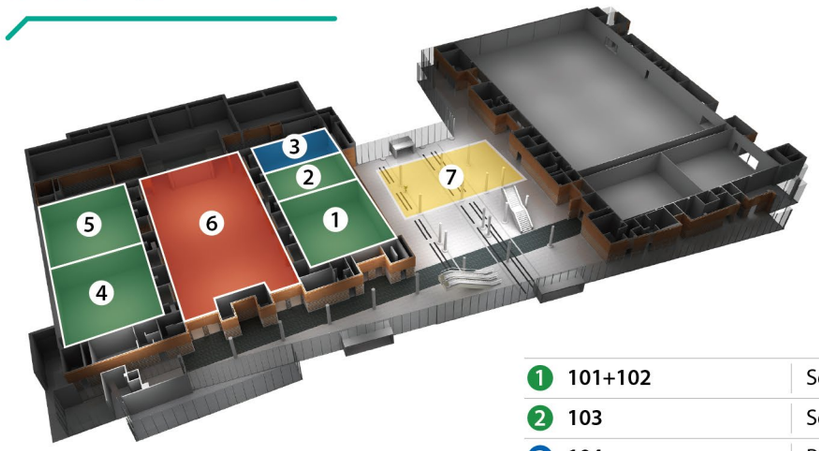
Conference Dinner Venue 3F Convention Hall, **Hotel ICC (Daejeon)**

- **November 17 (Tue), 19:00**
- For eligible participants only
  Admission requires a
  name badge marked "CD".
- **5 mins walk from DCC**



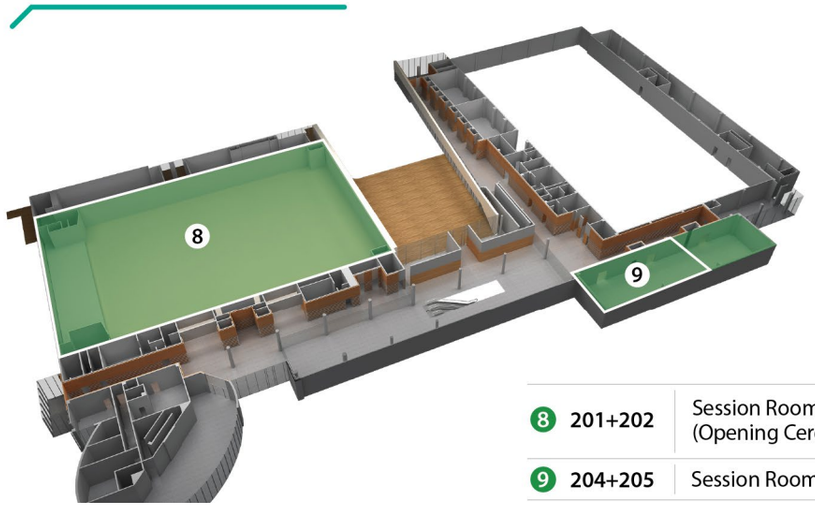
Floor Plan Daejeon Convention Center

DCC 1 _ 1st Floor



1	101+102	Session Room 1
2	103	Session Room 2
3	104	Preview Room
4	105+106	Session Room 3
5	107+108	Session Room 4
6	Meeting Room Lobby	Welcome Reception
7	DCC 1 Lobby	Registration Desk

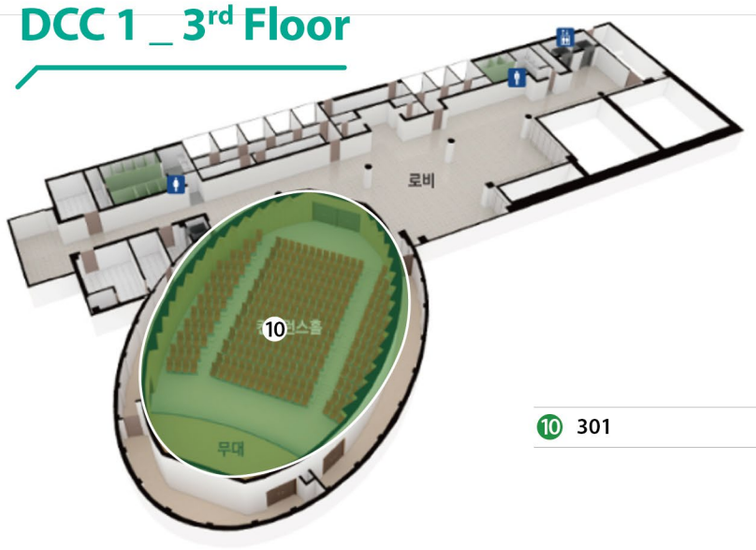
DCC 1 _ 2nd Floor



8	201+202	Session Room 5 (Opening Ceremony, Plenary)
9	204+205	Session Room 6

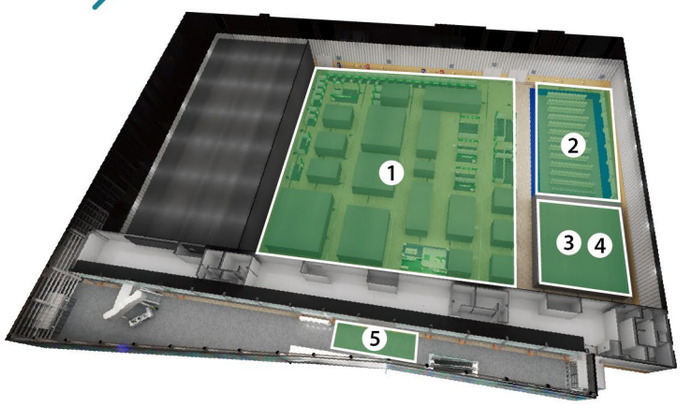
Floor Plan Daejeon Convention Center

DCC 1 _ 3rd Floor



10	301	Session Room 7

DCC 2 _ 1st Floor



1	Exhibition Hall 2-4	Solar & Green-Energy Show
2		Poster Session
3		Industry Forum
4		Energy Talk Concert
5	DCC 2 Lobby	Registration Desk

WCPEC-9
2026 DAEJEON

Awards

WCPEC Award



Richard M. Swanson

Founder, SunPower Corporation
Former Professor, Stanford University

Education

· 1969 B.S. & M.S., Ohio State University
· 1975 Ph.D., Electrical Engineering, Stanford University

Career

· 1975-1976, Stanford University, IBM Post Doctoral Fellow
· 1976-1982, Stanford University, Assistant Professor of Electrical Engineering
· 1982-1991, Stanford University, Associate Professor of Electrical Engineering
· 1985-2003, SunPower Corporation, President and CEO
· 2003-2012, SunPower Corporation, President and CTO

Citation

Dr. Richard Swanson's contributions to the development of modern PV technology have been extraordinary. Richard (Dick) Swanson is mostly well known for the development of the Interdigitated Back Contact (IBC) solar cell from 1980 at Stanford University, and for the founding of SunPower Corporation, the first PV company to commercialize solar cells and solar PV panels with very high efficiency.

IBC solar cells have been at the top of the efficiency charts for more than four decades. But Richard Swanson's legacy is much more than that. He created a methodology for implementing all future high-efficiency solar cells and founded a company to demonstrate that high-efficiency modules can be produced cost-effectively.

He reimagined the IBC solar cell and developed the tunnel-oxide-polysilicon passivating contact before any other group. He invented the technique to measure bulk lifetime and emitter Jo with a contactless method, a technique that has been used for many years by every PV research lab or PV company in the world that has saved millions in development cost and time for everyone. In practical terms, the work of Dr. Swanson at Stanford and SunPower has led to the most important development of high-efficiency silicon solar cells manufactured today.

PVSEC Award

PVSEC Award

The PVSEC Award is presented to an individual who has devoted many years to the advancement of photovoltaic science and engineering.

For PVSEC-37, two recipients were selected by the PVSEC-37 Award Committee based on nominations.

Hamakawa Award

The Hamakawa Award named in honor of Professor Yoshihiro Hamakawa of Osaka University, a founder of the photovoltaic community in Japan and of the International Photovoltaic Science and Engineering Conference (PVSEC). The award recognizes scientists and engineers for outstanding research, technological accomplishments, and creativity in photovoltaic energy conversion, including new concepts, new materials, and new devices. For PVSEC-37, three recipients were selected by the PVSEC-37 Award Committee based on nominations.

PVSEC Special Award

The PVSEC Special Award is presented to an individual or group who has made significant contributions in any of the following PV fields: development of photovoltaic industrial technology, public policymaking, international activities, international standardization, human resource development, education, and dissemination. For PVSEC-37, three recipients were selected by the PVSEC-37 Award Committee based on nominations.

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is presented to an individual aged 50 or under who has made outstanding contributions to the development of photovoltaic science and technology. For PVSEC-37, three recipients were selected by the PVSEC-37 Award Committee based on nominations.

PVSEC Award



Chinho Park

Distinguished Professor & Acting President, Korea Institute of Energy Technology (KENTECH), Korea

> “For his pioneering contributions to the development of next-generation thin film solar cells and his outstanding leadership in the Asia-Pacific PV community.”

Key Achievements

- More than two decades of thin-film PV research spanning hybrid solar cells, earth-abundant chalcogenide absorbers (CIGS, CZTS, Cu_2SnS_3, SnS), perovskites and perovskite/CIGS tandems
- Advanced solution-based, vacuum-free fabrication routes such as nanoparticle inks and electrospray deposition, and founded the start-up Solar Powder
- Served as PV R&D Program Director (2011–2013) and Managing Director of Energy Industry (2016–2019) at the Korean Ministry of Trade, Industry & Energy
- Represented Korea as a Task 1 member of IEA PVPS for 12 years (2012–2023)

Contributions to the PVSEC Community

- Conference General Chair of PVSEC-30 (Jeju, 2020), which drew more than 1,310 registrations during the COVID-19 pandemic, one of the largest in PVSEC history
- Chair of the Fund-Raising Committee of PVSEC-25 (Busan, 2015), and Co-Chair of three satellite workshops, including the Korea–Germany Collaboration Workshop on Photovoltaics
- Regular presenter at PVSEC since PVSEC-17 (Fukuoka), including PVSEC-27 (Otsu) and PVSEC-29 (Xi’an)
- 4th President of the Korea Photovoltaic Society, General Chair of the Global Photovoltaic Conference (GPVC), and editor of Current Photovoltaic Research
- Moderator of PV Market Insights events for more than 15 years.



Junsin Yi

Professor, Department of Electronic and Electrical Engineering, Sungkyunkwan University, Korea

> “For three decades of outstanding and sustained contributions to photovoltaic science, engineering and industry, from founding Korea’s first solar-cell manufacturing and mass production to advancing silicon, tandem and reliability technologies, and for leading the Korea Photovoltaic Society and the Asia-Pacific PV community through conferences, committees and education.”

Key Achievements

- Founded PSE (2000), which built Korea’s first industrial solar-cell pilot line, and launched Korea’s first commercial mass production of mono-Si solar cells
- Led Korea’s national TOPCon programme (2020–2024), delivering 24.15% cells, 23.12% modules and a 23.29% average efficiency in mass production
- Demonstrated a bifacial four-terminal perovskite/Si tandem exceeding 30% and Korea’s first Si/III–V tandem cells at 36%
- Authored about 590 SCI papers and established Korea’s first solar-energy graduate school (2006); 2025 Korea Renewable Energy Award

Contributions to the PVSEC Community

- 7th President of the Korea Photovoltaic Society (KPVS) in 2020, following his roles as Vice Chairman (2013–2015) and Editorial Committee Chair (2015). He currently serves as an Advisor to KPVS, the host society of WCPEC-9.
- Chair of the Organizing Committee of GPVC 2014; recipient of the GPVC 2023 Award and the GPVC 2024 CPR Award
- Member of the WCPEC-IAC International Expert Committee since 2020
- President of the Korean Society for New and Renewable Energy (2021–2022) and the Korean Institute of Electrical and Electronic Material Engineers (2023)

Hamakawa Award



Jihye Gwak

Principal Researcher & Chief, Photovoltaics Research Department,
Korea Institute of Energy Research (KIER), Korea

> "For her outstanding contributions to advancing photovoltaic technologies and her visionary leadership in fostering technological innovation, industry collaboration, and international cooperation in the global PV community."

Key Achievements

- More than three decades of photovoltaic research spanning CIGS and kesterite (CZTS/CZTSe) thin-film solar cells, flexible devices, and perovskite/CIGS tandem solar cells
- Advanced low-cost, solution-based fabrication routes for chalcopyrite absorbers, including nanoparticle precursor inks and electrostatic spray deposition
- Holds more than 120 domestic and international patents and has an extensive track record of technology transfer to industry
- Led the establishment of the Center for Advanced Solar PV Technology (CAST) at KIER, an open-innovation platform with a 100 MW-scale module pilot line and solar-cell pilot facilities
- Led KIER's photovoltaic and renewable energy research as Head of the PV Research Division (2017–2020), Director of the Renewable Energy Research Institute (2020–2023), and Chief of the Photovoltaics Research Department (2023–present)

Contributions to the PVSEC Community

- Korean Representative to the Executive Committee of the IEA Photovoltaic Power Systems Programme (IEA PVPS) since 2024
- Session chair and speaker at past PVSEC conferences
- Member of the Korea Photovoltaic Society since 2009 and of the National Academy of Engineering of Korea since 2022
- Advisory member of the Presidential Committee on Carbon Neutrality and Green Growth (since 2022) and the Presidential Advisory Council on Science and Technology (2021–2022)



Xiaojing (Jeana) Hao

Scientia Professor, UNSW Sydney, Australia

> "For her outstanding contributions to sustained breakthroughs in the efficiency of wide-bandgap thin-film solar cells, addressing critical challenges for next-generation tandem solar cells."

Key Achievements

- Brought four different thin-film PV technologies to certified world-record status, including the first kesterite (CZTS) cell above 10% on a 1 cm^2 area and five kesterite records (current record 13.2%)
- Achieved certified world-record efficiencies for solution-processed wide-bandgap Cu(In,Ga)S_2 (15.95%, 2026) and antimony chalcogenide (10.7%, 2024) solar cells
- Co-established certified perovskite cell records of up to 27.3%; her patented ink additive enabled a certified 23.5% perovskite sub-module on an industrial pilot line
- Founder and Chief Scientist of the spin-off TANDEM ART, with patents developed and validated alongside industry partners including JinkoSolar and UtmoLight

Contributions to the PVSEC Community

- Connects the US, European and Asian PV communities through workshops she has organised, joint publications, and plenary, keynote and invited talks
- Keynote speaker at WCPEC-9 & PVSEC-37 (Daejeon, 2026)
- Scientific Technical Program Committee member of PVSEC-34 (China, 2023) and PVSEC-35 (Japan, 2024)
- Contributed more than 50 presentations at PVSEC conferences since 2007
- She and her group received multiple conference awards, including Best Poster Awards at PVSEC-17 (2007), PVSEC-33 and WCPEC-7, and a Best Oral Presentation Award at PVSEC-33

Hamakawa Award



Jin Young Kim

Professor, Seoul National University, Korea

> “For his pioneering contributions to the advancement of high-efficiency perovskite-based tandem solar cells and his distinguished leadership in the photovoltaics research community.”

Key Achievements

- Developed pure-iodide wide-bandgap perovskites that eliminate halide segregation, enabling 29.4% perovskite/Si tandems
- Achieved 30.05% perovskite/Si tandem cells using commercial PERC bottom cells through tailored self-assembled monolayers
- Co-led a certified 26.3% perovskite/CIGS tandem with KIST, recognized as a world record in 2025 and listed on NREL’s efficiency chart
- Holds domestic and international patents on tandem architectures and fabrication methods

Contributions to the PVSEC Community

- Organizing Committee member of PVSEC-30 & GPVC 2020 (Jeju)
- Delivered the tutorial lecture “Halide Perovskites for Photovoltaic Applications” at PVSEC-30 & GPVC 2020
- Invited speaker at several PVSEC conferences, and at GPVC 2025 with “Perovskite Tandems with Commercial Bottom Cells”
- Recipient of the GPVC Young Scientist Award (2023)

PVSEC Special Award

Hae-Seok Lee

Professor, Graduate School of Energy & Environment, Korea University, Korea



> “In recognition of his pioneering contributions to both the industrialization of PV and various educational programs, as well as his exceptional leadership in driving industrial advancement and collaboration within the PV community.”

Key Achievements

- Led industrial development of high-efficiency silicon solar cells (LDSE, PERC) as Managing Director of R&D at Shinsung Solar Energy (2008–2012), following thin-film work at LG Electronics
- Developed n-type TOPCon and HJT cells above 25% and perovskite/Si tandems above 30% with Hanwha Qcells and HD Hyundai Energy Solutions
- Led a Korea–Germany joint R&D project achieving perovskite/Si tandem cells above 26% with a novel silicide-based interlayer
- Pioneered PV–AI convergence research, applying machine learning to wafer-quality assessment and smart solar-cell manufacturing

Contributions to the PVSEC Community

- Chair of the Exhibition Committee for PVSEC-30 (2020), GPVC 2024–2025 and WCPEC-9 (2026)
- Vice-chair of the Technical Program Committee of PVSEC-25 (Busan, 2015)
- Executive Vice President of the Korea Photovoltaic Society (2026); committee member since 2012 and Chair of its Section Committee on Silicon Solar Cells and Modules (2018–2022)
- Coordination Chair of the 7th Korea–Japan Joint Workshop on PV (2018), and General Secretary of the 8th Korea–Japan (2022) and 9th Korea–China–Japan (2024) Joint Workshops on PV

PVSEC Special Award



Armin G. Aberle

Professor, National University of Singapore / Solar Energy Research Institute of Singapore (SERIS), Singapore

> “For his outstanding leadership in the Asia-Pacific PV community and his pioneering contributions to the development of industrial high-efficiency silicon solar cells.”

Key Achievements

- Pioneered crystalline-silicon surface passivation research, developing the concept of field-effect passivation and inventing the gate-enhanced solar cell
- Developed low-temperature remote-plasma silicon nitride films achieving record-low surface recombination velocities on Si wafers
- Co-founded SERIS at NUS in 2008, serving as Deputy CEO (2008–2012) and CEO (2012–2026)
- Co-authored more than 500 papers (over 22,000 citations) and supervised more than 50 PhD students

Contributions to the PVSEC Community

- Chairman of the 26th International Photovoltaic Science and Engineering Conference (PVSEC-26), Singapore, October 2016
- Member of the International Advisory Committee of the PVSEC series in the Asia-Pacific region since 2014
- Member of the International Advisory Committee of WCPEC-9 in Daejeon, Korea, since 2022
- Co-organiser of the Korea–Singapore–Malaysia Joint PV Symposium since 2023
- Member of the UNSW academic team that developed and taught the world’s first Bachelor of Engineering programme in Photovoltaic and Renewable Energy Engineering (1998–2008)

Soo-Jin Moon

Director, Pangyo R&D Center, Hanwha Solutions Qcells, Korea



> “For her contributions to the scalable manufacturing and real-world reliability of perovskite/silicon tandem solar cells, and her initiatives in exploring their new applications in space photovoltaics.”

Key Achievements

- Contributed to the sequential deposition method for high-performance perovskite solar cells (Nature, 2013) at EPFL and CSEM
- Demonstrated the first application of laser-scribing patterning to produce perovskite solar modules
- Directed the launch and operation of a pilot line for high-efficiency perovskite/silicon tandem solar cells
- Leads outdoor reliability demonstrations of tandem modules and new research into tandem cells for space photovoltaics

Contributions to the PVSEC Community

- Presents her group’s findings on perovskite/silicon tandem technology at prominent international PV conferences, providing technical references for researchers across the Asia-Pacific region
- Serves on industrial and governmental advisory committees for next-generation photovoltaics, contributing to national R&D planning and technology roadmaps
- Bridges academia and industry as a research leader at Hanwha Qcells, and has fostered a proactive intellectual-property culture at the Pangyo R&D Center
- Plans to share the center’s outdoor reliability data and space PV results at future PVSEC and WCPEC conferences

PVSEC Young Scientist Award



Jaeyeong Heo

Professor, Chonnam National University, Korea

> “For his innovative contributions to interface engineering and defect passivation in earth-abundant thin-film solar cells, particularly through atomic layer deposition strategies advancing tin monosulfide photovoltaics, and his emerging leadership in photovoltaic research, international collaboration, and the training of next-generation researchers.”

Key Achievements

- Advanced earth-abundant SnS solar cells, from phase-pure absorber growth to junction engineering and atomic-layer-deposited ZnSnO buffer layers
- Extended interface engineering to perovskite and monolithic perovskite/silicon tandem cells using hole-selective monolayers and sacrificial layers
- Authored 163 SCIE-indexed papers (h-index 42) and holds 10 granted patents, including one U.S. patent
- Completed four technology transfers to two Korean companies, CN1 and NEEL SCIENCES

Contributions to the PVSEC Community

- Conference Coordination Co-Chair of PVSEC-30 & GPVC 2020 (Jeju, Korea)
- General Secretary of Global Photovoltaic Conference (GPVC) for three consecutive years (2021-2023)
- Regular participant in PVSEC conferences since 2015, contributing to scientific exchange on thin-film PV materials, atomic layer deposition and interface engineering
- At PVSEC-25 (Busan, 2015), corresponding author of four presentations from his group on emerging absorbers, buffer layers and transparent conducting oxides
- Committed to international collaboration and the training of next-generation photovoltaic researchers through his group’s conference activities

Srinivasan Manickam

Assistant professor Senior Grade 2
School of Advanced Sciences
Vellore Institute of Technology, Vellore Tamilnadu, India



> “For his contributions to the indigenous development of high-efficiency silicon crystals for photovoltaics and his exceptional leadership in advancing the Asia-Pacific PV community.”

Key Achievements

- Leads India’s indigenous development of PV silicon crystal growth, including directional solidification furnaces for ingots up to 800 kg and a Czochralski crystal puller
- Pioneered recycling of end-of-life PV modules in India, recovering silicon, silver, copper, glass and EVA for reuse
- Led 19 national and international research projects worth USD 1.6 million, with collaborations across more than 20 countries
- Integrates modeling, experiments and machine learning for silicon growth, and develops hybrid PV–thermoelectric generators

Contributions to the PVSEC Community

- Led India’s successful bid to host PVSEC-40, presented as a committee member at PVSEC-36 (Bangkok, 2025)
- Indian-side organizer of the Korea–India PV Workshop held as part of WCPEC-9 (2026)
- Organized seven bilateral programmes with PVSEC committee members, including three Indo-Japan PV workshops with the Japan PV Society
- Participant in PVSEC since PVSEC-25 (Busan, 2015), including PVSEC-34 (Nagoya, 2023)
- Played a pivotal role in establishing the Indian PV Society, serving as its Secretary; Council Member of the International Organization for Crystal Growth and Secretary of the Indian Association for Crystal Growth

PVSEC Young Scientist Award



Jun Hong Noh

Professor, Korea University, Korea

“For his pioneering contributions and outstanding scientific leadership in advancing metal halide perovskite photovoltaics from fundamental materials research toward high-efficiency, stable, and scalable photovoltaic technologies.”

Key Achievements

- Established influential materials-design principles for perovskite solar cells at KRICT, including compositional engineering (Nature, 2015) and intramolecular exchange (Science, 2015), contributing to successive world-leading certified efficiencies
- Achieved a then-world-leading certified efficiency of 22.1% through iodide management, and developed photostable La-doped $BaSnO_3$ electrodes retaining about 93% performance after 1,000 hours (both Science, 2017)
- Pioneered a double-layered halide architecture with dopant-free P3HT (Nature, 2019) and discovered contact-triggered cationic interactions between 2D and 3D perovskites, reaching 26.25% efficiency (Nature Energy, 2026)
- Played a major role in a KRW 1.55 billion perovskite technology transfer (2016), and directs the Energy Innovation Research Center for Organic–Inorganic Hybrid Solar Cells, an industry–academia platform with Hanwha Solutions Qcells
- Recipient of the 2019 Presidential Young Scientist Award (Korea) and a Clarivate Highly Cited Researcher for eight consecutive years (2018–2025)

Contributions to the PVSEC Community

- Tutorial lecturer at PVSEC-25 (Busan, 2015), delivering “Inorganic-Organic Hybrid Halide Perovskite Solar Cells”
- Technical Program Committee member of PVSEC-30 (2020) for Topic T5: Perovskite Solar Cells
- Program Committee member of WCPEC-9 (Daejeon, 2026)
- Trains the next generation of PV researchers: his center produced 39-degree recipients and 35 employed graduates in 2022–2025, including eight now at Hanwha Solutions Qcells
- Member of the Young Korean Academy of Science and Technology (since 2023)

GPVC Award



Jin Hyeok Kim

Professor, Chonnam National University, Korea

“For his 20 years of dedication to compound thin-film and eco-friendly energy materials and device research and PV talent development, and for his leadership in bringing WCPEC-9 to Korea and elevating the international standing of KPVS and GPVC.”

Key Achievements

- Developed core technologies for kesterite (CZTS/CZTSSe) thin-film solar cells based on low-cost, earth-abundant elements, achieving world-class efficiencies through back-interface control and simultaneous cation substitution
- Secured core technologies for high-efficiency photoelectrochemical (PEC) electrodes and devices for solar-driven green hydrogen production
- Published widely in leading journals such as Advanced Materials, Nano Energy and ACS Nano, and led major national R&D and industry projects; received the Minister of Trade, Industry and Energy Award (2024)
- Has led the Opto-Electronic Thin Film Laboratory at Chonnam National University for 27 years, training researchers
- Member of the National Academy of Engineering of Korea (since 2022)

Contributions to the Photovoltaic Community

- 10th President of the Korea Photovoltaic Society (KPVS) in 2023, expanding the global sessions of GPVC and inviting leading international speakers
- Played a key role in bringing WCPEC-9 (2026) to Daejeon, making Korea the second Asian country after Japan to host the World Conference
- Secretary General of GPVC 2017–2019, bringing the conference to Gwangju and coordinating with Kimdaejung Convention Center
- Director and Vice President of KPVS since 2013, and planner of the GPVC series that turned the society’s domestic spring conference into an international meeting
- Recipient of the GPVC Young Scientist Award (2017) and the GPVC Daejoo Award (2021)

GPVC Daejoo Award



Jin Young Kim

Professor, Ulsan National Institute of Science and Technology (UNIST), Korea

> “For two decades of outstanding research on organic, quantum-dot and perovskite solar cells, and for his dedicated service to the Korea Photovoltaic Society.”

Key Achievements

- Realized the world’s first all-solution-processed tandem organic solar cell (Science, 2007) and introduced processing additives to optimize active-layer morphology (Nature Materials, 2007)
- Reached 24.02% perovskite efficiency (23.48% NREL-certified) by using an MACl additive to form pure-phase $FAPbI_3$ (Joule, 2019), and was the first to apply formate ($HCOO^-$) pseudo-halide anion engineering to perovskites (Nature, 2021)
- Published about 350 SCI(E) papers with about 40,000 citations (h-index 76) and holds more than 50 patents; Clarivate Highly Cited Researcher (2017–2018)
- Elected Member of the National Academy of Engineering of Korea (2026); his work was named one of Korea’s 100 Best National R&D Achievements (2022)

Contributions to the Photovoltaic Community

- Active member of KPVS since 2014 and editorial board member of Current Photovoltaic Research (CPR) since 2020
- Co-Chair of the QPOD program at GPVC 2021 and the 2021 KPVS Fall Conference, and Co-Chair of the Program Committee of the 2022 Fall Conference
- Member of the KPVS Academic Committee since 2022 and Chair of the QPOD Division (2023)
- Chair of the Program Committee of the 2026 KPVS Spring Conference



Yuzuru Ueda

Professor and Dean of the Faculty of Engineering,
Tokyo University of Science, Japan

> “For his outstanding contributions to photovoltaic systems research and to the Asia-Pacific and global PV community, and for his leadership in Korea–Japan PV exchange and cooperation.”

Key Achievements

- Has developed PV system performance analysis models for over two decades, contributing pioneering research findings across a wide range of PV technologies and applications.
- Quantitatively analyzed the performance and losses of more than 500 residential PV systems on a single low-voltage distribution network, and proposed measures against voltage rise caused by reverse power flow
- Analyzed the detailed performance and water-cooling effects of floating PV systems as early as 2008, before floating PV became a major large-scale application
- Conducts research on energy management and forecasting of PV generation and electricity demand using physical, statistical and machine-learning models

Contributions to the Photovoltaic Community

- Chair of the WCPEC International Advisory Committee and member of the PVSEC International Advisory Committee
- President of the Japan Photovoltaic Society (JPVS), 2024–2025
- Technical Program Chair of PVSEC-35 (2024) and General Chair of PVSEC-39 (2028)
- Led Korea–Japan PV exchange and cooperation, beginning with the Korea–Japan Joint Seminar on Photovoltaics
- Invited speaker at numerous international PV conferences held in Korea, including PVSEC and GPVC

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SG ENERGY CO., LTD.

Leading the BIPV (Building-Integrated Photovoltaics) Industry

Narakium Daejeon Government I 42kW

Through innovation in Building-Integrated Photovoltaics, SG ENERGY is shaping a sustainable future.

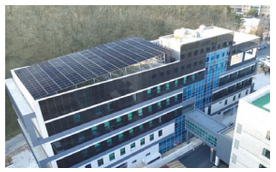
SG ENERGY, a specialist in BIPV, has maintained its position as Korea's No. 1 BIPV market leader for eight consecutive years since its establishment in 2019.
With technological excellence and a forward-looking approach, we continue to drive innovation and growth, striving to become a global leader in the BIPV industry.

- BIPV module manufacturing / sales / construction
- Renewable energy project business
- Government support / mandatory installation project
- Smart Energy New Industry

Cumulative production capacity : 25,350kW

Cumulative installation sites : 1,075 sites


I Daeryung Post Tower 8 448kW


I Daejeon Veterans Hospital 170kW


I Gwangju Science Museum 123kW


I Botanique Nonhyeon 153kW


I DITTO Data Center 427kW


I Siheung Water Treatment Plant 76kW


I IBK Hanam Data Center 28kW


I Korea East-West Power 49kW

Headquarters / Factory 34002, 55, Gukjegwahak 9-ro, Yuseong-gu, Daejeon, Republic of Korea
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Seoul Office 08592, #712, House D.Y. Wise Tower, 75-15,Gasan Digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea
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WORLD SOLAR CONGRESS
COMPANY PROFILE

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국내 최초 BIPV 수출 기업

한국에서 만든 건물일체형태양광(BIPV),
이제 세계 각국의 랜드마크를 밝힙니다.

혁신제품 지정 중소벤처기업부 · 고장 조기검출 BIPV 발전장치 · 2026 - 2029

싱가포르 글로벌 제약사 SANOFI · BIPV 60.7kW · 2024

GLOBAL EXPORT

한국에서 세계로




SINGAPORE

글로벌 제약사 SANOFI
G to G · 60.7kW · 2024.09


INDONESIA

인도네시아 중앙은행
G to G · 24.4kW · 2024.12

· 베트남 Quatest3 BIPV 33.3kW · AGC Asia Pacific 협약 · 사이공 하이테크파크(SHTP) 사업화

CORE TECHNOLOGY 아름답고 안전한 BIPV



01 컬러 BIPV
18가지 이상 컬러·패턴 구현. 2024·2025 연속 국내 최대 컬러 BIPV 제작·시공(강남데이터센터 900kW)



02 안전강화 시스템
무정전 고장 조기검출(NET 신기술)과 내진형 구조물(특허)로 화재·감전 걱정 없는 BIPV. 혁신제품 지정



03 비전스트라이프 · 필름
유리의 투명성을 유지하는 비전스트라이프, 이미지·문구까지 담는 필름 내장형 BIPV(TUV·UL 인증)

500+	100MW	21 · 39	TUV · UL · SNI
국내외 BIPV 납품 현장	연간 생산 능력	특허 · KS 인증	해외 인증 보유

BIPV No.1
SKSE

에스케이에스이(주) SKSE Inc.
본사 대전광역시 서구 월평북로 85, 3층 372호
공장·연구소 세종특별자치시 연동면 장욱진로 112
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홈페이지 바로가기

Why Qcells?

Total Energy Solution

Qcells 의 에너지 솔루션

한화그룹은 1952년 창립 이후, 성장을 멈추지 않았습니다.
20년 뒤에도 함께할 안정적인 파트너, 한화큐셀은 모듈·인버터·에너지 솔루션까지
한 번에 책임지는 **유일한 파트너**입니다.



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글로벌 Top Tier 모듈 제조 역량
PPA·VPP 솔루션까지 **직접 제공**하는
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국내 생산 기반 모듈·인버터·EPC·
PPA·VPP 운영까지 **기자재→시공**
컨설팅→에너지 솔루션 제공

검증된 신뢰

기업신용등급 AA-
표준 계약·정산과
데이터/AI 기반 리스크 관리

RE100 솔루션 직접 PPA 계약

한화큐셀만의 RE100컨설팅을 통해
신뢰할 수 있는 **PPA 계약 중심**
재생 에너지 제공

자체 AI 모델 운영

출력제어·변동 시대에 맞는
발전량 예측 알고리즘 및 실시간
VPP 최적 운영

국내 최대 발전 네트워크 보유

폭넓은 발전·수요 파트너 기반
빠른 매칭과 장기 계약
안정적 수익 파이프라인 확보

발전 사업의 다음, 새로운 수익 기회를 만들어보세요.



직접 PPA

상담 신청하기

RE100 달성을 위한
신뢰할수 있는
직접 PPA 파트너



VPP

상담 신청하기

데이터 전문가의 운영으로
발전 효율을 극대화하는
VPP 파트너

AP energy

Engineering a Sustainable Energy Future

As a renewable energy engineering and EPC company, AP Energy delivers innovative solutions for a cleaner and more sustainable future.



Our Expertise

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Engineering solutions optimized for performance, safety, and constructability.

Strategic Planning

From business development and feasibility studies to project planning and execution.

Sustainable Energy Solutions

Innovative solar solutions for land-based and floating PV applications.

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Business Areas

We create sustainable energy value through our diverse business areas and technical expertise.



Government Support Projects

We implement renewable energy support projects led by central and local governments, supplying solar power systems to a wide range of facilities including residential buildings, public institutions, and rural areas.

These projects contribute to local energy self-reliance and the expansion of renewable energy adoption.



Solar Power Development

We develop and build solar power plants by utilizing various sites such as idle land, rooftops, and parking lots.

From feasibility analysis, energy yield assessment, design, and equipment procurement to construction and permitting, we provide comprehensive EPC and project management services.



Floating Solar Development

We develop floating solar power plants by utilizing idle water surfaces, such as reservoirs and freshwater lakes.

We provide specialized EPC solutions with floating structures, mooring systems, and designs optimized for aquatic environments.

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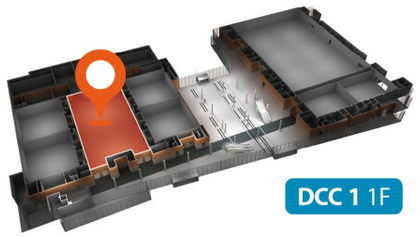
Conference Program

Social Events



Welcome Reception

Date/Time Sunday, 15 November 2026, 18:30-20:00
Venue 1F, Medium Conference Room lobby, DCC 1

- Menu: Standing Buffet with Beer
- For eligible participants only
  Admission requires a name badge marked "WR".

The Welcome Reception marks the beginning of the 9th World Conference on Photovoltaic Energy Conversion, bringing together distinguished guests, international delegates, and experts from around the world. It provides an opportunity for participants to connect, exchange ideas, and build networks ahead of the conference.

Opening Ceremony

Date/Time Monday, 16 November 2026, 10:00-10:45
Venue 2F, Grand Ballroom(201+202), DCC

The Opening Ceremony officially marks the opening of the 9th World Conference on Photovoltaic Energy Conversion. Bringing together distinguished leaders and photovoltaic experts from around the world, the ceremony features welcome addresses, congratulatory remarks, an introduction to the conference program, and celebratory performances. It provides an opportunity to reaffirm the importance of international cooperation and share a vision for the future of solar energy.





Exhibition Opening Ceremony

Date/Time Monday, 16 November 2026, 11:00-12:00
Venue 1st Floor (Main Entrance), DCC 2

The Exhibition Opening Ceremony officially inaugurates the WCPEC-9 exhibition, showcasing the latest technologies, products, and innovations in photovoltaic energy. It brings together leading companies, industry professionals, and researchers to explore new developments, exchange insights, and foster business and research collaboration.

WCPEC Awards Ceremony

Date/Time Monday, 16 November 2026, 13:00-14:00
Venue 2F, Grand Ballroom(201+202), DCC 1

The WCPEC Awards Ceremony recognizes outstanding achievements and contributions by researchers and experts to the advancement of photovoltaic science and technology. Through prestigious awards, including GPVC, PVSEC, and WCPEC awards, as well as commemorative lectures by award recipients, the ceremony highlights excellence and innovation in the global photovoltaic community.





Conference Dinner

Date/Time Tuesday, 17 November 2026, 19:00-20:30
Venue 3F, Convention Hall, ICC Hotel (5 mins walk from DCC)

- Menu: Course Menu with Korean Wine
- Special Performance Included
- For eligible participants only
  Admission requires a name badge marked "CD".

The Conference Dinner offers participants an opportunity to enjoy an evening of networking and fellowship in a welcoming atmosphere. Featuring a special course menu and Korean wine, the dinner provides an occasion for international delegates and experts to strengthen connections and exchange experiences beyond the conference sessions.

Closing Ceremony

Date/Time Friday, 20 November 2026, 11:00-12:30
Venue 2F, Grand Ballroom(201+202), DCC 1

The Closing Ceremony marks the conclusion of the 9th World Conference on Photovoltaic Energy Conversion. It provides an opportunity to reflect on key achievements and insights from the conference, recognize the contributions of participants, and celebrate the outcomes of international collaboration while looking ahead to the future of photovoltaic technology.



Tutorial Session

Date/Time Sunday, 15 November 2026, 09:00-18:30

Venue 3F, Room 301 (Session Room 7), DCC 1

Chair Ned Ekins-Daukes, University of New South Wales

Co-Chair Dong-Won Kang, Chung-Ang University
Jincheol Kim, Macquarie University

The WCPEC-9 Tutorial Program offers a comprehensive educational experience covering the fundamentals, recent advances, and future directions of key photovoltaic (PV) technologies. Continuing the long-standing tradition of tutorial lectures at previous WCPEC conferences, this year's program is designed as an engaging in-person learning experience led by internationally recognized experts.

Each tutorial features two complementary one-hour lectures delivered by internationally recognized experts, providing participants with both fundamental knowledge and the latest research perspectives in their respective fields. Together, these five tutorials provide a comprehensive overview of today's photovoltaic technologies, spanning fundamental device physics, emerging materials, advanced cell architectures, and PV system applications.

The Tutorial Program is intended for graduate students, early-career researchers, engineers, educators, and scientists who wish to strengthen their understanding of photovoltaic technologies or broaden their expertise into new research areas.

Participants will have the opportunity to:

- **Learn the scientific principles underlying today's leading PV technologies.**
- **Understand recent technological breakthroughs and future research directions.**
- **Gain insights from internationally recognized experts.**
- **Engage with tutorial lecturers through discussions and knowledge exchange.**

As one of the flagship educational programs of WCPEC-9, the Tutorial Program provides an excellent opportunity to build a strong technical foundation for the technical sessions throughout the conference. We warmly encourage all WCPEC-9 participants to join this unique learning experience.

Overall Program

Room 301 (DCC 1, 3F)	
09:00-10:00	Fundamentals of PV
10:00-12:00	Silicon Solar Cells
13:00-14:00	Perovskite Solar Cells
14:15-16:15	PV Modules and Systems
16:30-18:30	Tandem Solar Cells

Session 1: Fundamentals of PV (09:00-10:00)

Speakers **Ned Ekins-Daukes, University of New South Wales**
Fundamentals of Solar PV Power Conversion

This tutorial will cover the key principles of photovoltaic energy conversion. Starting from an idealised case, the theoretical limits of conversion efficiency are established. Then, the material requirements of the semiconductor absorber are considered to establish the properties needed for efficient energy conversion. The loss mechanisms in real materials are considered along with the standard techniques used to measure and understand these losses. Having established the fundamental operation of PV devices, a comparison of the mainstream and emerging technologies is presented, describing both the current status and challenges for these material groups.

Tutorial Session

Session 2: Silicon Solar Cells (10:00-12:00)	
Speakers	**Bram Hoex, University of New South Wales** New Architectures, New Failure Modes: A Tutorial on TOPCon and Heterojunction Reliability **Soo Min Kim, Korea Institute of Ceramic Engineering and Technology** Mathematical Foundations of Artificial Intelligence and Optimization Theories for Engineering Applications in Photovoltaics

Advanced Silicon Photovoltaics: Reliability and AI-Enabled Engineering

High-efficiency crystalline-silicon photovoltaics are entering a new era driven by advanced cell architectures, increasingly complex material interfaces, and data-driven approaches to device design and manufacturing.

As Tunnel Oxide Passivated Contact (TOPCon) and silicon heterojunction (HJT) technologies move rapidly into large-scale production, improvements in efficiency must be accompanied by a deeper understanding of reliability, degradation, and long-term field performance.

This tutorial will first examine reliability challenges in state-of-the-art silicon solar cells and modules, focusing on how passivation stacks, hydrogen, transparent conductive oxides, metallisation, encapsulation, and interconnection schemes influence degradation under ultraviolet exposure, moisture, heat, electrical bias, contamination, and thermal cycling, with particular attention to emerging failure modes such as UV- and hydrogen-related degradation, corrosion, and potential-induced degradation.

The tutorial will then introduce the mathematical foundations of artificial intelligence and optimization in an accessible framework, covering artificial neurons, activation functions, feed-forward neural networks, loss functions, gradient descent, and backpropagation, together with photovoltaic examples showing how machine learning can predict complex material and device properties and accelerate materials discovery and engineering optimization.

Together, the two lectures highlight how advanced reliability engineering and AI-enabled methodologies can support the development of the next generation of high-performance and durable photovoltaic technologies.

Session 3: Perovskite Solar Cells (13:00-14:00)	
Speakers	**Sang Il Seok, Ulsan National Institute of Science and Technology** Perovskite Solar Cells: Key Milestones from Hybrid Heterojunctions to Stable Tandem Photovoltaics

Perovskite Photovoltaics: From Materials and Interfaces to Tandem Technologies

Halide perovskite solar cells have emerged as one of the most rapidly advancing photovoltaic technologies, progressing in little more than a decade from early perovskite-sensitized devices to highly efficient single-junction cells, large-area modules, and diverse tandem architectures.

This tutorial will provide an integrated overview of the materials and device concepts underpinning this development, beginning with the ABX3 perovskite structure and the relationships between composition, bandgap, crystal phase, defect formation, and photovoltaic performance.

Key topics will include stabilization and crystallization of FAPbI3-based perovskites, solution-processed thin-film formation, charge-transport layers, self-assembled molecular layers, defect passivation, ion-migration suppression, and interface engineering, illustrating the field's evolution from compositional optimization toward sophisticated control of interfaces and operational stability.

The tutorial will then place these advances in the broader context of high-efficiency single-junction devices, large-area modules, emerging manufacturing capabilities, and perovskite-based tandem photovoltaics, including perovskite/silicon, all-perovskite, perovskite/organic, and perovskite/CIGS architectures.

Remaining challenges in stable wide-bandgap perovskites, scalable fabrication, long-term durability, and reliable tandem integration will be discussed to provide a perspective on the pathway from laboratory breakthroughs toward practical perovskite photovoltaic technologies.

Tutorial Session

Session 4: PV Modules and Systems (14:15-16:15)

Speakers

Ralph Gottschalg, Fraunhofer Center for Silicon Photovoltaics
PV Module Failure, Degradation and Cost of Quality

David Moser, Becquerel Institute Italia
Field Performance, Diagnostics and Bankability

PV Modules and Systems: Reliability, Risk, and Bankability

As photovoltaic deployment continues to expand worldwide, the long-term performance of PV modules and systems has become a critical determinant of energy yield, project economics, and investor confidence.

This tutorial will connect the physical mechanisms of module failure and degradation with the testing, modelling, and risk-management approaches required for reliable and bankable PV systems.

Major failure and degradation modes, their physical origins, and methods for identifying them through laboratory testing and field data will be discussed, with particular attention to the distinction between qualification of a module design and assessment of the reliability of specific products, production batches, bills of materials, mounting configurations, and operating environments.

The tutorial will also examine the limitations of conventional qualification and conformity assessment, highlighting the need for appropriately targeted testing that avoids both under-testing and unnecessary over-testing.

Reliability analysis will then be extended from module-level degradation to system- and project-level consequences through physics-based and statistical lifetime models that translate failure and degradation into warranty risk, energy-yield loss, intervention requirements, levelized cost of electricity, and cost-of-failure estimates.

By linking materials and module reliability with field performance and financial decision-making, the tutorial will provide a practical framework for understanding how effective reliability engineering supports quality assurance, risk management, and the bankability of photovoltaic assets.

Session 5: Tandem Solar Cells (16:30-18:30)

Speakers

Jin Young Kim, Seoul National University
Fundamentals of perovskite-based tandem solar cells

Christophe Ballif, EPFL / CSEM
Tandem and multi-junctions solar cells from III-V to perovskite-silicon devices: from theoretical limit to practical challenges.

Tandem Photovoltaics: From Fundamental Principles to Perovskite/Silicon Integration

Tandem solar cells offer a powerful route to overcome the efficiency limitations of conventional single-junction photovoltaics by combining absorbers with complementary bandgaps to utilize the solar spectrum more effectively.

This tutorial will introduce the fundamental principles of perovskite-based tandem photovoltaics, including complementary absorption, bandgap engineering, device architectures, current matching, interfacial recombination, optical and electrical losses, and device integration, providing a framework for understanding both their efficiency potential and key design challenges.

The tutorial will then focus on monolithic perovskite/silicon tandem solar cells and the materials and device engineering strategies that have driven their rapid performance improvements, including perovskite composition design, additive and interface engineering, defect passivation, charge-selective contacts, optical and electrical management, and integration with high-performance silicon bottom cells.

Recent progress in efficiency, operational stability, and scalability will be discussed together with the remaining challenges in long-term reliability, scalable manufacturing, and commercial deployment, providing a comprehensive perspective from the fundamental physics of tandem photovoltaics to the practical engineering of advanced perovskite/silicon tandem technologies.

[Tutorial] Fundamentals of PV

Chair(s) Dong-Won Kang(Chung-Ang University)

TS-F-1 **Fundamentals of Solar PV Power Conversion**
Ned Ekins-Daukes[1]*
[1]University of New South Wales, Australia

[Tutorial] Silicon Solar Cells

Chair(s) Dong-Won Kang(Chung-Ang University)

TS-S-1 **New Architectures, New Failure Modes: A Tutorial on TOPCon and Heterojunction Reliability**
Bram Hoex[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

TS-S-2 **Mathematical Foundations of Artificial Intelligence and Optimization Theories for Engineering Applications in Photovoltaics**
Soo Min Kim[1] *
[1]Department of AI-Convergence R&D Group, Korea Institue of Ceramic Engineering and Technology, Republic of Korea

[Tutorial] Perovskite Solar Cells

Chair(s) Jincheol Kim(Macquarie University)

TS-P-1 **Perovskite Solar Cells: Key Milestones from Hybrid Heterojunctions to Stable Tandem Photovoltaics**
SANG IL Seok[1] *
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of korea

[Tutorial] PV Modules and Systems

Chair(s) Jincheol Kim(Macquarie University)

TS-PV-1 **PV Module Failure, Degradation and Cost of Quality**
Ralph Gottschalg[1], David Moser[2] *
[1]Department of Fraunhofer Center for Silicon Photovoltaics CSP, Halle, Germany, Hochschule Anhalt, Köthen, Germany
[2]Department of Becquerel Institute Italia, Italy

TS-PV-2 **Field Performance, Diagnostics and Bankability**
David Moser[2] * , Ralph Gottschalg[1]
[1]Department of Fraunhofer Center for Silicon Photovoltaics CSP, Halle, Germany, Hochschule Anhalt, Köthen, Germany
[2]Department of Becquerel Institute Italia, Italy

[Tutorial] Tandem Solar Cells

Chair(s) Jincheol Kim(Macquarie University)

TS-T-1 **Fundamentals of Perovskite-based Tandem Solar Cells**
Jin Young Kim[1] *
[1]Department of Materials Science and Engineering, Seoul National University, Republic of korea

TS-T-2 **Tandem and multi-junctions solar cells from III-V to perovskite-silicon devices: from theoretical limit to practical challenges.**
Christophe Ballif[1]*
[1]EPFL / CSEM, Switzerland

Technical Tour

Overview

Date/TIme Nov 18, 2026 (Wed), 14:00–18:30

* WCPEC-9 registrants only · Free of charge · English

Schedule

14:00	Assembly (attendance check)
14:30	Departure (boarding)
14:30–17:30	Site visit
~18:30	Return to DCC

Meeting Point



DCC 1st Exhibition Hall, 1F Lobby (Tour Desk)

Notes

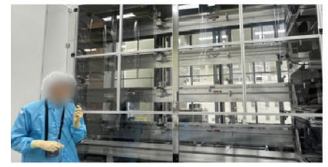
※ Participants who fail to arrive before the departure time may be cancelled without prior notice.
※ End times vary by course.
※ Duplicate registrations are not permitted.

Course 1

Center for Advanced Solar PV Technology (CAST) at KIER

A course featuring the Si and Si-based tandem fabrication line.





Course 2





SG Energy & SJ AM

A course covering the full process of BIPV systems, from R&D to manufacturing, supply, and installation, and an automated color glass production line using inorganic coating, from raw glass processing to coating and tempering.

Course 3

Korea Research Institute of Chemical Technology (KRICT)

A course to visit a large-area perovskite solar cell and module fabrication laboratory.





Technical Program

Technical Program

Overview

The WCPEC-9 Technical Program brings together leading experts from academia and industry to showcase the latest advances in photovoltaic science and technology. Covering topics from next-generation solar cells and module reliability to systems integration and sustainability, the program highlights both cutting-edge research and practical applications. By uniting the global PV community, WCPEC-9 provides a unique platform for knowledge exchange, collaboration, and shaping the future of solar energy.

Technical Program Areas

Area Description

Area 1. Tandem Solar Cells and Modules

Area Chair *Seung Yeop Myong, Korea Institute of Energy Technology Evaluation and Planning*

Area 1 (Tandem Solar Cells and Modules) collects all presentations which deal with next-generation ultrahigh efficient double-junction (and/or triple-junction) solar cells and modules using perovskite technologies. The whole spectrum of emerging tandem technologies is divided into 3 subareas,which address typical issues and fields of technology development including the improvement of efficiency, long-term stability, and scale-up for early commercialization.

Area 1-1 : c-Si Based Tandem Solar Cells and Modules

Chair: Hae-Seok Lee, Korea University

Tandem and triple-junction solar cell structures consist of a perovskite top cell and a crystalline silicon bottom cell (e.g., PVSK/Si and PVSK/ PVSK/Si): theoretical and analysis studies, innovation in materials, processing, and manufacturing technologies, manufacturing up-scaling up to a module level.

Area 1-2 : Thin-Film Based Tandem Solar Cells and Modules

Chair: Jin Young Kim, Seoul National University

Tandem and triple-junction solar cell structures consist of a perovskite top cell and a thin-film based bottom cell (e.g., PVSK/PVSK, PVSK/CIGS, PVSK/CZTS, PVSK/OPV, PVSK/CdTe, etc.): theoretical and analysis studies, innovation in materials, processing, and manufacturing technologies, manufacturing up-scaling up to a module level.

Area 1-3 : Reliability for Tandem Solar Cells and Modules

Chair: Seungkyu Ahn, Korea Institute of Energy Research

Contributions which focus on reliability for tandem solar cells and modules including electrical performance measurement technologies for tandem solar cells and modules, or tandem module encapsulation and reliability: pre-conditioning, efficiency and temperature-coefficient measurement technologies, outdoor field test results to propose global standards.

Area 2 : Silicon Solar PV Technology

Area Chair *Jun-Sik Cho, Korea Institute of Energy Research*
Area co-chairs *Hee-eun Song, Korea Institute of Energy Research*

Area 2 focuses on the science and engineering of crystalline silicon photovoltaics, which form the backbone of global PV production. It spans the entire innovation chain—from materials and wafer processing, to advanced cell architectures, manufacturing integration, and detailed characterization and modeling. The area highlights technological progress that enhances the efficiency, productivity, and reliability of silicon photovoltaics while promoting industrial scalability and sustainability. By linking fundamental research with industrial implementation, Area 2 serves as a central platform for advancing mainstream silicon solar-cell technology.

Area 2-1 : Silicon Materials and Processing

Chair: Kwanyong Seo, Ulsan National Institute of Science and Technology

Area 2-1 covers advances in crystalline silicon materials and wafer engineering for photovoltaic applications. It includes ingot and wafer formation (Cz, FZ), control of oxygen and metal impurities, defect passivation, and carrier-lifetime enhancement through thermal or laser-based treatments. It also addresses hydrogenation, LID/LeTID mitigation, surface texturing and slicing techniques, as well as material and component technologies that contribute to cell-performance improvement—such as metallic pastes, electrode materials, conductive coatings, and surface-treatment chemicals.

Area 2-2 : Innovative Silicon PV Cell Architectures and Interfaces

Chair: Yoonmook Kang, Korea University / Sang Hee Lee, Korea Institute of Energy Research

Area 2-2 focuses on innovative cell designs and interfacial engineering for high-efficiency silicon solar cells. It includes PERC, PERT, TOPCon, HJT, and IBC/HPBC architectures, selective-contact technologies, interface passivation, contact-resistance reduction, optical management within the cell, and metallization innovations such as Ag reduction or Cu plating. Emphasis is placed on structural and physical innovations that drive performance improvements in single-junction silicon devices.

Area 2-3 : Manufacturing and Process Integration of Silicon Photovoltaics

Chair: Young-Joo Eo, Korea Institute of Energy Research / Yongki Min, SHINSUNG E&G

Area 2-3 emphasizes mass-production and process-integration technologies for silicon solar cells. It covers the full manufacturing line from wafering to cell fabrication, focusing on productivity improvement, yield optimization, and process stability. Topics include automated production lines, inline metrology and feedback control, low-temperature metallization, high-throughput diffusion and passivation, scaling for large-format wafers (M10, G12), and resource- and energy-efficient processes. It also includes research on solar-cell processing equipment—such as diffusion furnaces, passivation and thermal systems, metallization and plating tools, and inline inspection and control systems—addressing performance enhancement, optimization, and reliability. In addition, the session welcomes studies on manufacturing challenges and industrial implementation, including process reliability, equipment optimization, and material compatibility.

Area 2-4 : Characterization, Modeling, and Analysis

Chair: Ka-hyun Kim, Chungbuk National University

Area 2-4 covers the physical and electrical characterization of silicon wafers and cells. It includes studies using PL/EL imaging, TRPL, EBIC, DLTS, and TCAD modeling for defect and lifetime analysis, interface evaluation, and reliability phenomena such as LID, LeTID, and PID at the cell or wafer level. Module- or system-level reliability and field diagnostics belong to Session 5.

Technical Program

Area 3 : Perovskite Solar PV Technology

Area Chair *Jangwon Seo, Korea Advanced Institute of Science and Technology*
Area co-chairs *Matthew Davis, Swansea University / Ulrich Paetzold, Karlsruher Institute of Technology*

Advances in Perovskite Solar Cells & Modules – From Fundamentals to Scalable Applications. Perovskite solar cells (PSCs) have emerged as one of the most promising next-generation photovoltaic technologies, offering an attractive combination of high efficiency, tunable optoelectronic properties, and compatibility with low-cost, solution-based processing. Area 3 is designed to provide a comprehensive view of the current state and future direction of PSC research and development, covering both cutting-edge fundamental research and innovations in scalability and application.

Area 3-1 : Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps

Chair: Jun Hong Noh, Korea University

Area 3-1 focuses on the in-depth study of PSCs with wide, mid, and narrow bandgaps, addressing their fundamental material properties, advanced analytical techniques, thin-film fabrication, interface and additive engineering, charge-transporting materials, and the development of high-efficiency & stability of PSCs. This sub-area aims to deepen understanding of the core mechanisms driving performance and stability in next-generation PSCs.

Area 3-2 : Perovskite Solar Cells & Modules: Advances in Scalability and Reliability

Chair: Dong Suk Kim, Ulsan National Institute of Science and Technology

Area 3-2 highlights recent progress in the scalability and reliability of perovskite solar cells & modules. Topics include large-area processing (both wet and dry methods), module fabrication, long-term and outdoor stability, and strategies for sustainability such as eco-friendly materials, recycling, and cost-effective production.

Area 3-3 : Perovskite Solar Cells & Modules: Advances in Application Versatility

Chair: Jin-Wook Lee, Seoul National University

Area 3-3 highlights recent progress in application versatility of perovskite solar cells & modules. Topics include a wide range of applications, including flexible, lightweight, semi-transparent, indoor, and space-based PSCs.

Area 4 : Thin-Film and Emerging Solar PV Technology

Area Chair *Kihwan Kim, Korea Institute of Energy Research*
Area co-chairs *Monica Morales Masis, Eindhoven Univeristy /*
Bart Vermang, Interuniversity Microelectronics Centre

Area 4 invites presentations that highlight recent progress in thin film solar cell technologies. Submissions may focus on chalcogenide thin film photovoltaics (e.g., CIGS, CZTS, CdTe), solution-processed photovoltaics (including organic and quantum dot-based devices), and novel or emerging materials aimed at next-generation performance and environmental compatibility.

Area 4-1 : Recent Advances in Chalcogenide Thin Film PV Technology

Chair: Kihwan Kim, Korea Institute of Energy Research

Area 4-1 invites contributions that explore recent advancements in chalcogenide-based thin film photovoltaics, including materials such as CIGS ($Cu(In,Ga)Se_2$), CdTe, and their variants. Topics may range from fundamental studies of material properties and device physics to innovations in fabrication techniques and practical applications of chalcogenide thin film technologies.

Area 4-2 : Innovations in Solution-Processed Solar PV: Organic and Quantum Dot Photovoltaics

Chair: Sung-Yeon Jang, Ulsan National Institute of Science and Technology

Area 4-2 will explore recent advances in solution-processed solar cell technologies, focusing on organic photovoltaics, dye-sensitized solar cells, and quantum dot solar cells. Emphasis will be placed on innovative material designs, interfacial engineering, device optimization, and scalable fabrication techniques aimed at enhancing device efficiency and stability. The sub-area invites contributions covering fundamental studies, novel characterization methods, and practical approaches toward commercialization.

Area 4-3 : Emerging Materials for Next-generation Thin Film PV Technology

Chair: Dae-Hwan Kim, Daegu Gyeongbuk Institute of Science&Technology

Area 4-3 aims to explore new materials and novel device architectures in the field of thin film photovoltaics. Discussions will focus on emerging and sustainable absorber candidates for the post-perovskite era, including CZTS ($Cu_2ZnSn(S,Se)_4$)-based kesterites, Sb-/Bi-based binary compounds, as well as a wide range of innovative organic–inorganic hybrid materials.

Technical Program

Area 5 : PV Module and System Engineering, Integrated/Applied PV

Area Chair *Sung Ju Tark, Research Institute of Industrial Science & Technology*
Area co-chairs *Ulrike Jahn, Fraunhofer Center for Silicon Photovoltaics / Eduardo Roman, Tecnalia*

Area 5 covers the full engineering lifecycle of photovoltaic (PV) modules and systems from design and deployment to operation, performance optimization, and long-term reliability across diverse environments and applications. We welcome contributions on system integration and balance-of-system (BoS) components; resource assessment and data-driven forecasting; performance monitoring; reliability and accelerated testing; and integrated/applied PV such as building-integrated PV (BIPV), agricultural PV (Agri-PV), and floating PV (FPV). We particularly encourage submissions that highlight installation strategies, O&M best practices, standards, and safety.

Area 5-1 : PV System Design, Integration and Resource Assessment

Chair: Soohyun Bae, Korea Institute of Energy Research

Area 5-1 focuses on the engineering design, integration, and optimization of photovoltaic (PV) systems and balance of system (BoS) components, along with methods for performance monitoring, operation, and data-driven resource assessment and forecasting that ensure reliable and efficient system operation across various applications. It encompasses engineering design and installation aspects such as system and module configuration, as well as the integration of inverters, module-level power electronics (MLPE), and other power-electronic units that enable both grid-support and grid-forming functionalities. The discussion also covers BoS components and infrastructure, including mounting and tracking systems, cabling, connectors, junction boxes, switchgear, grounding, and lightning-protection systems, all designed to meet mechanical integrity and safety compliance standards. Furthermore, it highlights operation and performance management practices, focusing on operation and maintenance (O&M), performance optimization, predictive maintenance, diagnostic analytics, safety, and cybersecurity, supported by case studies addressing diverse climate zones and site-specific constraints. Lastly, it includes resource assessment and forecasting through the use of satellite and ground-based irradiance data, real-time monitoring architectures, and predictive modeling tools that support system-level performance modeling, grid-integration studies, and long-term energy planning.

Area 5-2 : Reliability and Performance of PV Modules and Systems

Chair: Kyu-Jin Kim, Korea Conformity Laboratories

Area 5-2 focuses on the reliability, durability, and long-term performance of photovoltaic (PV) modules and systems, addressing both technical and operational aspects that influence sustained performance. It encompasses accelerated testing and type-approval methods designed to evaluate module and system robustness, as well as performance modeling and risk quantification at multiple system levels. The discussion also extends to the reliability of balance of system (BoS) components, including connectors, cables, junction boxes, inverters, trackers, and other moving parts critical to overall system stability. Additionally, it highlights the use of advanced diagnostic and inspection techniques such as infrared (IR), electroluminescence (EL), and photoluminescence (PL) imaging, alongside emerging tools like drone and robotic inspection and AI-driven image-based analytics. These technologies play a key role in predictive maintenance, fault detection, and field performance assessment, thereby enhancing the long-term reliability and efficiency of PV systems.

Area 5-3 : Building-Integrated and Applied PV (BIPV, VIPV, IPPV)

Chair: Jun-Tae Kim, Kongju National University

Area 5-3 focuses on photovoltaic (PV) systems integrated into buildings, covering both building-integrated (BIPV) and building-applied (BAPV) approaches. It includes product and system design—such as varied form factors, colored or flexible modules, and curved-surface applications—along with installation methods and compliance with building and fire codes. Key considerations include weatherproofing, structural safety, acoustics, and glare control. The sub-area also addresses architectural integration related to aesthetics, daylighting, thermal comfort, and interactions with building energy management systems (BEMS) or heat-pump coupling. Additionally, it examines urban applications like balcony PV, retrofits, permitting, and stakeholder engagement, as well as infrastructure-integrated (IIPV) and vehicle-integrated PV (VIPV) solutions that expand solar use across diverse built environments.

Area 5-4 : PV Deployment in Diverse Environments (Agri-PV and Floating PV)

Chair: Jae-hak Jung, Yeungnam University

Area 5-4 examines photovoltaic (PV) systems integrated with agriculture and aquatic environments—Agri-PV and Floating PV (FPV). It explores how solar energy generation can coexist with farming and water management, improving land and water use efficiency while maintaining environmental balance. The sub-area includes system configurations such as elevated, greenhouse, vertical, tracking, and floating designs, along with key considerations in structure, anchoring, electrical safety, and maintenance. Performance and environmental aspects—like land/water-equivalent ratio, energy yield, light use, crop productivity, and aquatic ecosystem health—are also discussed. The session highlights site assessment, risk management, and relevant standards, as well as replicable designs and case studies across various climates, crops, and water bodies to showcase scalable, sustainable PV applications.

Technical Program

Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area Chair *Jong Hyeok Park, Yonsei University*
Area co-chairs *Uk Sim, Sungkyunkwan University / David Moser, Becquerel Institute Italia*

Area 6 focuses on frontier and upstream research that broadens the scientific and technological scope of photovoltaics (PV). It explores how PV technology evolves beyond electricity generation toward new physical, chemical, and digital applications. Topics include PV-driven chemical and thermal conversion, high-performance photovoltaics for space and extreme environments, and AI-enabled innovation in PV materials, devices, and operation. Unlike "PV in the Energy Transition," which addresses system-level integration and flexibility, this area highlights fundamental and cross-disciplinary advances in PV science and technology that enable the next generation of solar applications.

Area 6-1 : PV-driven Energy Conversion and Hybrid Concepts

Chair: Jungkyu Kim, Sungkyunkwan University

Area 6-1 explores how photovoltaic (PV) technology can enable electrochemical, photoelectrocatalytic, and thermal processes to create new pathways for renewable energy conversion and utilization. It includes PV-assisted electrochemical and photoelectrocatalytic systems such as water splitting and CO_2 reduction, as well as PV–thermal and PV–battery hybrid architectures that enhance overall energy efficiency. The discussion also highlights the development of advanced absorber and interface materials that improve photoelectrochemical coupling, alongside materials and surface engineering strategies that enhance charge transfer and chemical stability. Additionally, it examines emerging PV–chemistry integration concepts aimed at producing renewable fuels and value-added chemicals.

Area 6-2 : PV for Space and Extreme Environments

Chair: Jongsung Park, Gyeongsang National University

Area 6-2 focuses on advanced photovoltaic (PV) devices and systems engineered to operate under extreme environmental conditions, including space, high-radiation, and high-temperature settings. It covers the development of high-efficiency, radiation-resistant, and ultra-light PV technologies tailored for space missions, as well as performance optimization under vacuum, thermal, and radiation stress. The discussion includes innovations in encapsulation, coating, and substrate materials that enhance mechanical strength and radiation resilience, along with durability testing and degradation analysis to ensure long-term reliability. Additionally, it explores how insights gained from extraterrestrial PV research can inform and drive advancements in terrestrial solar technologies.

Area 6-3 : AI and Data-driven PV Innovation

Chair: Yonghyun Kim, Korea Photonics Technology Institute

Area 6-3 highlights the growing role of artificial intelligence (AI) and data-driven tools in accelerating innovation across photovoltaic (PV) research, design, and manufacturing. It includes the use of machine learning for PV materials discovery and device optimization, as well as AI-guided process control and fault detection to enhance manufacturing efficiency and reliability. Data-driven modeling is applied to understand material degradation, defect dynamics, and lifetime prediction, supporting improved performance and durability. The discussion also covers digital platforms that streamline PV research and development, enabling faster design-to-deployment workflows. Furthermore, it emphasizes the integration of materials informatics into PV science and device engineering to advance next-generation solar technologies.

Area 7 : PV in the Energy Transition

Area Chair *Kang Won Kim, Korea Energy Agency*
Area co-chairs *Christian Breyer, Lappeenranta-Lahti University of Technology / Kirstin Alberi, National Laboratory of the Rockies*

Area 7 addresses the multifaceted role of photovoltaics (PV) in advancing the global energy transition and the Sustainable Development Goals (SDGs). It covers policy frameworks, economic and financial mechanisms, industrial strategies and supply-chain resilience, and sustainability pathways including circular economy and life cycle assessment. Special emphasis is placed on building flexible and resilient power systems while also considering social and environmental aspects of PV deployment.Through policy design, industrial practice, and international cooperation, this session highlights how photovoltaics can accelerate climate action, enhance energy security, and contribute to a just and inclusive transition.

Area 7-1 : Policy, Economics and Finance for the PV Transition

Chair: Seoung Moon Lee, Korea Energy Economics Institute

Area 7-1 explores the policy, economic, and financial factors enabling global photovoltaic (PV) deployment for a just and inclusive energy transition. It focuses on policy frameworks and governance models aligned with the Sustainable Development Goals (SDGs), as well as market design, competitiveness, and cost trends shaping regional adoption. Key themes include economic instruments and transition modeling for carbon neutrality, along with investment mechanisms such as power purchase agreements (PPAs), green bonds, and blended finance to enhance scalability and reduce risk. It also emphasizes equitable energy access, community participation, and socio-economic inclusion in expanding PV markets.

Area 7-2 : Industry Strategies and Geo-economics of Solar Manufacturing

Chair: Byeong In(Ethan) Park, Korea Energy Agency

Area 7-2 examines the industrial and geopolitical aspects of global solar manufacturing, emphasizing supply-chain resilience, innovation, and international collaboration. It addresses the security of raw materials and critical components, industrial competition, and regional strategies shaping major PV markets. The discussion also considers the effects of trade policies and geopolitical dynamics on global supply stability. Furthermore, it highlights advances in high-efficiency and low-carbon manufacturing processes and underscores the importance of international cooperation to build sustainable, resilient, and interconnected PV manufacturing networks worldwide.

Area 7-3 : Flexible and Resilient Energy Systems with PV Integration

Chair: Seungwan Kim, Korea Institute of Energy Technology

Area 7-3 focuses on integrating photovoltaic (PV) systems into flexible, reliable, and decarbonized power systems. It examines strategies to manage PV intermittency and improve grid stability and efficiency through both technical and policy measures. Key enablers include energy storage, demand response, and smart-grid technologies that enable real-time balancing and system flexibility. The discussion also highlights the role of distributed generation and microgrids in enhancing local energy resilience, as well as sector coupling and cross-sectoral decarbonization strategies that support deeper renewable integration. Finally, it emphasizes market design improvements and policy frameworks that strengthen adaptability, reliability, and sustainability in modern power systems.

Area 7-4 : Sustainability and Circular Pathways

Chair: Jin Seok Lee, Korea Institute of Energy Research

Area 7-4 focuses on environmental and social sustainability across the photovoltaic (PV) lifecycle, emphasizing circular economy models, recycling, and ESG-based standards. It includes life-cycle assessment (LCA) of PV modules and materials, along with strategies for recycling and resource recovery to minimize waste and environmental impact. Efforts to reduce the carbon footprint of PV manufacturing are also highlighted, alongside the development of sustainability metrics and frameworks that strengthen long-term environmental and social accountability within the global solar industry.

Conference Program

DAY	Day 0 (Pre-Conference day)		DAY 1 | Monday, 16 Nov.						DAY 2 | Tuesday 17, Nov,							DAY 3
ROOM	Session Room 6 (204-205)	Session Room 7 (301)	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 7 (301)	Session Room 1 (101-102)
08:30-09:00									2B0.3 A2-1	The 2nd Asia-Africa (A^2) Joint PV Symposium	4B0.3 A4-1	5B0.3 A5-1	3B0.3 A3-1	6B0.3 A6-2		2C0.6 A2-2, 2-4
09:00-09:30		Tutorial PV Modules and Systems														
09:30-09:50																
09:50-10:00									Break							Break
10:00-10:30		Tutorial Tandem Solar Cells					Opening Ceremony		2B0.4 A2-3	The 2nd Asia-Africa (A^2) Joint PV Symposium	4B0.4 A4-1	5B0.4 A5-1	3B0.4 A3-1	6B0.4 A6-2		2C0.7 A2-2
10:30-11:00																
11:00-11:20							Exhibition Opening Ceremony (DCC2)									
11:20-11:30									Break							Break
11:30-12:00													Plenary Session 2			
12:00-12:30			Break													
12:30-13:00									Break							Break
13:00-13:30	The 10th Korea-China-Japan Joint Workshop on Photovoltaics	Tutorial Tandem Solar Cells					WCPEC Awards Ceremony									
13:30-14:00									2B0.5 A2-2	The 2nd Asia-Africa (A^2) Joint PV Symposium	4B0.5 A4-2	5B0.5 A5-1	3B0.5 A3-1	6B0.5 A6-3	Daejeon Speacial Session: Powering Daejeon's Future with Solar Energy	2C0.8 A2-3
14:00-14:30							Plenary Session 1									
14:30-14:50	The 10th Korea-China-Japan Joint Workshop on Photovoltaics															
14:50-15:00			Break						Break		Break					Break
15:00-15:30			2A0.1 A2-1	IEA PVPS Workshop: Asia in Focus - Market & Policy	4A0.1 A4-1	5A0.1 A5-3	3A0.1 A3-1	6A0.1 A6-2	Next-Generation BIPV Forum		EU-Korea Cooperation : PV R&I Challenges	5B0.6 A5-1	3B0.6 A3-1	6B0.6 A6-3		From Belgium to Beyond Europe : How Does PV Innovation Move from Lab to Industry?
15:30-16:00	The 10th Korea-China-Japan Joint Workshop on Photovoltaics									The 2nd Asia-Africa (A^2) Joint PV Symposium						
16:00-16:20																
16:20-16:30			Break		Break							Break				
16:30-17:00	The 10th Korea-China-Japan Joint Workshop on Photovoltaics	Tutorial PV Modules and Systems	2A0.2 A2-2		4A0.2 A4-1	5A0.2 A5-3	3A0.2 A3-1	6A0.2 A6-2				5B0.7 A5-1, 5-2	3B0.7 A3-1, 3-2, 3-3			
17:00-17:30																
17:30-17:50																
17:50-18:00			Break						Break							
18:00-18:30			Poster Session (DCC 2, Exhibition Hall)						Poster Session (DCC 2, Exhibition Hall)							
18:30-19:00	Welcome Reception (1F Medium Conference Room Lobby, DCC1)															
19:00-20:00									Conference Dinner (3F Convention Hall, ICC Hotel)							

Wednesday 18, Nov.						DAY 4 | Thursday 19, Nov.						DAY 5 | Friday 20, Nov.					
Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 7 (301)	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 3 (105-106)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 4 (107-108)	Session Room 5 (201-202)	Session Room 6 (204-205)
7C0.1 A7-1	4C0.6 A4-2	5C0.8 A5-2	3C0.8 A3-2, 3-3		1C0.1 A1-2	2D0.9 A2-2	7D0.4 A7-1, 7-2	4D0.11 A4-3	5D0.13 A5-3	1D0.6 A1-1	Asia-Europe Emerging Materials for Thin Film Solar Cells	2E0.14 A2-4	7E0.9 A7-3, 7-4	5E0.18 A5-3, 5-4	1E0.11 A1-1	6E0.11 A6-1
Break				Special Session (Closed Session)	Break	Break						Break				
7C0.2 A7-1	4C0.7 A4-2	5C0.9 A5-2	3C0.9 A3-2, 3-3		1C0.2 A1-2	2D0.10 A2-3	7D0.5 [Industry Forum I] A7-3	4D0.12 A4-3	5D0.14 A5-3	1D0.7 A1-1	Asia-Europe Emerging Materials for Thin Film Solar Cells				Plenary Session 5	
Break					Break	Break						Break				
			Plenary Session 3							Plenary Session 4					Closing Ceremony	
Women In PV	Break					Break										
7C0.3 A7-2	4C0.8 A4-3	5C0.10 A5-2	3C0.10 A3-2, 3-3	6C0.7 A6-3	1C0.3 A1-1	2D0.11 (KOR-IND) A2	7D0.6 [Industry Forum II] A7-3	Asia-Europe Emerging Materials for Thin Film Solar Cells	5D0.15 A5-4	1D0.8 A1-1	6D0.9 A6-1					
Break						Break										
The 4th Korea-Singapore-Malaysia Joint PV Symposium	4C0.9 A4-3	5C0.11 A5-2	3C0.11 A3-2, 3-3	6C0.8 A6-1	1C0.4 A1-3	2D0.12 (KOR-IND) A2	7D0.7 A7-4		5D0.16 A5-4	1D0.9 A1-1, 1-3	6D0.10 A6-1					
Break						Break										
The 4th Korea-Singapore-Malaysia Joint PV Symposium	4C0.10 A4-3	5C0.12 A5-2	3C0.12 A3-2, 3-3		1C0.5 A1-2, 1-3	2D0.13 (KOR-IND) A2	7D0.8 A7-3	IEA PVPS Workshop: Task 12 - PV Sustainability	5D0.17 A5-3, 5-4	1D0.10 A1-3						
						Break										
						Poster Session (DCC 2, Exhibition Hall)										

Area 1 : Tandem Solar Cells and Modules
- Area 1-1 : c-Si Based Tandem Solar Cells and Modules
- Area 1-2 : Thin-Film Based Tandem Solar Cells and Modules
- Area 1-3 : Reliability for Tandem Solar Cells and Modules

Area 2 : Silicon Solar PV Technology
- Area 2-1 : Silicon materials and processing
- Area 2-2 : Innovative Silicon PV Cell Architectures and Interfaces
- Area 2-3 : Manufacturing and Process Integration of Silicon Photovoltaics
- Area 2-4 : Characterization, Modeling, and Analysis

Area 3 : Perovskite Solar PV Technology
- Area 3-1 : Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps
- Area 3-2 : Perovskite Solar Cells & Modules: Advances in Scalability and Reliability
- Area 3-3 : Perovskite Solar Cells & Modules: Advances in Application Versatility

Area 4 : Thin-Film and Emerging Solar PV Technology
- Area 4-1 : Recent Advances in Chalcogenide Thin Film PV Technology
- Area 4-2 : Innovations in Solution-processed Solar PV: Organic and Quantum Dot Photovoltaics
- Area 4-3 : Emerging Materials for Next-generation Thin Film PV Technology

Area 5 : PV Module and System Engineering, Integrated/Applied PV
- Area 5-1 : PV System Design, Integration and Resource Assessment
- Area 5-2 : Reliability and Performance of PV Modules and Systems
- Area 5-3 : Building-Integrated and Applied PV (BIPV, VIPV, IPPV)
- Area 5-4 : PV Deployment in Diverse Environments (Agri-PV and Floating PV)

Area 6 : PV Expansion: Frontiers in PhotovoltaicScience and Technology
- Area 6-1 : PV-driven Energy Conversion and Hybrid Concepts
- Area 6-2 : PV for Space and Extreme Environments
- Area 6-3 : AI and Data-driven PV Innovation

Area 7 : PV in the Energy Transition
- Area 7-1 : Policy, Economics and Finance for the PV Transition
- Area 7-2 : Industry Strategies and Geo-economics of Solar Manufacturing
- Area 7-3 : Flexible and Resilient Energy Systems with PV Integration
- Area 7-4 : Sustainability and Circular Pathways

Session Code

Area — 1 A O . 1 — Session Number

Day Codes: **A** Monday, 16, Nov. **B** Tuesday, 17, Nov. **C** Wednesday, 18, Nov. **D** Thursday, 19, Nov. **E** Friday, 20, Nov.

Session Type: **PL** Plenary Session **O** Oral Session **P** Poster Session

Plenary Speakers



Plenary Session 01

Pl.1	Perovskite Solar Cells: From Discovery to a New Era of Photovoltaics
Date & Place	Nov. 16 (Mon), 14:00-15:00, Session Room 5 (201+202), DCC 1
Chair(s).	Jae-Joon Lee

Prof. Nam-Gyu Park

Sungkyunkwan University

Professional Career

1996.3 - 1997.5: France ICMCB-CNRS, post-doc
1997.6 - 1999.12: National Renewable Energy Laboratory (NREL), post-doc
2000.1 - 2005.11: ETRI, Korea, Senior Researcher
2005.12 - 2009.6: KIST, Korea, Director of Solar Cell Research Center
2009.7 – 2026.2: Sungkyunkwan University, School of Chemical Engineering, Professor/SKKU Fellow
2017.1 – current: KAST (Korean Academy of Science and Technology), Fellow
2022.3 – 2027.2: SKKU Institute of Energy Science and Technology (SIEST), Director
2026.7 – current: SKKU National Lab for Intelligent Energy Solution Technology (SIEST), Director
2026.3 -: Sungkyunkwan University, Lifetime Distinguished University Professor



Plenary Session 02

Pl.2	Where is Solar Heading? Silicon versus Perovskite
Date & Place	Nov. 17 (Tue), 11:30-12:30, Session Room 5 (201+202), DCC 1
Chair(s).	Karin Hinzer

Prof. Martin A. Green

University of New South Wales

Professional Career

1999-present: Scientia Professor, UNSW Sydney.
2010-present: Permanent Honorary Chairman, SNEC Power Expo, Shanghai (world's largest PV Exhibition; 3,100 exhibitors & >400,000 visitors);
1993-2026: Editor-in-Chief, Wiley Journal, "Progress in Photovoltaics".
2013-2023: Founding Director, Australian Centre for Advanced Photovoltaics; Headquartered UNSW.
2018-2023: Chief Scientist, Jiangsu Sunport;
2010-2015: Honorary President, Guodian New Energy Research Institute, Beijing (Guodian is a "big 5" power company in China);
2005-2013: Chief Scientist, Suntech Power.
2002-2012: Executive Research Director, ARC Photovoltaics Centre of Excellence, UNSW.
2004-2010: Research Director, CSG Solar Pty Ltd.;
2001-2009: Australian Gov't Federation Fellow.
2000-2003: Director, ARC Special Research Centre for Third Generation Photovoltaics.
1995-2003: Director (Research), Pacific Solar P/L
1990-1999: Founding Director, Photovoltaics Special Research Centre growing to >80 academic, research/ support staff & postgraduate students. Forerunner to School of Photovoltaic & Renewable Energy Engineering.



Plenary Session 03

Pl.3	Perovskite solar cells: A game changer for the future of photovoltaic solar energy
Date & Place	Nov. 18 (Wed), 11:30-12:30, Session Room 5 (201+202), DCC 1
Chair(s).	Delfina Muñoz

Prof. Henry Snaith

University of Oxford

Professional Career

06/2021-present The Binks Professor of Renewable Energy
10/2015-06/2021 Professor of Physics, Group Leader; Photovoltaics and Optoelectronics device group
10/2012-9/2015 Reader in Physics, Group Leader: ; Photovoltaics and Optoelectronics device group
10/2007–9/2012 RCUK Fellow/Lecturer in Photovoltaics, Group Leader, Senior Research Fellow, Jesus College



Plenary Session 04

Pl.4	Development of High-Efficiency Silicon-Based Photovoltaic Technology at LONGi
Date & Place	Nov. 19 (Thu), 11:30-12:30, Session Room 5 (201+202), DCC 1
Chair(s).	Kaining Ding

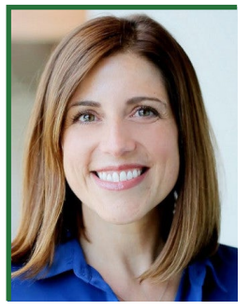
Dr. Xixiang Xu

LONGi Green Energy Technology Co., Ltd.

Professional Career

2023.04-present: Chief Scientist of LONGi Green Energy Technology Co., Ltd.
2022.04-present: Vice president of LONGi Central R&D Institute.
2020.4-2022.3: Vice president of R&D, Xi'an LONGi Leye Photovoltaic Technology Co., Ltd.
2011.7-2020.1: SVP, Chief scientist and CTO (Chief Technology Officer) of Hanergy Solar Group/Hanergy Thin Film Power Group, Chengdu, China
2010.9-2011.7: Sr. vice president technology & chief scientist, GS-Solar (Fujian) Company Ltd., Quanzhou, China
2007.1-2010.9: Sr. scientist and manager/director in R&D Department, United Solar Ovonic, Troy, Michigan, USA
1997-2006.12: Sr./staff engineer in Portland Technology Development, Intel Corporation, Hillsboro, Oregon, USA
1991-1996: Research scientist in R&D Department, ECD/United Solar Systems, Troy, Michigan
1985-1989: Lecturer/Associate Prof., Dept. of Physics, Lanzhou Univ
2004-2020: Adjunct professor and industrial supervisor in Lanzhou University, Beijing University of Technology, Sichuan University and Shaanxi Normal University

Plenary Speakers



Plenary Session 05

Pl.5	Building the Next Generation of Solar: Qcells' Path from Silicon Innovation to Perovskite-Silicon Tandem
Date & Place	Nov. 20 (Fri), 10:00-11:00, Session Room 5 (201+202), DCC 1
Chair(s).	Haeseok Lee

Dr. Danielle Merfeld

Hanwha Qcells

Professional Career

2023-Present, Global Chief Technology Officer, Hanwha Qcells, Seoul, Korea
2017-2023, Chief Technology Officer, GE Renewable Energy, Paris, France
2015-2017, GM GE Global Research Headquarters, GE, Niskayuna, New York, USA
2012-2015, Senior Executive Technology Director, Electrical Technologies & Systems, GE Global Research, Niskayuna, NY, USA
2011-2012, GM Solar Technologies, GE Power, Schenectady, NY, USA
2007-2011, Solar Platform Leader, GE Corporate R&D, Niskayuna, NY, USA
1999-2007, Lab Manager, Semiconductor Technologies, GE Corporate R&D, Niskayuna, NY, USA

Keynote Speakers



Area 1 : Tandem Solar PV Technology
Area 1-1 : c-Si Based Tandem Solar Cells and Modules

Stefan W. Glunz
Professor
Fraunhofer ISE / University of Freiburg
Germany



Area 1 : Tandem Solar PV Technology
Area 1-2 : Thin-Film Based Tandem Solar Cells and Modules

Jin Young Kim
Professor
Seoul National University
Republic of Korea



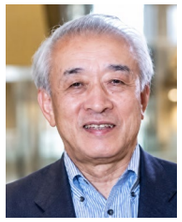
Area 1 : Tandem Solar PV Technology
Area 1-1 : c-Si Based Tandem Solar Cells and Modules

Christophe Ballif
Professor
EPFL / CSEM
Switzerland



Area 2 : Silicon Solar PV Technology
Area 2-3 : Manufacturing and Process Integration of Silicon Photovoltaics

Menglei Xu
Doctor
Zhejiang Jinko Solar Co., Ltd
China



Area 2 : Silicon Solar PV Technology
Area 2-2 : Innovative Silicon PV Cell Architectures and Interfaces

Masafumi Yamaguchi
Professor
Toyota Technological Institute
Japan



Area 2 : Silicon Solar PV Technology
Area 2-3 : Manufacturing and Process Integration of Silicon Photovoltaics

Taejun Kim
Doctor
HD Hyundai Energy Solution
Republic of Korea



Area 3 : Perovskite Solar PV Technology
Area 3-1 : Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps

Michael Graetzel
Professor
École Polytechnique Fédérale de Lausanne
Switzerland



Area 3 : Perovskite Solar PV Technology
Area 3-1 : Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps

Sang Il Seok
Professor
Ulsan National Institute of Science and Technology
Republic of Korea



Area 3 : Perovskite Solar PV Technology
Area 3-1 : Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps

Tsutomu Miyasaka
Professor
Toin University of Yokohama
Japan



Area 3 : Perovskite Solar PV Technology
Area 3-1 : Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps

Prashant Kamat
Professor
University of Notre Dame
United States of America

Keynote Speakers



Area 3 : Perovskite Solar PV Technology

Area 3-2 : Perovskite Solar Cells & Modules: Advances in Scalability and Reliability

Jingbi You
Professor
Institute of Semiconductors, Chinese Academy of Sciences
China



Area 4 : Thin-Film and Emerging Solar PV Technology

Area 4-1 : Recent Advances in Chalcogenide Thin Film PV Technology

Xudong Xiao
Professor
Wuhan University
China



Area 4 : Thin-Film and Emerging Solar PV Technology

Area 4-2 : Innovations in Solution-processed Solar PV: Organic and Quantum Dot Photovoltaics

Gang Li
Professor
The Hong Kong Polytechnic University
China



Area 4 : Thin-Film and Emerging Solar PV Technology

Area 4-3 : Emerging Materials for Next-generation Thin Film PV Technology

Xiaojing Hao
Professor
University of New South Wales
Australia



Area 5 : PV Module and System Engineering, Integrated/Applied PV

Area 5-3 : Building-Integrated and Applied PV (BIPV, VIPV, IPPV)

Francesco Frontini
Professor
University of Applied Sciences and Arts of Southern Switzerland
Switzerland



Area 5 : PV Module and System Engineering, Integrated/Applied PV

Area 5-1 : PV System Design, Integration and Resource Assessment

Meng Tao
Professor
Arizona State University
United States of America



Area 5 : PV Module and System Engineering, Integrated/Applied PV

Area 5-2 : Reliability and Performance of PV Modules and Systems

Eszter Voroshazi
Doctor
CEA-Liten
France



Area 5 : PV Module and System Engineering, Integrated/Applied PV

Area 5-3 : Building-Integrated and Applied PV (BIPV, VIPV, IPPV)

Matthieu Despeisse
Doctor
Centre Suisse d'Électronique et de Microtechnique SA
Switzerland



Area 5 : PV Module and System Engineering, Integrated/Applied PV

Area 5-4 : PV Deployment in Diverse Environments (Agri-PV and Floating PV)

Leonardo Micheli
Professor
Sapienza University of Rome
Italy



Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area 6-2 : PV for Space and Extreme Environments

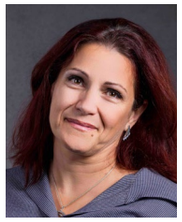
Randy J. Ellingson
Professor
The University of Toledo
United States of America



Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area 6-2 : PV for Space and Extreme Environments

Steven Ringel
Professor
The Ohio State University
United States of America



Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area 6-3 : AI and Data-driven PV Innovation

Veronica Bermudez
Doctor
BERBETIN
France



Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area 6-1 : PV-driven Energy Conversion and Hybrid Concepts

Lianzhou Wang
Professor
The Hong Kong Polytechnic University
Hong Kong



Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area 6-1 : PV-driven Energy Conversion and Hybrid Concepts

Ho Won Jang
Professor
Seoul National University
Republic of Korea



Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Area 6-1 : PV-driven Energy Conversion and Hybrid Concepts

Ji-Wook Jang
Professor
Ulsan National Institute of Science and Technology
Republic of Korea



Area 7 : PV in the Energy Transition

Arnulf Jaeger Waldau
Doctor
European Commission, Joint Research Centre
Italy



Area 7 : PV in the Energy Transition

Daniel Mugnier
Doctor
International Energy Agency Photovoltaic Power Systems Programme
France



Area 7 : PV in the Energy Transition

Christian Breyer
Professor
Lappeenranta–Lahti University of Technology
Finland



Area 7 : PV in the Energy Transition

Peter Fath
Doctor
RCT Power
Germany

Invited Speakers

Area 1. Tandem Solar Cells and Modules

Name	Affiliation	Session
Hairen Tan	Nanjing University	Nov 18 (Wed) 08:30-08:50
Atsushi Wakamiya	Kyoto University	Nov 18 (Wed) 08:50-09:10
Donghoe Kim	Korea University	Nov 18 (Wed) 09:10-09:30
Yi Hou	National University of Singapore	Nov 18 (Wed) 10:30-10:50
Xinbo Yang	Soochow University	Nov 18 (Wed) 14:00-14:20
Anita Ho-Baillie	The University of Sydney	Nov 18 (Wed) 14:20-14:40
David McMeekin	University of Oxford	Nov 18 (Wed) 14:40-15:00
Ralph Gottschalg	Fraunhofer CSP & Hochschule Anhalt	Nov 18 (Wed) 15:00-15:20
Chengying Shi	Zhejiang HJE Co Ltd	Nov 18 (Wed) 15:20-15:40
Quentin Jeangros	CSEM	Nov 18 (Wed) 16:30-16:50
Waqas Zia	WAVELABS | Eternal Sun	Nov 18 (Wed) 16:50-17:10
Marco Ruiz	Hanwha Q CELLS GmbH	Nov 19 (Thu)08:30-08:50
Mengmeng Chen	Toshiba Corporation	Nov 19 (Thu) 08:50-09:10
Edward Crossland	Oxford Photovoltaics ltd	Nov 19 (Thu) 10:30-10:50
Mingzhen Liu	University of Electronic Science and Technology of China	Nov 19 (Thu) 11:05-11:25
Makoto Konagai	Tokyo City University	Nov 19 (Thu) 13:30-13:50
Sephin Cho	HD Hyundai Energy Solutions	Nov 19 (Thu) 13:50-14:10
Bernd Stannowski	Helmholtz Zentrum Berlin	Nov 19 (Thu) 16:30-16:50
Helen Bristow	CEA	Nov 19 (Thu) 16:50-17:10

Area 2 : Silicon Solar PV Technology

Name	Affiliation	Session
Dhamrin Marwan	The University of Osaka / Toyo Aluminium K.K.	Nov 16 (Mon) 15:00-15:20
Milind Kulkarni	Renaissance Solar and Electronic Materials	Nov 16 (Mon) 15:20-15:40
Yasuyoshi Kurokawa	Kansai University	Nov 16 (Mon) 16:30-16:50
Olindo Isabella	Delft University of Technology	Nov 16 (Mon) 16:50-17:10
Alexander Eberst	Forschungszentrum Jülich GmbH	Nov 17 (Tue) 08:30-08:50
Vick Peng	Suzhou Maxwell	Nov 17 (Tue) 10:30-10:50
Hisham Nasser	ODTU GUNAM	Nov 17 (Tue) 13:30-13:50
Thien Truong	US National Laboratory of the Rockies (NLR)	Nov 18 (Wed) 08:30-08:50
Wei Long	Tongwei Co Ltd	Nov 18 (Wed) 08:50-09:10
Haeseok Lee	Korea University	Nov 18 (Wed) 10:30-10:50
Maxime Babics	CEA-Liten	Nov 19 (Thu) 08:30-08:50
Yongseok Jun	Korea University	Nov 19 (Thu) 08:50-09:10
Young Woo Ok	Georgia Institute of Technology	Nov 19 (Thu) 10:30-10:50
Vineet Saini	Department of Science and Technology, Government of India	Nov 19 (Thu) 13:30-13:50
Sang Hee Lee	Korea Institute of Energy Research	Nov 19 (Thu) 13:50-14:10
Srinivasan Manickam	Vellore Institute of Technology	Nov 19 (Thu) 14:10-14:30
Young Joo Eo	Korea Institute of Energy Research	Nov 19 (Thu) 14:30-14:50
Vamsi K Komarala	Indian Institute of Technology Delhi	Nov 19 (Thu) 15:00-15:20
Ian Lee	Korea Energy Service	Nov 19 (Thu) 15:20-15:40
S. Saravanan	EMMVEE Solar Group	Nov 19 (Thu) 15:40-16:00
Ka-Hyun Kim	Chungbuk National University	Nov 19 (Thu) 16:00-16:20
Chandan Banerjee	Ministry of New and Renewable Energy	Nov 19 (Thu) 16:30-16:50
Kwanyong Seo	Ulsan National Institute of Science and Technology	Nov 19 (Thu) 16:50-17:10
Avinash Kumar	Raana Semiconductors Private Ltd	Nov 19 (Thu) 17:10-17:30
Hyung Jun Song	Seoul National Univ of Science and Technology	Nov 19 (Thu) 17:30-17:50
Rabin Basnet	The Australian National University	Nov 20 (Fri) 08:30-08:50
Noritaka Usami	Nagoya University	Nov 20 (Fri) 08:50-09:10

Invited Speakers

Area 3 : Perovskite Solar PV Technology

Name	Affiliation	Session
Jingjing Xue	Zhejiang University	Nov 16 (Mon) 15:30-15:50
Aranzazu Aguirre	IMEC	Nov 16 (Mon) 17:00-17:20
Shuzi Hayase	The University of Electro-Communications	Nov 17 (Tue) 09:00-09:20
Yana Vaynzof	Leibniz Institute for Solid State and Materials Research Dresden	Nov 17 (Tue) 10:00-10:20
Jangwon Seo	Korea Advanced Institute of Science and Technology	Nov 17 (Tue) 10:20-10:40
Hiroshi Segawa	The University of Tokyo	Nov 17 (Tue) 10:40-11:00
Jinhui Tong	Wuhan University of Technology	Nov 17 (Tue) 11:00-11:20
Hendrik J Bolink	University of Valencia	Nov 17 (Tue) 14:00-14:20
Jun Hong Noh	Korea University	Nov 17 (Tue) 15:00-15:20
Rui Wang	Westlake University	Nov 17 (Tue) 15:20-15:40
Beat Ruhstaller	Fluxim Inc and Zurich University of Applied Sciences	Nov 17 (Tue) 15:40-16:00
Paola Vivo	Tampere University	Nov 17 (Tue) 16:00-16:20
Arno Hendrikus Marie Smets	Delft University of Technology	Nov 17 (Tue) 16:30-16:50
Jin-Wook Lee	Seoul National University	Nov 17 (Tue) 16:50-17:10
Michael Saliba	University of Stuttgart	Nov 17 (Tue) 17:10-17:30
Dong Suk Kim	Ulsan National Institute of Science and Technology	Nov 18 (Wed) 09:00-09:20
Jin Young Kim	Ulsan National Institute of Science and Technology	Nov 18 (Wed) 10:00-10:20
Byunghong Lee	Hyundai Motor Group	Nov 18 (Wed) 10:20-10:40
Taisuke Matsui	Panasonic Holdings Corporation	Nov 18 (Wed) 10:40-11:00
Hyun Suk Jung	Sungkyunkwan University	Nov 18 (Wed) 13:30-13:50
Zonghao Liu	Huazhong University of Science and Technology	Nov 18 (Wed) 13:50-14:10
Young Yun Kim	Korea Research Institute of Chemical Technology	Nov 18 (Wed) 14:10-14:30
Kasparas Rakstys	Kaunas University of Technology	Nov 18 (Wed) 14:30-14:50
Seigo Ito	University of Hyogo	Nov 18 (Wed) 15:00-15:20
Ulrich Paetzold	Karlsruhe Institute of Technology	Nov 18 (Wed) 16:30-16:50

Area 4 : Thin-Film and Emerging Solar PV Technology

Name	Affiliation	Session
Hiroki Sugimoto	PXP Corporation	Nov 16 (Mon) 15:30-15:50
William Shafarman	Unversity of Delaware	Nov 16 (Mon) 16:30-16:50
Kaiwen Sun	University Of New South Wales	Nov 16 (Mon) 16:50-17:10
Bart Vermang	Hasselt University and imec	Nov 17 (Tue) 08:30-08:50
Inchan Hwang	Korea Institute of Energy Research	Nov 17 (Tue) 10:00-10:20
Jianyu Yuan	Soochow University	Nov 17 (Tue) 13:30-13:50
Qing Shen	The University of Electro Communications	Nov 17 (Tue) 13:50-14:10
Tom Wu	The Hong Kong Polytechnic University	Nov 18 (Wed) 09:00 09:20
BongSoo Kim	Ulsan National Institute of Science and Technology	Nov 18 (Wed) 10:00-10:20
Byungha Shin	KAIST	Nov 18 (Wed) 14:00-14:20
Stela Canulescu	Technical University of Denmark DTU	Nov 18 (Wed) 15:00-15:20
Qingbo Meng	Institute of Physics, Chinese Academy of Sciences	Nov 18 (Wed) 16:30-16:50
Mirjana Dimitrievska	Swiss Federal Laboratories for Materials Science and Technology	Nov 19 (Thu) 08:30-08:50
Maarja Grossberg-Kuusk	Tallinn University of Technology	Nov 19 (Thu) 10:00-10:20

Area 5 : PV Module and System Engineering, Integrated/Applied PV

Name	Affiliation	Session
Rebecca Yang	University Of Melbourne	Nov 16 (Mon) 15:30-15:50
Simon Boddaert	Scientific and Technical Building Center	Nov 16 (Mon) 16:30-16:50
Kyewon Park	Korean Fire Protection Association	Nov 16 (Mon) 16:50-17:10
Manajit Sengupta	National Laboratory of the Rockies	Nov 17 (Tue) 08:30-08:50
Yu Xie	National Laboratory of the Rockies	Nov 17 (Tue) 10:00-10:20
Jan Remund	Meteotest AG	Nov 17 (Tue) 14:00-14:20
Marios Theristis	Sandia National Laboratories	Nov 17 (Tue) 16:30-16:50

Invited Speakers

Area 5 : PV Module and System Engineering, Integrated/Applied PV

Name	Affiliation	Session
Jaewon Oh	University of North Carolina at Charlotte	Nov 17 (Tue) 16:50-17:10
Young Joo Eo	Korea Institute of Energy Research	Nov 18 (Wed) 09:00-09:20
Yaowanee Sangpongsanont	CES Solar Cells Testing Center and King Mongkut's University of Technology Thonburi	Nov 18 (Wed) 10:00-10:20
Giosue Maugeri	RSE S.p.A.	Nov 18 (Wed) 13:30-13:50
Praveen Ramamurthy	Indian Institute of Science	Nov 18 (Wed) 15:00-15:20
Anil Kottantharayil	Indian Institute of Technology Bombay	Nov 18 (Wed) 16:30-16:50
Carlos Clement	National University of Singapore	Nov 19 (Thu) 09:00-09:20
Momir Tabakovic	FH Technikum Wien	Nov 19 (Thu) 10:00-10:20
Janghee Kang	Scotra Co. Ltd.	Nov 19 (Thu) 14:00-14:20
Matthias MeierGruell	Research Center Juelich	Nov 19 (Thu) 15:00-15:20
Changsub WON	Mirae Solar Power Co. ,Ltd. and Sungkyunkwan University	Nov 19 (Thu) 15:20-15:40
Eduardo Román	TECNALIA RESEARCH & INNOVATION	Nov 19 (Thu) 16:30-16:50
Ian Lee	Korea Energy Service	Nov 19 (Thu) 16:50-17:10
Cheolho Kim	Sejong International Co Ltd	Nov 19 (Thu) 17:10-17:30
Hisashi Ishii	LIXIL Corporation	Nov 19 (Thu) 17:30-17:50
Yong Jun Park	Hanbit Innotech Co Ltd	Nov 20 (Fri) 08:30-08:50
Hyeongno Lee	GrandSun Technology Co., Ltd	Nov 20 (Fri) 08:50-09:10
Duhwan Lee	Eco-Friendly Technology Group, EnergyX Inc.	Nov 20 (Fri) 09:10-09:30
Thomas Reindl	Solar Energy Research Institute of Singapore (SERIS)	Nov 20 (Fri)09:30-09:50

Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Name	Affiliation	Session
Felix Lang	University of Potsdam	Nov 16 (Mon) 15:30-15:50
Jessica Yajie Jiang	University of New South Wales	Nov 16 (Mon) 16:30-16:50
Jongsung Park	Gyeongsang National University	Nov 16 (Mon) 16:50-17:10

Area 6 : PV Expansion: Frontiers in Photovoltaic Science and Technology

Name	Affiliation	Session
Seth Hubbard	Rochester Institute of Technology	Nov 17 (Tue) 09:30-09:50
Jae Sung Yun	University of Surrey	Nov 17 (Tue)10:30-10:50
Jinyoun Cho	Umicore	Nov 17 (Tue) 10:50-11:10
David Moser	Becquerel Institute Italia	Nov 17 (Tue) 15:00-15:20
Sanghan Lee	Gwangju Institute of Science and Technology	Nov 18 (Wed) 15:00-15:20
Suil In	Daegu Gyeongbuk Institute of Science and Technology	Nov 18 (Wed) 15:20-15:40
Hajime Suzuki	Kyoto University	Nov 19 (Thu) 14:00-14:20
Tsubasa Mikie	Hiroshima University	Nov 19 (Thu) 15:00-15:20
Heechae Choi	Xian Jiaotong Liverpool University	Nov 19 (Thu) 15:20-15:40

Area 7 : PV in the Energy Transition

Name	Affiliation	Session
Seung Heon Oh	Kim&Chang Law office	Nov 18 (Wed) 09:00-09:20
Kihong Kim	Hanwha Qcells	Nov 18 (Wed) 10:30-10:50
Youru Tan	BloombergNEF	Nov 18 (Wed) 13:30-13:50
Muhammad Mustafa Amjad	Renewables First	Nov 18 (Wed) 13:50-14:10
Chang Ki Kim	Korea Institute of Energy Research	Nov 19 (Thu) 09:00-09:20
Shigeru Niki	New Energy and Industrial Technology Development Organization	Nov 19 (Thu) 09:20-09:40
Izumi Kaizuka	RTS Corporation	Nov 19 (Thu) 09:40-09:55
Benjamin Damiani	Cherry Street Energy	Nov 19 (Thu) 13:30-13:50
Jan Remund	Meteotest AG	Nov 19 (Thu) 13:50-14:10
Seung Wan Kim	Korea Institute of Energy Technology	Nov 19 (Thu) 14:10-14:30
Meng Tao	Arizona State University	Nov 19 (Thu) 15:10-15:30
Claudia Buerbop-Lutz	Forschungszentrum Jülich GmbH	Nov 20 (Fri) 08:30-08:50
Laurie Burnham	Sandia National Laboratories	Nov 20 (Fri) 08:50-09:10

Technical Program

Monday, November 16

Time	ROOM		
	Session Room 1(101-102)	Session Room 2(103)	Session Room 3(105-106)
8:30			
9:00			
9:30			
10:00			
10:30			
11:00			
11:30			
12:00	Break		
12:30			
13:00			
13:30			
14:00			
14:30			
15:00	**15:00-16:30** **2AO.1** Silicon Ingot Growth, Texturing and Sustainable Manufacturing	**15:00-18:00** IEA PVPS Workshop: Asia in Focus - Market & Policy	**15:00-16:30** **4AO.1** Narrow-Bandgap Chalcogenides for Tandem Applications
15:30			
16:00			
16:30	**16:30 - 18:00** **2AO.2** Passivating Contacts and Interface Engineering		**16:30 - 18:00** **4AO.2** Fundamentals and Characterization of Chalcogenide Absorbers
17:00			
17:30			
18:00	Poster Session		
18:30			
19:00			
19:30			

ROOM		
Session Room 4(107-108)	Session Room 5(201-202)	Session Room 6(204-205)
	10:00-11:00 Opening Ceremony	
	11:00-12:00 Exhibition Opening Ceremony	
Break		
	13:00-14:00 WCPEC-9 Awards Ceremony	
	14:00-14:50 Plenary Session 1	
15:00-16:30 **5AO.1** Advances in BIPV Technology and Integration	**15:00-16:30** **3AO.1** Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Materials and Interface Engineering	**15:00-16:30** **6AO.1** PV for Space and Extreme Environments
16:30 - 18:00 **5AO.2** BIPV Deployment: Performance, Safety, and Acceptance	**16:30 - 18:00** **3AO.2** Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Scalable Interface and Contact Engineering	**16:30 - 18:00** **6AO.2** PV for Space and Extreme Environments
Poster Session		

Technical Program

Monday, November 16

Plenary Session 1

Chair(s) Jae-Joon Lee (Dongguk University)

Pl.1 14:00-15:00

Perovskite Solar Cells: From Discovery to a New Era of Photovoltaics

Nam-Gyu Park[1] *

[1]Department of Chemical Engineering, Sungkyunkwan University National Lab for Intelligent Energy Solution Technology, Sungkyunkwan University, Republic of Korea

2AO.1 Silicon Ingot Growth, Texturing and Sustainable Manufacturing

Chair(s) Delfina Muñoz(CEA-Liten)
Milind Kulkarni(Renaissance Solar and Electronic Materials)

2AO.1-IV-1 15:00-15:20

The Post-Silver Era of Photovoltaics: Materials, Processes, and Industrial Readiness

Dhamrin Marwan[1] *

[1]Department of Graduate School of Engineering, The University of Osaka, Toyo Aluminium KK, Japan

2AO.1-IV-2 15:20-15:40

Path to $0.015/kWh LCOE in India by Solar Manufacturing and Technology Roadmap Execution

Milind S Kulkarni*

2AO.1-OP-3 15:40-15:55

Machine Learning Applications in Czochralski Silicon Crystal Growth

Chenyun Pan[1] , Xuefeng Han[1] * , Shuai Yuan[1] , Xuegong Yu[1] , Deren Yang[1]

[1]Department of State Key Laboratory of Silicon and Advanced Semiconductor Materials and School of Materials Science, Zhejiang University, China

2AO.1-OP-4 15:55-16:10

Sustainable Alkaline Etching Strategies for Reflectivity Reduction and Efficiency Enhancement in Monocrystalline Silicon Solar Cells

Rithika Muralidharan[1] , Mariyappan Raman[2] , Srinivasan Manickam[2] * , Tamilmani Vairapperumal[1]

[1]Department of Chemistry, Sri Sivasubramaniya Nadar College of Engineering, India
[2]Department of Physics, Sri Sivasubramaniya Nadar College of Engineering, India

2AO.1-OP-5 16:10-16:25

Synergistic Effect of Oxide Plasma Treatment and Double-Layer Structure on P+ Poly-Si Passivating Contact

Shuo Deng[1] * , Jichun Ye[2] , Martin Green[1] , Ning Song[1] , Lina Ye[2] , Zunke Liu[2] , Yalun Cai[1] , Shona McNab1 , Fiarce Rougieux[1] , Yuhao Cheng[1] , Zichen Wang[1] , Songyan Yin[3] , Lizhi Sun[1] , Yihao Zhou[1] , Yuheng Zeng[2]

[1]Department of SPREE, University of New South Wales, Australia
[2]Department of Ningbo Institute of Material Technology and Engineering, Chinese Academy of Sciences, China
[3]Department of Surface Analysis Laboratory, University of New South Wales, Australia

2AO.2 Passivating Contacts and Interface Engineering

Chair(s) Rabin Basnet(The Australian National University),
Hisham Nasser(Center for Solar Energy Research & Applications ODTU-GUNAM)

2AO.2-IV-1 16:30-16:50

Optical Management of Si Heterojunction Solar Cells for Perovskite/Si Tandem Solar Cells

Yasuyoshi Kurokawa[1] *

[1]Department of Green Electronics, Kansai University, Japan
[2]Department of Materials Process Engineering, Nagoya University, Japan

2AO.2-IV-2 16:50-17:10

From Materials and Interfaces to High-Efficiency Silicon and Tandem Solar Cells

Olindo Isabella1 * , Sebastian Smits[1] , Katarina Kovačević[1] , Yingwen Zhao[1] , Yi Zheng[1] , Riccardo Brondolin[1] , Liqi Cao[1] , Engin Özkol[1] , Luana Mazzarella[1] , Paul Procel Moya[1] , Yifeng Zhao[1]

[1]Department of Photovoltaic Materials and Devices Group, Delft University of Technology, Delft University of Technology, Netherlands

2AO.2-OP-3 17:10-17:25

Bifacial Tunnel Oxide Passivating Contacts for Silicon and Perovskite/Silicon Tandem Solar Cells

Kun Gao[1] , Jie Mao[2] , Zhongshu Yang[3] , Xinbo Yang[1] *

[1]Department of College of Energy, Soochow University, China
[2]Department of Research and Development Department, Zhejiang Jinko Solar Co. Ltd., China
[3]Department of School of Engineering, Australian National University, Australia

2AO.2-OP-4 17:25-17:40

Optimizing Laser-Induced Phase Transformation to Achieve Low Contact Resistivity of ITO/n+-Poly-Si Contacts for Heterojunction and Tunnel Oxide Hybrid Passivated Back Contact Solar Cells

Zhonglan Li[1] , Yaodong Ma[2] , Xumin Li[2] , Menglei Feng[2] , Hao Cheng[2] , Xiaohua Zhang[2] , Xiajie Meng[2] , Guoqiang Xing[2] , Guanggui Cheng[1] , Jianning Ding[1] *

"[1]Department of School of Mechanical Engineering, Jiangsu University, China
[2]Department of PV Technology Department, Tongwei Solar Ltd, China"

2AO.2-OP-5 17:40-17:55

Factors Affecting the Passivation Performance of Non-Stoichiometric Cat-CVD SiNx Films

Yuehong Shan[1] * , Kensaku Maeda[2] , Keisuke Ohdaira[2]

[1]Department of Materials Science, Japan Advanced Institute of Science and Technology, China
[2]Department of Materials Science, Japan Advanced Institute of Science and Technology, Japan

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3AO.1 Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Materials and Interface Engineering

Chair(s) Jangwon Seo(Korea Advanced Institute of Science and Technology)

3AO.1-KN-1 15:00-15:30

The Central Role of Materials Innovation in Perovskite Photovoltaic Evolution

Michael Graetzel[1] *
[1]Department of Chemistry, EPFL, Switzerland

3AO.1-IV-2 15:30-15:50

Stabilizing Molecule-Based Selective Contacts for Perovskite Solar Cells

Jingjing Xue[1] *
[1]Department of Materials Science and Engineering, Zhejiang University, China

3AO.1-OP-3 15:50-16:05

Interface Engineering for High-Performance Perovskite Solar Cells

Wei Wang[1] , Guozheng Du[1] , Anh Bui[1] , Khoa Nguyen[1] , Hualin Zhan[1] , Klaus Weber[1] , Heping Shen[1] *
[1]Department of School of Engineering, Australian National University, Australia

3AO.1-OP-4 16:05-16:20

Degradation Mechanisms in Inverted Metal Halide Perovskite Modules: Insights from 1 Year of Outdoor Data

Zhengtian Tan[1] , Chen Wei[1] *
[1]Department of Huazhong University of Science and Technology, Huazhong University of Science and Technology, China

3AO.2 Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Scalable Interface and Contact Engineering

Chair(s) Dong Suk Kim(Ulsan National Institute of Science and Technology)

3AO.2-KN-1 16:30-17:00

Contact-Dependent Precursor Design and Charge-Transport Layer Engineering in Perovskite Solar Cells

Sang Il Seok[1] *
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology UNIST, Republic of korea

3AO.2-IV-2 17:00-17:20

Strategies for Scaling Perovskite Solar Modules for Long Life.

Aranzazu Aguirre[1] * , Tamara Merckx[1] , Yinghuan Kuang[1] , Anurag Krishna[1] , Tom Aernouts[1]
[1]Department of PV Tech, imec, U Hasselt, Energyville, Belgium

3AO.2-OP-3 17:20-17:35

Scalable Interface Engineering in Hybrid FAPbI3 Enabling Stable Perovskite Devices and Industrially Relevant Tandem Integration

Cristian Villalobos Meza[1] * , Sunil Suresh[2] , Aslihan H. Babayigit[2] , Tom Aernouts[2] , Yinghuan Kuang[2] , Bart Vermang[2] , Jef Poortmans[1]
[1]Department of Institute for Materials Research IUMAT, Katholieke Universiteit Leuven, Interuniversity Microelectronics Centre, Universiteit Hasselt, Belgium
[2]Department of Institute for Materials Research IUMAT, Interuniversity Microelectronics Centre, Universiteit Hasselt, EnergyVille, Belgium

3AO.2-OP-4 17:35-17:50

P=O-Coordinated Electron-Transporting Self-Assembled Monolayers Beyond the Phosphonic Acid Chemisorption

Chanhyeok Kim[1] , Hanul Min[1] *
[1]Department of KUKIST Graduate School of Converging Science Technology, korea university, Republic of korea

4AO.1 Narrow-Bandgap Chalcogenides for Tandem Applications

Chair(s) Kihwan Kim(Korea Institute of Energy Research)
Bart Vermang(IMEC / Hasselt University)

4AO.1-KN-1 15:00-15:30

Progress of Cu(InGa)(SSe)$_2$ Based Tandem Solar Cells

Xudong Xiao[1] *
[1]Department of School of Physics, Wuhan University, China

4AO.1-IV-2 15:30-15:50

Flexible Perovskite/Chalcopyrite Tandem Solar Modules via Flexible Fabrication Methods

Hiroki Sugimoto[1] * , Ching Chang Lin[1] , Yuta Higashino[1] , Miori Takahashi[1] , Motoshi Nakamura[1]
[1]Department of Head office, PXP Corporation, Japan

4AO.1-OP-3 15:50-16:05

What is Limiting the State-of-the-art 1.0 eV Bandgap (Ag,Cu)(In,Ga)Se2 Solar Cells for Tandem Applications?

Francesco Lodola[1] * , Sevan Gharabeiki[1] , Maximilian Krause[2] , Shiro Nishiwaki[2] , Romain Carron[2] , Susanne Siebentritt[1]
[1]Department of Physics and Materials Science, Laboratory for Photovoltaics, University of Luxembourg, Luxembourg
[2]Department of Swiss Federal Laboratories for Materials Science and Technology, Laboratory for Thin Films and Photovoltaics, Empa, Switzerland

4AO.1-OP-4 16:05-16:20

Notch Engineering of Narrow-Bandgap Cu(In,Ga)Se$_2$ Absorbers for Tandem Photovoltaic Applications: From Simulation-Guided Design to Device Demonstration

Awet Mana Amare[1] , Jeonghun Park[1] , Syed Fawad Ali Shah[2] , Inchan Hwang[1] , Muhammad Rehan[1] , Inyoung Jeong[1] , Soomin Song[1] , Ara Cho[1] , Jihye Gwak[1] , Donghyeop Shin[1] * , Kihwan Kim[1]
[1]Department of Photovoltaic Laboratory, Korea Institute of Energy Research, Republic of korea
[2]Department of Energy Engineering, Korea Institute of Energy Technology, Republic of korea

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4AO.2 Fundamentals and Characterization of Chalcogenide Absorbers

Chair(s) Dae Hyung Cho(Electronics and Telecommunications Research Institute)
Hiroki Sugimoto(PXP Corporation)

4AO.2-IV-1 16:30-16:50

New Approaches for Processing and Enhancing Performance of CdTe Solar Cells

William Shafarman[1] *, Kevin Dobson[1], Pradipta Roy Dip[1], Bin Du[1], Shahrin Iqbal[1]
[1]Unversity of Delaware

4AO.2-IV-2 16:50-17:10

Wide-Bandgap Chalcogenide Solar Cells for Next-Generation Tandem Photovoltaics

Kaiwen Sun[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University Of New South Wales, Australia

4AO.2-OP-3 17:10-17:25

Understanding as Activation Limits in Polycrystalline CdTe Systems Using Single Crystal CdTe Model Systems

Serim S. Kwak[1] , Niranjana Mohan Kumar[2] , Arkita Chakrabarti[2] , Andrea Mathew[3] , Hongling Lott[3] , Magesh Murugesan[4] , John S. McCloy[4] , Eric Colegrove[3] , Mariana Bertoni[2] *
[1]Department of Materials Science and Engineering, Arizona State University, USA
[2]Department of Electrical, Computer and Energy Engineering, Arizona State University, USA
[3]Department of National Laboratory of the Rockies, National Laboratory of the Rockies, USA
[4]Department of Washington State University, Washington State University, USA

4AO.2-OP-4 17:25-17:40

Grain Boundaries in Various Photovoltaic Absorber Materials and Their Impact on the Device Performance

Daniel Abou-Ras[1] * , Luka Blazevic[1] , Chloe Lee Constantin[1] , Kaya Joanna Sroka[1]
[1]Department of Structure and Dynamics of Energy Materials, Helmholtz Center Berlin, Germany

4AO.2-OP-5 17:40-17:55

Decoding the Immune System of Alkali-Treated CIGS: Xas-Resolved K/Cs Local Structures and Complementary Proton-Irradiation Functions for Space Photovoltaics

Tsung-Yen Tsai[1] , Chen-Yu Wu[1] , Yu-Ming Lin[1] , Cheng-Wei Kao[2] , Ting-Shan Chan[2] , Tzu-Ying Lin1 *
[1]Department of Materials Science and Engineering, National Tsing Hua University, Chinese taipei
[2]Department of X-ray Absorption Group, National Synchrotron Radiation Research Center, Chinese taipei

5AO.1 Advances in BIPV Technology and Integration

Chair(s) Simon Boddaert(Scientific and Technical Building Center)
Kye-Won Park(Korean Fire Protection Association)

5AO.1-KN-1 15:00-15:30

From Innovation to Integration: Global Progress and Key Topics in BIPV Development

Francesco Frontini[1] * , Pierluigi Bonomo[1]
[1]Department of Environment Construction and Design, Scuola universitaria professionale della Svizzera italiana, Switzerland

5AO.1-IV-2 15:30-15:50

Evaluating the Technical and Economic Potential of Building-Integrated Photovoltaics

Rebecca Yang[1] *
[1]Department of InfrastructureEngineering, University of Melbourne, Australia

5AO.1-OP-3 15:50-16:05

Suppression of Vibration Stress for Encapsulant-Less Vertical Crystalline-Silicon Photovoltaic Modules Using Thermoplastic Module Base Structures

Adrian Augusto Sumalde[1] * , Kensaku Maeda[1] , Keisuke Ohdaira[1]
[1]Department of School of Materials Science, Japan Advanced Institute of Science and Technology, Japan

5AO.1-OP-4 16:05-16:20

High-Efficiency Semi-Translucent BIPV Glazing Demonstrator with Dynamic Management of Low-Glare Daylighting

Almudena Garcia-Sanchez[1] * , Guido Vallerotto[1] , Jaime J Hernández[2] , Isabel Rodríguez[2] , Giovanni Germano[2] , Fernando Fraternali[2] , Ignacio Antón[1] , César Domínguez[1]
[1]Department of Instruments and Systems Integration, Universidad Politecnica de Madrid, Spain
[2]Department of Nanostructured Functional Surfaces, Institutos Madrileños de Estudios Avanzados Nanociencia, Spain
[3]Department of Information Engineering, Electrical Engineering and Applied Mathematics, Università degli Studi di Salerno, Italy

5AO.2 BIPV Deployment: Performance, Safety, and Acceptance

Chair(s) Francesco Frontini(Institute of Applied Sustainability to the Built Environment)
Rebecca Yang(The University of Melbourne)

5AO.2-IV-1 16:30-16:50

Evaluation of the in-Service Performance of BIPV Systems - Method for Characterizing Deviations and Proposed Corrections

Simon Boddaert[1] * , Yoann Servant[1] , Laurent Calderon[1] , Simon Thebault[1]
[1]Department of Energy and Environment, Scientific and Technical Building Center, France

5AO.2-IV-2 16:50-17:10

Comprehensive Analysis of Vertical Fire Propagation in Building-Integrated Photovoltaic (BIPV) Cladding Systems

Kyewon Park[1] *
[1]Department of Risk Safety research center, Korean Fire Protection Association, Republic of korea

5AO.2-OP-3 17:10-17:25

Coloured PV Cells with Efficiency > 21% Realized by Incorporation of Perovskite Quantum Dots / Ethylene Vinyl Acetate (EVA) Composite Films

Minya Zhou[1] * , Hanchen Li[1] , Martin Green[1] , Yajie Jiang[1]
[1]Department of School of Photovoltaic Renewable Energy Engineering, University of New South Wales, Australia

5AO.2-OP-4 17:25-17:40

Coupled Building Energy-Daylighting Simulations of Dynamic BIPV Solar Protection Devices

Cesar Dominguez[1] , Mohcine Draou[1] * , Almudena Garcia-Sanchez[1] , Guido Vallerotto[1]
[1]Department of Solar Energy Institute, Universidad Politecnica de Madrid, Spain

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5AO.2-OP-5 17:40-17:55

Overcoming Social Barriers to IPV

Melodie de l'Epine[1] , Anna Bargues[1] * , Jose M Vega de Seoane[2] , David Moser[3] , Gaetan Masson[4]
[1]Department of 69003, Becquerel Institute France, France
[2]Department of Becquerel Institute Espana, Becquerel Institute Espana, Spain
[3]Department of Becquerel Institute Italia, Becquerel Institute Italia, Italy
[4]Department of Becquerel Institute, Becquerel Institute, Belgium

6AO.1 PV for Space and Extreme Environments

Chair(s) Jongsung Park(Gyeongsang National University)

6AO.1-KN-1 15:00-15:30

Cadmium Telluride Thin Film Solar Cells for Orbital Space Power: Resilient, Manufacturable, Disruptive

Randy Ellingson1 * , Scott Lambright1 , Aesha Patel[1] , Samuel Erickson[1] , Ryan Muzzio[2] , James Becker[3] , Ebin Bastola[1] , Abudulimu Abasi[1] , Irving Rick[1] , Alisha Adhikari[1] , Yanfa Yan[1] , Adam Phillips[1] , Matt Reese2 , Zhaoning Song[1] , Michael Heben[1]
[1]Department of Physics and Astronomy, The University of Toledo, Wright Center for Photovoltaics Innovation and Commercialization, USA
[2]Department of Center for Materials Science, National Laboratory of the Rockies, USA
[3]Department of Advanced Research, First Solar, Inc., USA

6AO.1-IV-2 15:30-15:50

Stability-Limiting Mechanisms of Perovskite-Based Single and Tandem PV for Earth and Space

Felix Lang[1] *
[1]Department of ROSI Freigeist Juniorgroup, University of Potsdam, Germany

6AO.1-OP-3 15:50-16:05

Defect Evaluation of Composition-Graded Sige Films for Iii-V-on-Si Photovoltaics Based on near-Infrared Polarized Transmission Imaging Combined with Transmission Electron Microscopy

Manami Iwata[1] , Ryoji Katsube[1] , Shota Suzuki[2] , Hideaki Minamiyama[2] , Marwan Dhamrin[2] , Noritaka Usami[1] *
[1]Department of Materials Process Engineering, Nagoya University, Japan
[2]Department of Advanced Technology Division, Toyo Aluminium Kabushiki Kaisha, Japan

6AO.1-OP-4 16:05-16:20

Silicon Heterojunction Solar Cell Performance Under Space Environmental Stressors

Tommy Richards[1] , Chaowei Xue[2] , Xiaoning Ru[2] , Yong Liu[2] , Ram Datt3 , Wing Chung Tsoi[3] , Jessica Yajie Jiang[4] , Rick Kimber[5] , S. Ravi P. Silva[1] , Jae Sung Yun[1] *
[1]Department of Advanced Technology Institute, University of Surrey, UK
[2]Department of Central Research and Development Institute, LONGi, China
[3]Department of Materials Science and Engineering, Swansea University, UK
[4]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[5]Department of Power, Surrey Satellite Technology Limited, UK

6AO.2 PV for Space and Extreme Environments

Chair(s) Jinyoun Cho(Umicore)

6AO.2-IV-1 16:30-16:50

Spectral Conversion for Next Generation Silicon Photovoltaics Beyond 30%

Jessica Yajie Jiang[1] * , Minya Zhou[1] , Heying Wu[1] , Victor Yu Zhang[1] , Minh Tien Tran[1] , Huber Hu[1] , Hanchen Li[1] , Martin A. Green[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

6AO.2-IV-2 16:50-17:10

Effect of Alpha and Proton Irradiation on Wide Bandgap Perovskite Solar Cells for Space Application

Jongsung Park[1] *
[1]Department of Energy Engineering, Gyeongsang National University, Republic of korea

6AO.2-OP-3 17:10-17:25

Faster Epitaxial Lift-off of Crack-Resilient Inverted Metamorphic Multijunction Solar Cells

Bernice Mae Yu Jeco[1] * , Yusuke Oteki[1] , Yoshitaka Okada[1]
[1]Department of Research Center for Advanced Science and Technology, The University of Tokyo, Japan

6AO.2-OP-4 17:25-17:40

Flexible InGaP/GaAs/InGaAs Multijunction Photovoltaics with Robust Encapsulation for Chemical and Radiation Hardness

Sukkyu Hong[1] , Seungwan Woo[1] , Hoki Son[2] , Hyun-Beom Shin[3] , Eungbeom Yeon[1] , Jeongeun Mo[1] , Ho Kwan Kang[3] , Sung-Min Lee[4] , Won Jun Choi[1] *
[1]Department of Center for Quantum Technology, Korea Institute of Science and Technology, Republic of korea
[2]Department of Global Institute for Advanced Nanoscience & Technology, Changwon National University, Republic of korea
[3]Department of Device Technology Division, Korea Advanced Nano Fab Center, Republic of korea
[4]Department of Semiconductor Engineering, Hanyang University, Republic of korea

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Time	ROOM		
	Session Room 1(101-102)	Session Room 2(103)	Session Room 3(105-106)
8:30	**08:30 - 10:00**	**08:30 - 10:00**	**08:30 - 10:00**
9:00	**2BO.3** Thin-Film and TCO Engineering for SHJ and Tandem Bottom Cells	The 2nd Asia-Africa (A^2) Joint PV Symposium	**4BO.3** Chalcogenide Device Architecture and Interface Engineering
9:30			
10:00	**10:00 - 11:30**	**10:00 - 11:30**	**10:00 - 11:30**
10:30	**2BO.4** Advances in Silicon Cell Manufacturing (1): TOPCon, SHJ and Back Contact	The 2nd Asia-Africa (A^2) Joint PV Symposium	**4BO.4** Wide-Bandgap Chalcogenides and Tandem Applications
11:00			
11:30			
12:00			
12:30	Break		
13:00			
13:30	**13:30 - 15:00**		**13:30 - 15:00**
14:00	**2BO.5** Surface Passivation and Emerging Concepts for Advanced Silicon Solar Cells	**14:00 - 15:30**	**4BO.5** Recent advances in quantum dot photovoltaics and charge-transport layers
14:30		The 2nd Asia-Africa (A^2) Joint PV Symposium	
15:00	**15:00 - 17:30**	**15:30 - 17:00**	**15:00 - 16:30**
15:30	Next-Generation BIPV Forum	The 2nd Asia-Africa (A^2) Joint PV Symposium	EU-Korea Cooperation : PV R&I Challenges
16:00			
16:30			
17:00			
17:30			
18:00	Poster Session		
18:30			
19:00	Conference Dinner 19:00 - 21:00		
19:30			

ROOM			
Session Room 4(107-108)	Session Room 5(201-202)	Session Room 6(204-205)	Session Room 7(301)
08:30 - 10:00	**08:30 - 10:00**	**08:30 - 10:00**	
5BO.3 Innovations in PV Module Design and Performance Assessment	**3BO.3** Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Advanced Materials and Molecular Interface Design	**6BO.3** PV for Space and Extreme Environments	
10:00 - 11:30	**10:00 - 11:30**	**10:00 - 11:30**	
5BO.4 PV Performance Modelling, Simulation, and Optimization	**3BO.4** Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Composition and Additive Engineering	**6BO.4** PV for Space and Extreme Environments	
	11:30 - 12:30		
	Plenary Session 2		
Break			
13:30 - 15:00	**13:30 - 15:00**	**13:30 - 15:00**	
5BO.5 Advanced Data Analytics, Grid Integration, and Applied PV Systems	**3BO.5** Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Vacuum Processing and Interface Characterization	**6BO.5** AI and Data-driven PV Innovation	**14:00 - 17:00** Special Session DAEJEON SPECIAL SESSION Powering Daejeon's Future with Solar Energy
15:00 - 16:30	**15:00 - 16:30**	**15:00 - 16:30**	
5BO.6 Grid Integration, Forecasting, and Performance Monitoring of PV Systems	**3BO.6** Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Emerging Concepts and Applications in Perovskite Photovoltaics	**6BO.6** AI and Data-driven PV Innovation	
16:30 - 18:00	**16:30 - 18:00**		
5BO.7 PV Operations, Maintenance, and Performance Optimization	**3BO.7** Perovskite Solar Cells & Modules: Strain, Band Structure and Interface Engineering		
Poster Session			
Conference Dinner 19:00 - 21:00			

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Tuesday, November 17

Plenary Session 2

Chair(s) Karin Hinzer(University of Ottawa)

Pl.2 11:30-12:30

Where is Solar Heading? Silicon versus Perovskite

Martin Green[1]*, Angus Gentle[1], Mark Keevers[1], Zibo Zhou[1], Jack Colwel[1], Alison Ciesla[1], Enning Li[1], Suyoung Jang[1], Yao Wang[1], Mingyuan Yang[1], Jessica Y. Jiang[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

2BO.3 Thin-Film and TCO Engineering for SHJ and Tandem Bottom Cells

Chair(s) Dhamrin Marwan(The University of Osaka, Toyo Aluminium K.K.)

2BO.3-IV-1 08:30-08:50

Impact of Seed Layers on the Properties of Indium-Free Transparent Conducting Oxides

Alexander Eberst[1] * , Junhan Bae[2] , Alexandr Zamchiy[1] , Hassan Osman[1] , Karsten Bittkau[1] , Andreas Lambertz[1] , Kaining Ding[1]
[1]Department of PV ThynC, Forschungszentrum Juelich GmbH, IMD 3 Photovoltaics, Germany
[2]Department of Electrical and Computer Engineering, Sungkyunkwan University, College of Information and Communication Engineering, Republic of korea

2BO.3-OP-2 08:50-09:05

Contact Optimization by CO2 Plasma Treatment for p-type nc-Si:H for Silicon Heterojunction Solar Cells

Delfina Muñoz [1] , Tristan Gageot[1] , José Alvarez[2] , Jean-Paul Kleider[2] , Amanda Merino Leiva[1] *
[1]Department of LPH, Commissariat à l'Énergie Atomique et aux Énergies Alternatives, Institut National de l'Energie Solaire, France
[2]Department of CNRS/GeePs, Université Paris-Saclay, Sorbonne Université, CentraleSupélec, France

2BO.3-OP-3 09:05-09:20

FTIR Detection of Hydrogen Released from Sin_x:H Towards Silicon Using a Hydrogen-Depleted a-Si:H Capture Layer

Lahiruni Ranasinghe[1] * , Muhammad Umair Khan[1] , Shona McNab1 , Alvin Mo[1] , Phillip Hammer[1] , Saul Winderbaum[1] , Alison Ciesla[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

2BO.3-OP-4 09:20-09:35

Development of Novel TCOs for Perovskite Silicon Tandem Solar Cells

Youri Lee[1] , Nan Sun[2] , Alexander Eberst[2] , Kwanyong Seo[1] * , Kaining Ding[2]
[1]Department of The School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of korea
[2]Department of IMD-3 Photovoltaik, Forschungszentrum Jülich, Germany

2BO.3-OP-5 09:35-09:50

More Than Just a Substrate: Driving >30% Perovskite-Silicon Tandem Efficiencies Through Advanced SHJ Bottom Cell Optimization

Yifeng Zhao[1] * , Liqi Cao[1] , Paul Procel[1] , Luana Mazzarella[1] , Olindo Isabella[1]
[1]Department of Photovoltaic Materials and Devices Group, Delft University of Technology, Netherlands

2BO.4 Advances in Silicon Cell Manufacturing (1): TOPCon, SHJ and Back Contact

Chair(s) Noritaka Usami(Nagoya University)

2BO.4-KN-1 10:00-10:30

Recent Advances in TOPCon, Back Contact, and Tandem Solar Cell Technologies

Menglei Xu[1] *
[1]Zhejiang Jinko Solar Co., Ltd

2BO.4-IV-2 10:30-10:50

27% Efficiency and Beyond: Novel Strategies for SHJ Solar Cells Approaching the Theoretical Limit

Vick Peng[1] * , Gangqiang Dong[1] , Hongfan Wu[1] , Chenran HE[1] , Yu Zhao[1] , Xiaowei Zhang[1] , Dinxin Cao[1] , Xiang Zeng[1] , Bijang Tao[1] , ChunPing Chen[1] , Qi Wang[1]
[1]Department of Cell RD Center, Suzhou Maxwell, China

2BO.4-OP-3 10:50-11:05

TOPCon-to-Back Contact Upgrade Pathways: A Techno-Economical Feasibility Assessment

Gourab Das[1] * , Julian Reichle[1] , Andreas Teppe[1] , Mehul Raval[1] , Wolfgang Joss[1] , Peter Fath[1]
[1]Department of TECHNOLOGY, RCT SOLUTIONS GmbH, Germany

2BO.4-OP-4 11:05-11:20

A Decade in the Sun: Chemical and Structural Changes in Fielded SHJ Modules

Nicholas Moser[1] * , Jorge Ochoa[1] , Michael Martinez-Szewczyk[1] , Dana Kern[2] , Steve Johnston[2] , Dirk Jordan[2] , Noah Kamm[3] , Robert Klie[3] , Julia Medvedeva[4] , Mariana Bertoni[1]
[1]Department of School for Engineering of Matter Transport and Energy, Arizona State University, USA
[2]Department of Photovoltaics, National Laboratory Of The Rockies, USA
[3]Department of Physics, University of Chicago - Illinois, USA
[4]Department of Physics Department, Missouri University of Science and Technology, USA

2BO.5 Surface Passivation and Emerging Concepts for Advanced Silicon Solar Cells

Chair(s) Yong-Jin Kim(Korea Insititute of Energy Research)

2BO.5-IV-1 13:30-13:50

Beyond the State of the Art in TOPCon-Based Technologies

Hisham Nasser[1] * , Yiğit Mert Kaplan[1] , Eni Muka[1] , Gökhan Altıner[1] , Raşit Turan[1]
[1]Department of Silicon Photovoltaics, ODTU GUNAM, Türkiye

2BO.5-OP-1 13:50-14:05

Post-Deposition Annealing Effect on the Surface Passivation of Al2O3 Films for Crystalline Silicon Solar Cells

Munse Kim[1] , Hyungwoo Kim[1] , Kyung Taek Jeong[1] , Hae-Seok Lee[2] , Hee-eun Song[1] , Sang Hee Lee[1] * , Yunae Cho[1] , Yong-Jin Kim[1] , Unsoo Kim[1]
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea
[2]Department of Graduate School of Energy and Environment (KU-KIST Green School), Korea University, Republic of korea

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2BO.5-OP-2 14:05-14:20

Morphology Tolerance and Paste Optics of Triangular Solar-Cell Front Contacts Fabricated by String Printing

Jonas Valentijn[1] * , Jelle Westerhof[1] , Rebecca Saive[1] , Olindo Isabella[2] , Yifeng Zhao[2] , Sebas Smits[2]
[1]Department of Inorganic Material Science, University of Twente, Netherlands
[2]Department of Photovoltaic Materials and Devices, Delft University of Technology, Netherlands

2BO.5-OP-3 14:20-14:35

Light-Induced Meta-Stability and Hydrogen-Defect in Silicon Interface

MyeongSeob Sim[1] , Hae-Seok Lee[2] *
[1]Department of Institute for Energy Technology, Korea University, Republic of korea
[2]Department of Graduate School of Energy and Environment, Korea University, Republic of korea
[3]Department of College of Engineering Department of Integrative Energy Engineering, Korea University, Republic of korea

2BO.5-OP-4 14:35-14:50

Improved Interlayers for Singlet Fission Enhanced Silicon Solar Cells

Shona McNab[1] * , Ben Carwithen[2] , WenYuan LimSchneider[1] , Alexander Baldacchino[1] , Alison Ciesla[1] , Murad Tayebjee[1] , Timothy Schmidt[2] , Nicholas Ekins-Daukes[1] , Michael Nielsen[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of School of Chemistry, University of New South Wales, Australia

3BO.3 Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Advanced Materials and Molecular Interface Design

Chair(s) Rui Wang(Westlake University)

3BO.3-KN-1 08:30-09:00

Interfacial Control of Iodine Chemistry for Stabilizing Metal Halide Perovskites

Prashant V. Kamat[1] *
[1]Department of Chemistry and Biochemistry, University of Notre Dame, USA

3BO.3-IV-2 09:00-09:20

Role of Ge Ions for Improving Efficiency and Stability of Sn-Based Perovskite Solar Cells for All-Perovskite Tandem Solar Cells.

Shuzi Hayase[1] *
[1]Department of Info-Powered Energy System Reserach Center, The University of Electro-Communications, Japan

3BO.3-OP-3 09:20-09:35

Multidentate Molecular Bridge Harmonizing Interfacial Mechanical Stress and Electronic Dipole Moment for Enhanced Perovskite Solar Cell Performance

Hong-Yi Lin[1] , Kai-Chi Hsiao[3] , Ting-Han Lin[2] , Jia-Mao Chang[1] , Kun-Mu Lee[4] , Ming-Chung Wu[5] *
[1]Department of Chemical and Materials Engineering, Chang Gung University, Chinese taipei
[2]Department of Chemical and Materials Engineering, Center for Sustainability and Energy Technologies, Chinese taipei
[3]Department of Chemical and Materials Engineering, Chang Gung University, Center for Heterogeneous and Innovative Post-Silicon Materials, Chinese taipei
[4]Department of Chemical and Materials Engineering, Chang Gung University, Center for Sustainability and Energy Technologies, Chinese taipei
[5]Department of Chemical and Materials Engineering, Chang Gung University, Center for Sustainability and Energy Technologies, Chang Gung Memorial Hospital, Chinese taipei

3BO.3-OP-4 09:35-09:50

Tailoring Primary Amine Surface Modification of Wide-Bandgap Perovskite Films for Efficient Perovskite/Silicon Tandem Solar Cells

Jae Ryoung Lee[1] , Seok Beom Kang[1] , Dong Hoe Kim[1] *
[1]Department of State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, China

3BO.4 Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Composition and Additive Engineering

Chair(s) Jingjing Xue(Zhejiang University)

3BO.4-IV-1 10:00-10:20

Towards Efficient All-Inorganic Perovskite Solar Cells

Yana Vaynzof[1] *
[1]Department of Institute for Emerging Electronic Technologies, Leibniz Institute for Solid State and Materials Research Dresden, TU Dresden, Germany

3BO.4-IV-2 10:20-10:40

Efficient and Stable Perovskite Solar Cells via Advanced Interface and Additive Engineering

Jangwon Seo[1] *
[1]Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology, Republic of korea

3BO.4-IV-3 10:40-11:00

Material Engineering Toward High Performance Perovskite Solar Cells and Modules

Hiroshi Segawa[1] *
[1]Department of RCAST, University of Tokyo, Japan

3BO.4-IV-4 11:00-11:20

High-Performance MA-Free All-Perovskite Tandem Solar Cells

Jinhui Tong[1] *
[1]Department of State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, China

3BO.5 Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Vacuum Processing and Interface Characterization

Chair(s) Ulrich Paetzold(Karlsruhe Institute of Technology)

3BO.5-KN-1 13:30-14:00

Interface Organic and Inorganic Engineering for Perovskite Solar Cells

Tsutomu Miyasaka[1] *
[1]Department of Graduate School of Engineering, Toin University of Yokohama, Waseda University, Japan

3BO.5-IV-2 14:00-14:20

Vacuum Deposited Perovskite Solar Cells

Hendrik Bolink[1] *
[1]Department of Instituto de Ciencia Molecular, University of Valencia, Spain

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3BO.5-OP-3 14:20-14:35

Advancing Fully Vacuum-Processed Perovskite Solar Cells: High Efficiency, Long-Term Stability, and Scalable Manufacturing

Barkha Tyagi[1] , Henry Snaith[1] *
[1]Department of Physics, University of Oxford, UK

3BO.5-OP-4 14:35-14:50

Disentangling Ion Migration from Artifacts in High-Fidelity Tof-Sims Depth Profiling of Perovskite Solar Cells

Aslihan Babayigit[1] * , Nico Fransaert[2] , Jean Manca[2] , Shabnam Ahadzadeh[3] , Bart Ruttens[6] , Jan D'Haen[6] , Dirk Valkenborg[4] , Bart Cleuren[5] , Bart Vermang[1]
[1]Department of Engineering Materials Applications, Hasselt University, Faculty of Engineering Technology, & EnergyVille, Belgium
[2]Department of Physics, X-LAB, Faculty of Sciences, Hasselt University, Belgium
[3]Department of Engineering Materials and Applications, Functional Materials Engineering, Faculty of Engineering Technology, Hasselt University, Belgium
[4]Department of Interuniversity Institute for Biostatistics and Statistical Bioinformatics, Data Science Institute, Center for Statistics, Hasselt University, Belgium
[5]Department of Physics, Theory Lab, Faculty of Sciences, Belgium
[6]Department of N/A., Institute for Materials Research, Hasselt University, Belgium

3BO.6 Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps: Emerging Concepts and Applications in Perovskite Photovoltaics

Chair(s) Ji-Youn Seo(Pusan National University)

3BO.6-IV-1 15:00-15:20

Multifunctional 2D Perovskites for Efficient and Stable Perovskite Solar Cells

Jun Hong Noh[1] *
[1]Department of School of Civil Environmental Architectural Engineering & Department of Integrative Energy Engineering, Korea University, Republic of korea

3BO.6-IV-2 15:20-15:40

Recent Progress on Perovskite-Based Photovoltaics

Rui Wang[1] *
[1]Department of Materials Science and Engineering, Westlake University, China

3BO.6-IV-3 15:40-16:00

Advanced Characterization and Simulation of Perovskite Single-Junction and Tandem Solar Cells

Beat Ruhstaller[1] * , Davide Moia[2] , Sandra Jenatsch[2] , Matthias Diethelm[2] , Simon Züfle[2] , Antonio Cabas Vidani[2] , Urs Aeberhard[2] , Simon Zeder[2] , Ralph van den Heuvel[2] , Tabea Krucker[3] , Balthasar Bluelle[2]
[1]Department of Institute of Computational Physics, Fluxim Inc and Zurich University of Applied Sciences, Switzerland
[2]Department of R&D, Fluxim Inc., Switzerland
[3]Department of Institute of Computational Physics, ZHAW, Switzerland

3BO.6-IV-4 16:00-16:20

Indoor Photovoltaics for Energy-Autonomous Iot Devices

Paola Vivo[1] *
[1]Department of Faculty of Engineering and Natural Sciences, Tampere University, Finland

3BO.7 Perovskite Solar Cells & Modules: Strain, Band Structure and Interface Engineering

Chair(s) Dong Suk Kim(Ulsan National Institute of Science and Technology)

3BO.7-IV-1 16:30-16:50

High Thermal Budget Processing Route for Flexible Thin-Film Perovskite Solar Cells and Modules: the Temporary 'Superstrate' Based on Al-Foil and Transparent Etch-Stop Barrier Layers

Arno Smets[1] * , Govind Padmakumar[1] , Federica Saitta[1] , Peer Sluijs[1] , Reinder Boekhof[1] , Lara van der Pol[2] , Niels van Silfhout[1] , Sreejith K. P.[1] , Paula Perez Rodriguez[1] , Luana Mazzarella[1] , Tom Savenije[2] , Malte Vogt[1] , Paul Procel Moya[1] , Rudi Santbergen[1]
[1]Department of Electrical Sustainable Energy, Delft University of Technology, Netherlands
[2]Department of Chemistry Department, Delft University of Technology, Netherlands

3BO.7-IV-2 16:50-17:10

Elucidating and Engineering Electronic Band Structure in Metal Halide Perovskite Solar Cells

Jin-Wook Lee[1] *
[1]Department of School of Transdisciplinary Innovation, Seoul National University, Republic of korea

3BO.7-IV-3 17:10-17:30

The Versatility of Perovskite Materials for Optoelectronics

Michael Saliba[1,2]*
[1]Institute for Photovoltaics (ipv), University of Stuttgart, Stuttgart, Germany
[2]Forschungszentrum Jülich, Jülich, Germany

3BO.7-OP-4 17:30-17:45

Uniformly Strained Stable Phase-Pure FAPbI3 Perovskite Photovoltaics

Mostafa Othman[1] , Austin Kuba[1] , Victor Boureau[1] , Madhubanti Mukherjee[1] , Quentin Jeangros[1] , Edward Sargent[1] , Ursula Rothlisberger[1] , Aïcha Hessler-Wyser[1] , Christian M. Wolff[1] , Christophe Ballif[1] *
[1]Department of Engineering, EPFL, Switzerland

3BO.7-OP-5 17:45-18:00

Layer-by-Layer All-Dry Processed Strain-Free High-Efficiency Perovskite Solar Cells with Long-Term Operational Stability

Sawanta Mali[1] , Jyoti V. Patil[1] , Chang Kook Hong[1] *
[1]Department of School of Chemical Engineering, Chonnam National University, Republic of korea

4BO.3 Chalcogenide Device Architecture and Interface Engineering

Chair(s) Kaiwen Sun(University of New South Wales)
Daniel Abou-Ras(Helmholtz-Zentrum Berlin)

4BO.3-IV-1 08:30-08:50

Inside out: Interface-Driven Device Architectures in Chalcopyrite Solar Cells

Bart Vermang[1] *
[1]Department of Engineering Technology, IUMAT, UHasselt, EnergyVille, Belgium

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4BO.3-OP-2 08:50-09:05

Micro-Striped Semi-Transparent Cu(in,Ga)Se_2 Solar Cells by Materials Efficient Fabrication

Sascha Sadewasser[1] * , Nuno Rodrigues[1] , José Fonseca[1] , Pedro Anacleto[1]
[1]Department of Sadewasser Research Group, INL International Iberian Nanotechnology Laboratory, Portugal

4BO.3-OP-3 09:05-09:20

Toward High Efficiency Bifacial Cu(in,Ga)Se_2 Thin-Film Solar Cells

Sascha Sadewasser[1] * , Pedro Salomé[1] , Negar Naghavi[2] , Stephane Collin[3] , Rico Gutzler[4] , Wolfram Witte[4] , Marika Edoff[5] , Romain Carron[6] , Susanne Siebentritt[7] , Phillip J. Dale[7] , Maxim Guc[8] , Roland Scheer[9] , Esko Niemi[10] , Andreas Zimmermann[11] , Marcin Morawski[12] , Conrad Spindler[13] , Capucine Tong[14] , Peter Borowski[15] , Ayodhya Tiwari[16]
[1]Department of Sadewasser Research Group, INL International Iberian Nanotechnology Laboratory, Portugal
[2]Institut Photovoltaique D'Ile de France, CNRS-IPVF, France
[3]Centre de nanosciences et de nanotechnologies, CNRS-C2N, France
[4]Zentrum für Sonnenenergie und Wasserstoff-Forschung Baden-Württemberg, Germany
[5]Department of Angstrom Solar Center, Uppsala University, Sweden
[6]EMPA, Switzerland
[7]University of Luxembourg, Luxembourg
[8]Catalonia Institut for Energy Research, Spain
[9]Martin-Luther University Halle-Wittenberg, Germany
[10]Midsummer AB, Sweden
[11]Sunplugged – Solare Energiesysteme GmbH, Austria
[12]Roltec, Poland
[13]Greendelta GmbH, Germany
[14]Saint-Gobain Research SA, France
[15]AVANCIS GmbH, Germany
[16]SOLTIWA, Switzerland

4BO.3-OP-4 09:20-09:35

Comprehensive Interface Engineering for CIGS/Zn(O,S) Solar Cells Through Post Deposition Treatments and High-Rate Buffer Growth

Woojung Lee[1] , Dae-Hyung Cho[1] , Tae-Ha Hwang[1] , Tae Ei Hong[1] , Kwangsik Jeong[3] , Chul Kang[4] , Yong-Duck Chung[1] *
[1]Department of Creative Basic Technology Research Division, Electronics and Telecommunications Research Institute, Republic of korea
[2]Department of Semiconductor and Advanced Device Engineering, Korea University of Science and Technology, Republic of korea
[3]Department of Division of AI Semiconductor, Yonsei University, Republic of korea
[4]Department of Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Republic of korea

4BO.3-OP-5 09:35-09:50

Synergistic Optical and Materials Engineering to Overcome Efficiency Losses in Ultrathin

Negar Naghavi[1] * , Javid Hajhemati[1] , Loukiana Kozlov[2] , Damien Coutancier[1] , Peggy Marie[1] , Nathanaelle Schneider[1] , Baptiste Berenguier[1] , Stefania Cacovich[1] , Jean-François Guillemoles[1] , Stephane Collin[2]
[1]Department of IPVF, CNRS, France
[2]Department of C2N, CNRS, France

4BO.4 Wide-Bandgap Chalcogenides and Tandem Applications

Chair(s) William Shafarman(University of Delaware)
Yong Duck Chung(Electronics and Telecommunications Research Institute)

4BO.4-IV-1 10:00-10:20

Development of High-Efficiency Wide-Bandgap Cu(in,Ga)Se_2 Solar Cells

Inchan Hwang[1] , Donghyeop Shin[1] , Kihwan Kim[1] *
[1]Department of Photovoltaic Research Department, Korea Institute of Energy Research, Republic of korea

4BO.4-OP-2 10:20-10:35

14.8% Efficient Solution-Processed Wide-Bandgap (Ag,Cu)(in,Ga)S_2 Solar Cells with a 77.4% Fill Factor

Xiaojie Yuan[1] , Xiaojing Hao[1] * , Kaiwen Sun[1] , Zuoyun Wang[1] , Jialiang Huang[1] , Jialin Cong[1] , Jingwen Cao[1] , Guojun He[1] , Ao Wang[1]
[1]Department of SPREE, University of New South Wales, Australia

4BO.4-OP-3 10:35-10:50

Certified 15.1% Efficiency in Solution-Processed Wide-Bandgap Cu(In,Ga)Se_2 Solar Cells Enabled by Diffusion-Controlled Bandgap Grading and Recombination Passivation

Zuoyun Wang[1] , Xiaojing Hao[1] * , Kaiwen Sun[1] , Xiaojie Yuan[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

4BO.4-OP-4 10:50-11:05

16.6%-Efficient Monolithic CGSe/Si Tandem Solar Cells Enabled by ITO/$CuGaSe_2$ Back-Contact Interface Engineering

Seonghoon Jeong[1] , Won Jae Lee[1] , Ah Reum Jeong[1] , Min Jun Kim[2] , Gee Yeong Kim[1] , Won Mok Kim[1] , Jeung-hyun Jeong[1] *
[1]Department of Advanced Photovoltaics Research Center, Korea Institute of Science and Technology, Republic of korea
[2]Department of Material Science and Engineering, Korea University, Republic of korea

4BO.4-OP-5 11:05-11:20

Voltage Loss Analysis in Bifacial Thin Film Chalcopyrite Solar Cells via Photoluminescence Spectroscopy

Saeed Bayat[1] , Rico Gutzler[2] , Wolfram Witte[2] , Capucine Tong[3] , Michele Melchiorre[1] , Matteo De Marzi[4] , Romain Carron[4] , Susanne Siebentritt[1] *
[1]Department of Physics and Materials Science, Laboratory for Photovoltaics University of Luxembourg, Luxembourg
[2]Department of 2Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg, Germany
[3]Department of 3Saint-Gobain Research, France
[4]Department of Swiss Federal Laboratories for Materials Science and Technology, Switzerland

4BO.5 Recent Advances in Quantum Dot Photovoltaics and Charge-Transport Layers

Chair(s) Younghoon Kim(Kookmin University)
Tom Wu(The Hong Kong Polytechnic University)

4BO.5-IV-1 13:30-13:50

Towards High-Throughput Fabrication of Quantum Dot Solar Cells

Jianyu Yuan[1] *
[1]Department of Institute of Functional Nano Soft Materials, Soochow University, China

4BO.5-IV-2 13:50-14:10

Defect Control, Interface Engineering, and Hot-Carrier Dynamics in Quantum Dot Solar Cells

Qing Shen[1] *
[1]Department of Faculty of Informatics and Engineering, The University of Electro

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4BO.5-OP-3 14:10-14:25

Exciton Delocalization in Quantum Dot Optoelectronics and Its Implications

Zhilong Zhang[1] *
[1]Department of School of Emergent Soft Matter, South China University of Technology, China

4BO.5-OP-4 14:40-14:55

Pentaiodide Hole Conductor Promotes Moisture-Tolerant Solar Cells with Years of Performance Maintenance

Francis Kwaku Asiam[1] , Muhammad Sadiq[1] , Cheng Chen[1] , Hyeong Cheol Kang[1] , Junyeong Ryu[1] , Raghisa Shahid[1] , Ilakeya Subbiah Arivuthilagam[1] , Jongdeok Park[1] , Jae-Joon Lee[1] *
[1]Department of Energy and Materials Engineering, Dongguk University, Republic of korea

5BO.3 Innovations in PV Module Design and Performance Assessment

Chair(s) Hyung Jun Song(Seoul National University of Science and Technology)
Daniel Burkhardt(Fraunhofer ISE)

5BO.3-IV-1 08:30-08:50

The National Solar Radiation Data Base

Manajit Sengupta[1] * , Yu Xie[1] , Aron Habte[1] , Brandon Benton[1] , Jaemo Yang[1] , Paul Edwards[1] , Michael Foster[2] , Andrew Heidinger[3]
*[1]Department of Energy Security and Systems Innovation, National Laboratory of the Rockies, USA
[2]Department of Space Science and Engineering Center, University of Wisconsin Madison, USA
[3]Department of National Environmental Satellite Data and Information Service, National Oceanic and Atmospheric Administration, USA"*

5BO.3-OP-2 08:50-09:05

Translucent Polycarbonate Honeycomb-Structured PV Modules for Lightweight Applications

Taiyufei Liu[1] * , Michio Kondo[1] , Hiroyuki Wada[1]
[1]Department of School of Materials and Chemical Technology, Institute of Science Tokyo, Japan

5BO.3-OP-3 09:05-09:20

Experimental Investigation on PV Self-Cleaning Effect Using Heating Solution

Simon Boddaert[1] * , Akio Sato[1] , Michio Condo[1] , Mauro Caccuvio[1] , Giovanni Bellanda[1] , Ze Guo[1] , Jab Mastny[1] , Tadanori Tanahashi[1] , Hiroshi Sawano[1]
[1]Department of Energy and Environment, Scientific and Technical Building Center, France

5BO.3-OP-4 09:20-09:35

FOILMET® – Laser-Joined Aluminum Foil for Silver-, Solder- and Adhesive-Free Crystalline Silicon PV Module Interconnection

Oliver John[1] * , Gernot Emanuel[1] , Andreas Nägele[1] , Sophie Schneider[1] , Jan Nekarda[1] , Ralf Preu[1]
[1]Department of Laser Technologies, Fraunhofer Institute for Solar Energy Systems, Germany

5BO.3-OP-5 09:35-09:50

Experimental Study on Induced Overvoltage Inside Solar Cell Module due to Lightning

Takuto Kurono[1] , Yuta Naito[1] , Kazuo Yamamoto[1] *
[1]Department of Electrical and Electronic Engineering, Chubu University, Japan

5BO.4 PV Performance Modelling, Simulation, and Optimization

Chair(s) Manajit Sengupta(National Laboratory of the Rockies)
Marios Theristis(Sandia National Laboratories)

5BO.4-IV-1 10:00-10:20

Estimation of Surface Irradiances for Spectral Mismatch Analysis and PV Optimization

Yu Xie[1] * , Manajit Sengupta[1] , Brandon Benton[1]
[1]Department of Power System Engineering Center, National Laboratory of the Rockies, USA

5BO.4-OP-2 10:20-10:35

Real-Time Power Optimization of Bifacial PV Tracking with Surrogate and Cell-Level Electrical Modelling

Daniel Burkhardt Burkhardt[1] * , Ralf Preu[1] , Matthias Demant[1]
[1]Department of QCS, Fraunhofer Institut for Solar Energy Systems Freiburg, Germany

5BO.4-OP-3 10:35-10:50

Degradation-Sensitive PV Monitoring from Curtailed Operating Points Using Single-Diode Model Fitting

Debby Ramadhani[1] * , Phillip Hammer[1] , Merlinde Kay[1] , Bram Hoex[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

5BO.4-OP-4 10:50-11:05

Model Adaptations for Improved Sub-Hourly Yield Simulation of PV Systems

Michele Oliosi[1] * , Luca Antognini[1] , Auriane Canesse[1] , André Mermoud[1] , Robin Vincent[1] , Bruno Wittmer[1]
[1]Department of Scientific team, PVsyst SA, Switzerland

5BO.4-OP-5 11:05-11:20

PVMD Toolbox v2: Open-Source First-Principles Modelling for Future Photovoltaic Modules and Systems

Youri Blom[1] , Malte R. Vogt[1] , Olindo Isabella[1] , Rudi Santbergen[1] *
[1]Department of Photovoltaic Materials and Devices PVMD, Delft University of Technology, Netherlands

5BO.5 Advanced Data Analytics, Grid Integration, and Applied PV Systems

Chair(s) Jaewon Oh(University of North Carolina at Charlotte)
Yu Xie(National Laboratory of the Rockies)

5BO.5-KN-1 13:30-14:00

Maximum Current Point Tracking in Direct-Coupled Solar Electrolyzers for Clean Hydrogen Production

Meng Tao[1] * , Adarsha Bohara[1] , Kelvin Tan[1]
[1]Department of School of Electrical Computer and Energy Engineering, Arizona State University, USA

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5BO.5-IV-2 14:00-14:20

IEA PVPS Task 16 - Easing PV Integration by Enhanced Solar Data

Jan Remund[1] * , Marc Perez[2] , Richard Perez[4] , Manajit Sengupta[3]
"[1]Department of Energy and Climate, Meteotest AG, Switzerland
[2]Department of Group Research, Clean Power Research, USA
[3]Department of Solar Measurement and Modeling, National Laboratory of the Rockies, USA
4Department of ASRC, SUNY Albany, USA"

5BO.5-OP-3 14:20-14:35

AI-Controlled Photovoltaic-Integrated Deployable Shelter for Emergency Energy Resilience

Kyoung Hee Kim[1] * , Hamideh Hossei[1]
[1]Department of Architecture, UNC Charlotte, Integrated Design Research Lab, USA

5BO.5-OP-4 14:35-14:50

Spatial-Consensus Kalman Filtering for Virtual Irradiance Sensing in Utility-Scale PV Plants

Deniz Ekin Canbay[1] * , Brendan Wright[1] , Ziv Hameiri[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

5BO.6 Grid Integration, Forecasting, and Performance Monitoring of PV Systems

Chair(s) Meng Tao(Arizona State University)
Jan Remund(Meteotest AG)

5BO.6-OP-1 15:00-15:15

Impact of Grid Forming Technology from PV Plants on the Stability of the Chilean National Electrical System: An Analysis Applied to the 500 kV Backbone Network

Daniel Briceño[1] , Patricio Lefort[1] * , Leonardo Gacitua[1] , Luis Valenzuela[2]
"[1]Department of Electrical Engineering, University of Santiago of Chile, Chile
[2]Department of O&M PV, ENEL CHILE, Chile"

5BO.6-OP-2 15:15-15:30

Recovering Missing PV Array Orientation Metadata through Data-Driven Optimisation

Hanrong Huang[1] , Fiacre Rougieux[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

5BO.6-OP-3 15:30-15:45

Reducing Uncertainty in Performance Assessment of Utility-Scale Solar Farms Under Cloudy Conditions

Raymond Li[1] * , Sijin Wang[1] , Deniz Canbay[1] , Hao Xue[2] , Flora Salim[3] , Ziv Hameiri[1] , Brendan Wright[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, ACDC Research Group, Australia
[2]Department of Computer Science and Engineering, Hong Kong University of Science and Technology, China
[3]Department of School of Computer Science and Engineering, University of New South Wales, CRUISE Research Group, Australia

5BO.6-OP-4 15:45-16:00

Short-Term Satellite-Driven District-Level Power Forecasting for Distributed Rooftop Photovoltaics

David Markovics[1] * , Martin János Mayer[1] , Dávid Dobák[1] , Dazhi Yang[3] , Tamás Bessenyei[2]
[1]Department of Energy Engineering, Budapest University of Technology and Economics, MTA BME Lendulet Momentum Renewable Energy Systems Research Group, Hungary
[2]Department of Department for Development of System Control, Hungarian Transmission System Operator Ltd., Hungary
[3]Department of School of Electrical Engineering and Automation, Harbin Institute of Technology, Key Laboratory of Energy Meteorology, China Meteorological Administration, China

5BO.7 PV Operations, Maintenance, and Performance Optimization

Chair(s) Angèle Reinders(Eindhoven University of Technology)
Momir Tabakovic(University of Applied Sciences Technikum Wien)

5BO.7-IV-1 16:30-16:50

The PV Underperformance Challenge

Marios Theristis[1] * , Kevin Anderson[1]
[1]Department of PSEL, Sandia National Laboratories, USA

5BO.7-IV-2 16:50-17:10

Design and Evaluation of a Low-Cost Passive-Active Snow Removal Technique for Photovoltaic Modules and Systems

Jaewon Oh[1] * , Harriet Ahu-Darkwah[1] , Sagar Bhoite[2] , Govindasamy Tamizhmani[2]
[1]Department of Engineering Technology and Construction Management, University of North Carolina at Charlotte, USA
[2]Department of Photovoltaic Reliability Laboratory, Arizona State University, USA

5BO.7-OP-3 17:10-17:25

Digital Watchdogs and Human-in-the-Loop for Smart O&M of PV Systems: Event-Based Evidence from 220 Sites

Xiaoqi Xu[1] * , André M. Nobre[2] , Qiying Ng[2] , Dhithijaiyratn Ratwade[2] , Ian Marius Peters[3] , Thomas Reindl[1]
[1]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore
[2]PV Doctor Pte. Ltd., Singapore
[3]Department of Institut für Energietechnologien, Forschungszentrum Jülich GmbH, Germany

5BO.7-OP-4 17:25:17:40

Power Output and Hot-Spot Characteristics in Masterpiece-Based Colored PV Arrays

Euiyoung Oh[1] , Hyung Bin Park[2] , Jaehoon Kim[3] , Hyung-Jun Song[1] *
[1]Department of Safety Engineering, Seoul National University of Science and Technology, Republic of korea
[2]Department of School of Computing, Gachon University, Republic of korea
[3]Department of Semiconductor Engineering, Gachon University, Republic of korea

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5BO.7-OP-5 17:40-17:55

Impact of Solar Cell Size, Metallization and Interconnection on Performance of Standard and Shingled Module Designs – Insights Form Cell-to-Module Simulations

Christian Reichel[1] * , Alexander Aguilar Protti[1] , Max Mittag[1] , Holger Neuhaus[1]
[1]Department of Module Technology, Fraunhofer Institute for Solar Energy Systems ISE, Germany

6BO.3 PV for Space and Extreme Environments

Chair(s) Jae Sung Yun(University of Surrey)

6BO.3-OP-1 08:30-08:45

Investigate the Impact of Space Radiation on Ultra-Thin Silicon Back Contacted Solar Cells

Li Wang[1] * , Yansong Wang[1] , Stefania Peracchi[2] , Ryan Drury[2] , Yongqing Zhang[1] , Zhenyu Sun[3] , Brett Hallam[1] , Ivan Perez-Wurfl[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of Centre for Accelerator Science, Australian Nuclear Science and Technology Organisation, Australia
[3]Department of CTET, Centre for Transformational Environmental Technologies, China

6BO.3-OP-2 08:45-09:00

Demonstration of Micro-Concentrator Photovoltaic Modules for Deep Space Missions

Guido Vallerotto[1] * , Anderson Bermudez-García[2] , Gerald Siefer[3] , Maike Wiesenfarth[3] , Almudena García-Sanchez[1] , Ignacio Antón[1] , Carsten Baur[4] , Pier Luigi Coz[4] , César Domínguez[1]
[1]Department of Instituto de Energia Solar, Universidad Politecnica de Madrid, Spain
[2]Department of R&D Solar Generators and Mechanisms, Thales Alenia Space, France
[3]Department of Division Photovoltaics, Fraunhofer Institute for Solar Energy Systems, Germany
[4]Department of Solar Generators Section, European Space Agency, Netherlands

6BO.3-OP-3 09:00-09:15

Hydride Vapor Phase Epitaxy of Compositionally Graded GaInP Buffers for Inverted Metamorphic III–V Triple-Junction Solar Cells

Ryuji Oshima[1] * , Yuri Kurosu[2] , Takeshi Nishida[1] , Akinori Ubukata[3] , Hidetoshi Suzuki[4] , Yoshinobu Okano[2] , Hiroki Tokunaga[3] , Takeyoshi Sugaya[1]
[1]Department of Renewable Energy Advanced Research Center, National Institute of Advanced Industrial Science and Technology, Japan
[2]Department of Faculty of Science and Engineering, Tokyo City University, Japan
[3]Nippon Sanso Corporation, Japan
[4]Department of Faculty of Engineering, University of Miyazaki, Japan

6BO.3-OP-4 09:15-09:30

Thermal-Shock-Resilient Perovskite Solar Cells for Space: Accelerated Testing, Nanoscale Degradation Analysis, and Near-Space Validation

Dohyung Kim[1] * , Minwoo Lee[2] , Jae Sung Yun[3]
[1]Department of Advanced Matreials Engineering, Chungbuk National University, Republic of korea
[2]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[3]Department of Electrical and Electronic Engineering, University of Surrey, UK

6BO.3-IV-5 09:30-09:50

Multifunctional III–V Laser Power Converters and Hybrid PV/EAM Devices for 1-µm Multi-Mode Laser Terminals

Seth Hubbard[1] * , Elijah Sacchitella[1] , Nikhil Pokharel[1] , Stephen Polly[1] , Raymond Hoheisel[2] , Christopher Limbach[3]
[1]Department of School of Physics and Astronomy, Rochester Institute of Technology, USA
[2]Department of Teravec Technologies, Teravec Technologies, USA
[3]Department of Aerospace Engineering, University of Michigan, USA

6BO.4 PV for Space and Extreme Environments

Chair(s) Sung Min Lee(Hanyang University)

6BO.4-KN-1 10:00-10:30

The Science and Engineering of Defects, Interfaces, and Epitaxy for III-V Photovoltaics: Metamorphic Growth and Si Integration

Steven Ringel[1] * , Tyler Grassman[1]
[1]Department of Electrical and Computer Engineering, The Ohio State University, USA

6BO.4-IV-2 10:30-10:50

Progress in Space Photovoltaic Research at the University of Surrey: Silicon and Perovskites and Their Tandems

Jae Sung Yun[1] *
[1]Department of Advanced Technology Institute, School of Computer Science and Electronic Engineering, University of Surrey, UK

6BO.4-IV-3 10:50-11:10

Advances in Engineered Ge Substrates for Multijunction Solar Cell Manufacturing

Jinyoun Cho[1] , Alexandre Chapotot[1] , Rajiv Sharma[1] , Priyanka Proost[1] , Robin Vanuytven[1] , Aitana Cano[2] , Rubén Fortín[2] , Daniel F. Reyes[3] , Veronica Braza[3] , Kristof Dessein[1] * , Ivan Garcia[2]
[1]Department of Electro Optic Materials, Umicore, Belgium
[2]Department of Instituto de Energía Solar, E.T.S.I Telecomunicación, Universidad Politécnica de Madrid, Spain
[3]Department of IMEYMAT, Instituto de Microscopía Electrónica y Materiales, Spain

6BO.4-OP-4 11:10-11:25

Radiation Study of Perovskite/Silicon 4T Tandem Solar Cell

Hyunsun Song[1] , Dong Gun Lee[2] , Chukwuka Madumelu[1] , Dong Won Kang[2] , Gavin Conibeer[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of School of Energy Systems Engineering, Chung Ang University, Republic of korea

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6BO.5 AI and Data-driven PV Innovation

Chair(s) Yong-Hyun Kim(Korea Photonics Technology Institute)

6BO.5-KN-1 13:30-14:00

Closing the Scale Gap: AI from the Fab Floor to Bankable PV Assets

Veronica Bermudez[1] *
[1]BERBETIN, France

6BO.5-OP-2 14:00-14:15

Leveraging Digital Twin Technology for Smarter Solar PV Management

Ibtihal Ait Abdelmoula[1] * , Hicham Oufettoul[1] , Imane Sebari[2] , Saad Motahhir[3]
[1]Department of Photovoltaic energy, Green Energy Park, Morocco
[2]Department of Photogrammetry and Cartography, IAV Hassan II, Morocco
[3]Department of Laboratoire des Sciences Appliquées et Technologies Innovantes, Sidi Mohamed Ben Abdellah, Morocco

6BO.5-OP-3 14:15-14:30

Simulation-to-Field Photovoltaic Fault Diagnosis Using Two-Stage Domain-Calibrated I-V Curves and LoRA Fine-Tuning

Jingwei Zhang[1] * , Daiqi Pan[1] , Yida Liu[1] , Wenjie Yang[1] , Kun Ding[1] , Xiang Chen[1] , Zenan Yang[1] , Hongfei Dai[2]
[1]Department of College of Mechanical and Electrical Engineering, Hohai University, China
[2]Department of Research Department, Nanjing Hope Techco., Ltd., China

6BO.5-OP-4 14:30-14:45

Value-Adjusted Levelized Cost of Energy Assessment for Industrial Rooftop Photovoltaic Portfolios Using AI-Based Virtual Power Plant Operation

Yong Hyun Kim[1] * , Minkook Kim[1] , Hyejeong Yang[1] , Young Ah Park[1]
[1]Department of AI Energy Research Center, Korea Photovoltaics Technology Institute, Republic of korea

6BO.6 AI and Data-driven PV Innovation

Chair(s) Yong-Hyun Kim(Korea Photonics Technology Institute)

6BO.6-IV-1 15:00-15:20

Transforming the PV Sector: The AI & Robotics Revolution

David Moser[1] * , Mousa Sondoqah[1]
[1]Becquerel Institute Italia, Italy

6BO.6-OP-2 15:20-15:35

Application of Machine Learning for Smart Solar Cell Manufacturing

Seungtae Lee[1] , Yoonmook Kang[1] *
[1]Department of The Institute for High Technology Materials and Devices, Korea University, Republic of korea
[2]Department of Graduate School of Energy and Environment (KU-KIST Green School), Korea University, Republic of korea

6BO.6-OP-3 15:35-15:50

A Diffusion-Based Framework for Isolating Defect Contributions to Solar Cell Efficiency Loss

Gaia Maria Javier[1] * , Victoria Zhao[2] , Ziv Hameiri[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of School of Computer Science and Engineering, University of New South Wales, Australia

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Time	ROOM: Session Room 1(101-102)	Session Room 2(103)	Session Room 3(105-106)
8:30	**08:30 - 10:00**	**08:30 - 10:00**	**08:30 - 10:00**
9:00	**2CO.6** Silver-Reduced Metallization and Advanced Contact Formation	**7CO.1** Economics, Industry & Policy	**4CO.6** Recent advances in organic materials design and interface engineering
9:30			
10:00	**10:00 - 11:30**	**10:00 - 11:30**	**10:00 - 11:30**
10:30	**2CO.7** Advanced Cell Engineering for Tandem and Emerging Applications	**7CO.2** Innovation & Markets	**4CO.7** Recent advances in organic light-absorbing materials and functional layers
11:00			
11:30			
12:00			
12:30	Break	**12:30 - 13:30** Women In PV	Break
13:00			
13:30	**13:30 - 15:00**	**13:30 - 15:00**	**13:30 - 15:00**
14:00	**2CO.8** Advances in Silicon Cell Manufacturing (2): Tandem and Metallization Technologies	**7CO.3** PV Supply Chains & Industrial Resilience	**4CO.8** Wide-Bandgap Emerging Chalcogenides for Tandem & Indoor PV
14:30			
15:00	**15:00 - 17:30**	**15:00 - 16:30**	**15:00 - 16:30**
15:30	From Belgium to Beyond Europe: How Does PV Innovation Move from Lab to Industry?	The 4th Korea-Singapore-Malaysia Joint PV Symposium	**4CO.9** Kesterite & Antimony Chalcogenides: From Defect Control to Modules
16:00			
16:30		**16:30 - 18:00**	**16:30 - 18:00**
17:00		The 4th Korea-Singapore-Malaysia Joint PV Symposium	**4CO.10** Kesterite and Beyond: Sb Chalcogenides, Chalco-Halides & SiGe
17:30			
18:00			
18:30			
19:00			
19:30			

ROOM: Session Room 4(107-108)	Session Room 5(201-202)	Session Room 6(204-205)	Session Room 7(301)
08:30 - 10:00	**08:30 - 10:00**		**08:30 - 10:00**
5CO.8 PV Module Reliability, Environmental Degradation, and Mitigation Strategies	**3CO.8** Perovskite Solar Cells & Modules: Stability and Degradation	**09:00 - 12:00** Special Session (Closed Session)	**1CO.1** Thin Film Based Tandem Cells and Modules
10:00 - 11:30	**10:00 - 11:30**		**10:00 - 11:30**
5CO.9 Translating Accelerated Testing to Field Degradation in PV Modules	**3CO.9** Perovskite Solar Cells & Modules: Scalable Processing and Photovoltaic Integration		**1CO.2** Thin Film Based Tandem Cells and Modules
	11:30 - 12:30 Plenary Session 3		
Break			
13:30 - 15:00	**13:30 - 15:00**	**13:30 - 15:00**	**13:30-15:00**
5CO.10 PV System Reliability: Fault Diagnosis, Degradation, and Accelerated Testing	**3CO.10** Perovskite Solar Cells & Modules: High Performance and Sustainability	**6CO.7** AI and Data-driven PV Innovation	**1CO.3** Si Based Tandem Cells and Modules
15:00 - 16:30	**15:00 - 16:30**	**15:00 - 16:30**	**15:00 - 16:30**
5CO.11 Advanced Materials, Packaging, and Reliability of PV Modules	**3CO.11** Perovskite Solar Cells & Modules: Scalable Processing and Application Versatility	6CO.8 PV-driven Energy Conversion and Hybrid Concepts	**1CO.4** Reliability of Tandem Cells and Modules
16:30 - 18:00	**16:30 - 18:00**		**16:30 - 18:00**
5CO.12 Data-Driven Fault Diagnosis and Smart O&M for PV Fleets	**3CO.12** Perovskite Solar Cells & Modules: Optical Process Monitoring/Characterization and Outdoor Performance		**1CO.5** Thin Film Based Tandem Cells and Modules / Reliability & Measurements

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Plenary Session 3

Chair(s) Delfina Muñoz(Commissariat à l'énergie atomique)

PI.3 11:30-12:30

Perovskite Solar Cells: A Game Changer for the Future of Photovoltaic Solar Energy

Henry J. Snaith*
The University of Oxford

1CO.1 Thin Film Based Tandem Cells and Modules

Chair(s) Yi Hou(National University of Singapore)
Jin Young Kim(Seoul National University)

1CO.1-IV-1 08:30-08:50

Advancing the Commercialization of Perovskite Single-Junction and Tandem Photovoltaic Modules

Hairen Tan[1] * , Han Gao[1]
[1]Department of College of Engineering and Applied Sciences, Nanjing University, China

1CO.1-IV-2 08:50-09:10

Interface Materials for Efficient Perovskite Tandem Solar Cells

Atsushi Wakamiya[1] * , Minh Anh Truong[1]
[1]Department of Institute for Chemical Research, Kyoto University, Japan

1CO.1-IV-3 09:10-09:30

Interface Engineering Across the All-Perovskite Tandem Solar Cells for High Efficiency

Donghoe Kim[1] *
[1]Department of Materials Science and Engineering, Korea University, Republic of korea

1CO.1-OP-4 09:30-09:45

Materials and Process Control for Vacuum-Processed Perovskite/Silicon Tandem Solar Cells

BeomSoo Kim[1] *
[1]Department of Division of Advanced Energy Materials Research, Korea Research Institute of Chemical Technology, Republic of korea

1CO.1-OP-5 09:45-10:00

First Demonstration of All-Evaporated Perovskites for All-Perovskite Tandem Solar Cells

Heon Jin[1] , Henry Snaith[1] *
[1]Department of Condensed Matter Physics, University of Oxford, UK

1CO.2 Thin Film Based Tandem Cells and Modules

Chair(s) Dong Hoe Kim(Korea University)

1CO.2-KN-1 10:00-10:30

Toward Stable High-Efficiency Thin-Film Tandem Solar Cells: Perovskites Meet Chalcogenides

Jin Young Kim[1] *
[1]Department of Materials Science and Engineering, Seoul National University, Republic of korea

1CO.2-IV-2 10:30-10:50

Upscaling Perovskite–Silicon Tandems: From 1 cm^2 Lab Cell Breakthroughs to Industrial Wafer Manufacturing

Yi Hou[1] *
[1]Department of SERIS, NUS, Singapore

1CO.2-OP-3 10:50-11:05

Scalable, Substrate-Adapted Laser Interconnection for Flexible Perovskite-CIGSe Tandem Modules

Nicolas Otto Select[1], Bert Stegemann[1] * , Thede Mehlhop[2] , Tadeus Ranisch[1] , Guillermo Farias-Basulto[2], Damilola Adeleye[2] , Christian Kaufmann[2] , Iver Lauermann[2] , Wuai Zhang[2] , Stefan Gall[2], Emil List-Kratochvil[2] , Nils Plate[3] , Nikolaus Weinberger[3] , Denise Kreugel[4] , Valerio Zardetti[4] , Veronique Gevaerts[4] , Inyoung Jeong[5] , Donghyeop Shin[5] , Inchan Hwang[5] , Rutger Schlatmann[2]
[1]Department of School of Engineering Energy and Information, University of Applied Sciences Berlin HTW, Germany
[2]Department of Competence Centre Photovoltaics Berlin - PVcomB, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany
[3]Department of Material Technology, University Innsbruck, Austria
[4]Department of Solar Energy, Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO, Netherlands
[5]Department of Photovoltaics Research, Korea Institute of Energy Research, Republic of korea

1CO.2-OP-4 11:05-11:20

Advanced Synchrotron GIWAXS Beamline Capabilities for Multi-Environmental In Situ and Operando Characterization of Perovskite Photovoltaics

Young Yong Kim[1] *
[1]Department of Beamline division, Pohang Accelerator Laboratory, Republic of korea

1CO.3 Si Based Tandem Cells and Modules

Chair(s) Hae-Seok Lee(Korea University)

1CO.3-KN-1 13:30-14:00

Understanding Perovskite Silicon Tandem Solar Cells: Interfaces, Transport Losses, Odd IV Curves, and Other Challenges

Stefan Glunz[1] *
[1]Department of Photovoltaics, Fraunhofer ISE, Germany

1CO.3-IV-2 14:00-14:20

High Efficiency Monolithic Perovskite/Silicon Tandem Solar Cells

Xinbo Yang[1] *
[1]Department of College of Energy, Soochow University, China

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1CO.3-IV-3 14:20-14:40

Perovskite Multijunction Solar Cell Research at the University of Sydney

Anita Ho Baillie[1] *
[1]Department of Physics, The University of Sydney, Australia

1CO.3-IV-4 14:40-15:00

Investigating Hexagonal Polytypes Crystallization Pathways and Identifying Vapor-Phase Degradation Products for Perovskite Solar Cells

David McMeekin[1] * , Philippe Holzhey[1] , Sebastian Fürer[1] , Steven Harvey[1] , Laura Schelhas[1] , James Ball[1] , Suhas Mahesh[1] , Seongrok Seo[1] , Nicholas Hawkins[1] , Jianfeng Lu[1] , Michael Johnston[1] , Joseph Berry[1] , Udo Bach[1] , Henry Snaith[1]
[1]Department of Physics, University of Oxford, Uk

1CO.4 Reliability of Tandem Cells and Modules

Chair(s) Helen Bristow(French National Institute for Solar Energy)
Waqas Zia(Wavelabs-EternalSun)

1CO.4-IV-1 15:00-15:20

From Power Rating to Technology Trust: Measurement Pathways for Reducing Warranty and Value Risk in Perovskite Tandem Photovoltaics

Ralph Gottschalg[1,2], Wenhao Xu[3], Christos Monokroussos[3]
[1]Fraunhofer CSP;
[2]Hochschule Anhalt;
[3]TÜV Rheinland Shanghai

1CO.4-IV-2 15:20-15:40

Research on Testing Technology for Large-Scale Perovskite/ Silicon Tandem Modules

Chengying Shi[1] * , Xiang Sun[2] , Hongfei Liu[3]
[1]Department of General Manager, Zhejiang HJE Co Ltd, China
[2]Department of Test Department, Zhejiang HJE Co Ltd, China
[3]Department of Quality Management Department, Zhejiang HJE Co Ltd, China

1CO.4-OP-3 15:40-15:55

Operando Photoluminescence Measurements for Evaluation of Perovskite-Silicon Tandem Degradation Mechanisms

Marko Topic[1] * , Miha Kikelj[1] , Gasper Matic[1] , Lisa Champault[2] , Quentin Jeangros[2] , Kristijan Brecl[1] , Marko Jost[1]
[1]Department of Faculty of Elec Eng, University of Ljubljana, Slovenia
[2]Department of Centre Suisse d'Electronique et de Microtechnique, CSEM, Switzerland

1CO.4-OP-4 15:55-16:10

Development and Demonstration of Commercial-Size Perovskite/Crystalline Silicon Tandem Module Technology

Jinha Kal[1] *
[1]Department of Technology group, Hanwha solution qcells, Republic of korea

1CO.4-OP-5 16:10-16:25

Navigating Meta-Stability: Challenges and Innovations in Perovskite Solar Cell Calibration

Blago Mihaylov[1] * , Ewan Dunlop[1]
[1]Department of Energy Efficiency and Renewables, European Commission Joint Research Centre, Italy

1CO.5 Thin Film Based Tandem Cells and Modules / Reliability & Measurements

Chair(s) Bernd Stannowski(Helmholtz-Zentrum Berlin for Materials and Energy)
Ralph Gottschlag(Fraunhofer Center for Silicon Photovoltaics)

1CO.5-IV-1 16:30-16:50

Durability Challenges in Monolithic Perovskite/Silicon Tandem and Triple-Junction Solar Cells

Quentin Jeangros[1] * , Kerem Artuk[1] , Lisa Champault[1] , Florent Sahli[1] , Michele De Bastiani[1] , Daniel Jacobs[1] , Ricardo Augusto Zanotto Razera[1] , Adriana Paracchino[1] , Adrien Theytaz[1] , Jean-David Decoppet[1] , Christian Wolff[2] , Deniz Turkay[2] , Mostafa Othman[2] , Hilal Can[2] , Jonas Geissbühler[1] , Laurie-Lou Senaud[1] , Antoine Descoeudres[1] , Bertrand Paviet-Salomon[1] , Christophe Ballif[2] , Tonio Buonassisi[1]
[1]Department of Sustainable Energy, CSEM, Switzerland
[2]Department of Institute of Microengineering, EPFL PV-LAB, Switzerland

1CO.5-IV-2 16:50-17:10

Accurate Performance and Stability Characterization of Commercial Perovskite PV Devices

Waqas Zia[1] , Peter Pasmans[1] * , Stefan Roest[1] , Lukas Ziegler[1] , Bernhard Mitchell[1]
[1]Department of Sales and Marekting, Eternal Sun WAVELABS, Germany

1CO.5-OP-3 17:10-17:25

Engineering Carrier Recombination Interfaces and Optical Pathways for Next Generation PVK/CIGS Tandem Solar Cells

Ryousuke Ishikawa[1] * , Chihiro Mizushima[1] , Kimihiko Saito[1] , Takahito Nishimura[2] , Yukiko Kamikawa[3] , Takeshi Nishida[3] , Shogo Ishizuka[3]
[1]Department of Advanced Research Laboratories, Tokyo City University, Japan
[2]Department of Electrical and Electronic Engineering, Institute of Science Tokyo, Japan
[3]Department of Renewable Energy Advanced Research Center, National Institute of Advanced Industrial Science and Technology, Japan

1CO.5-OP-4 17:25-17:40

All-Thin-Film Perovskite-CIGS Tandem Solar Cell Development for Improved Efficiency and Stability

Guillermo Farias Basulto[1] * , Wuai Zhang[3] , Nicolas J. Otto[2] , Thede Mehlhop[1] , Marko Remec[1] , Rohit Kumar Raman[1] , Ayman Maqsood[1] , Marcel Handke[1] , Damilola Adeleye[1] , Stefan Gall[1] , Carolin Ulbrich[1] , Quiterie Emery[1] , Rutger Schlatmann[1] , Christian A. Kaufmann[1] , Reiner Klenk[1] , Emil List-Kratochvil[3] , Iver Lauermann[1]
[1]Department of PVcomB, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany
[2]Department of Photovoltaics, HTW Berlin - University of Applied Sciences, Germany
[3]Department of Institut für Physik, Humboldt-Universität zu Berlin, Institut für Chemie, Germany

1CO.5-OP-5 17:40-17:55

Crystallization Suppression of Mixed-Halide Intermediates for Efficient Perovskite/Cu(in,Ga)Se2 Tandem Solar Cells

Borui Lei[1] , Jingjing Xue[1] * , Deren Yang[1]
[1]Department of State Key Laboratory of Silicon and Advanced Semiconductor Materials and School of Materials Science and Engineering, Zhejiang University, China

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2CO.6 Silver-Reduced Metallization and Advanced Contact Formation

Chair(s) Olindo Isabella(Delft University of Technology)

2CO.6-IV-1 08:30-08:50

Nanosecond Pulsed Laser Assisted Contact Enhancement in Silicon Solar Cells Metallization: Mechanisms and Stability

Thien Truong[1] * , William Nemeth[1] , Matthew Page[1] , Markus Kaupa[1] , John Mangum[1] , Chun-seng Jiang[1] , David Young[1] , Paul Stradins[1]
[1]Department of Materials Science Center, National Laboratory of the Rockies, USA

2CO.6-IV-2 08:50-09:10

Roadmap for Low-Indium Silver-Free Silicon Heterojunction Solar Modules

Wei Long[1] *
[1]Department of PV Technology Center, Tongwei Co Ltd, China

2CO.6-OP-3 09:10-09:25

Silver-Lean TOPCon: Reducing Silver without Sacrificing Performance

Li Wang[1] * , Zhen Yang[1] , Yansong Wang[1] , Bruno Vicari Stefani[1] , Catherine Chan[1] , Kuninori Okamoto[2] , Yifu Shi[2] , Dongliang Wang[2] , Yiwei Ao[2] , Daming Chen[3] , Zigang Wang[3] , Yunfeng Jiao[3], Yifeng Chen[3] , Brett Hallam[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of R&D, Changzhou Fusion New Materials Co., Ltd, China
[3]Department of R&D, TrinaSolar Co., Ltd, China

2CO.6-OP-4 09:25-09:40

A Failure Mode Affecting the Reliability of LECO Metallised High-Efficiency TOPCon Solar Cells

Yuelin Xiong[1] , Sebastian Bonilla[1] * , Tarek Abdul Fattah[1]
[1]Department of Materials, University of Oxford, UK

2CO.7 Advanced Cell Engineering for Tandem and Emerging Applications

Chair(s) Hee-eun Song(Korea Insititute of Energy Research)

2CO.7-KN-1 10:00-10:30

Overview and Perspective of Hybrid Si Tandem Solar Cells and Modules

Masafumi Yamaguchi[1] * , Patrick Schygulla[2] , Ivona Ivona[3] , Frank Dimroth[2], Rutger Schlatmann[3]
[1]Department of Semiconductors Laboratory, Toyota Technological Institute, Japan
[2]Department of III-V Solar Cells, Fraunhofer ISE, Germany
[3]Department of Tandem Cells, HZB, Germany

2CO.7-IV-2 10:30-10:50

Front Contact Engineering for 26% Efficient n-TOPCon Solar Cells and Their Tandem Applications

Haeseok Lee[1] * , Dongjin Choi[2] , Hoyoung Song[3] , Jiyeon Nam[3] , Jaeseung Seol[4]
[1]Department of Graduate School of Energy and Environment (KU-KIST Green School), Korea University, Republic of korea
[2]Department of Gangwon Technology Application Division, Korea Institute of Industrial Technology, Republic of korea
[3]Department of Institute for Energy Technology, Korea University, Republic of korea
[4]Department of Strategy Division, Hanwha Q Cells, Republic

2CO.7-OP-3 10:50-11:05

Silicon Solar Cell Design for Space Applications

Tommy Richards[1] , Rick Kimber[2] , Craig Underwood[3] , Jae Sung Yun[1] *
[1]Department of Advanced Technology Institute, University of Surrey, UK
[2]Department of Power, Surrey Satellite Technology Limited, UK
[3]Department of Surrey Space Centre, University of Surrey, UK

2CO.7-OP-4 11:05-11:20

Estimation of Interface State Parameters for SiOxNy/Crystalline Silicon Heterojunctions Using Effective Carrier Lifetime Analysis

Ayano Mukai[1] , Yinuo Song[2] , Yuto Michishita[1] , Shohei Fukaya[3] , Ryoji Katsube[1] , Yasuyoshi Kurokawa[4] , Keisuke Ohdaira[2] , Noritaka Usami[1] *
[1]Department of Graduate School of Engineering, Nagoya University, Japan
[2]Department of Graduate School of Advanced Science and Technology, Japan Advanced Institute of Science and Technology, Japan
[3]Department of Technology / Process & Device Research, Leibniz Institute for High Performance Microelectronics, Germany
[4]Department of Graduate School of Science and Engineering, Kansai University, Japan

2CO.8 Advances in Silicon Cell Manufacturing (2): Tandem and Metallization Technologies

Chair(s) Young Woo Ok(Georgia Institute of Technology)

2CO.8-OP-1 13:30-13:45

Root Cause Analysis of B-Grade Cells in Industrial TOPCon Cell Production

Furkan Kaya[1] , Hatice Duman[3] , Berfin Yağmur ÇAKMAK[1] , Hümeyra Betül ŞAHİN[3] , Çağatay Ezen[3] , Mert Kahraman[1] , Elif Toker[1] , Mehul Raval[2] * , Meriç ÇALIŞKAN ARSLAN[1]
[1]Department of Cell Line, Kalyon PV Gunes Teknolojileri, Türkiye
[2]Department of Technology, RCT Solutions GmbH, Germany
[3]Department of R&D, Kalyon PV Gunes Teknolojileri, Türkiye

2CO.8-OP-2 13:45-14:00

Sustainable Metallisation for n-TOPCon: A Poly-Finger Rear Aluminum Structure with Engineered Pastes

Ning Song[1] * , Yuhao Cheng[1] , Yuchao Zhang[2] , Lizhi Sun[1] , Zichen Wang[1] , Marwan Dhamrin[4] , Shuo Deng[1] , Kosuke Tsuji[3] , Martin Green[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of -, SunDrive Solar Pty Ltd, Australia
[3]Department of -, Toyo Aluminium K.K., Japan
[4]Department of Graduate School of Engineering, Osaka University, Toyo Aluminium K.K., Japan

2CO.8-OP-3 14:00-14:15

Exploring Carbon-Based Pastes for Sustainable Metallization and Interconnection of Silicon Heterojunction Cells

Mihir Mahajan[1] * , Bart Reekmans[1] , Valerie Depauw[1] , Filip Duerinckx[1] , Hariharsudan Sivaramakrishnan Radhakrishnan[1] , Bart Vermang[1] , David Martineau[2] , Aaron Frei[2]
[1]Department of Engineering Technology, Hasselt university, Imec, Institute for materials research, Belgium
[2]Department of EPFL Innovation Park, GraphEnergyTech, Switzerland

2CO.8-OP-4 14:15-14:30

Laser Direct Writing of a-Si:H Films for IBC Solar Cells

Benedikt Fischer[1] * , Carolin Walter[1] , Michael Schaaf[1] , Maurice Nuys[1] , Stefan Haas[1] , Uwe Rau[1]
[1]Department of IMD-3, Forschungszentrum Juelich GmbH, Germany

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3CO.8 Perovskite Solar Cells & Modules: Stability and Degradation

Chair(s) Jin-Wook Lee(Seoul National University)

3CO.8-KN-1 08:30-09:00

The Development of Perovskite Solar Cells

Jingbi You[1] *
[1]Department of Institute of Semiconductors, Chinese Academy of Sciences, China

3CO.8-IV-2 09:00-09:20

Fabrication of Highly Efficient Perovskite Solar Cells and Their Outdoor Performance Evaluation

Dong Suk Kim[1] *
[1]Department of Carbon neural institute, UNIST, Republic of Korea

3CO.8-OP-3 09:20-09:35

Multi-Strategy Interface and Bulk Engineering for Stable Large-Area Perovskite Solar Modules

Zhen Li[1] , Xiaojing Hao[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

3CO.8-OP-4 09:35-09:50

Unravelling Reverse Bias Induced Degradation in Perovskite Solar Cells and Modules

Sujith Vishwanathreddy[1] * , Sumeet Mujumdar[2] , Elias Peraticos[2] , Vasiliki Paraskeva[2] , Matthew Norton[2] , Andreas Polydorides[2] , Maria Hadjipanayi[2] , Aranzazu Aguirre[1] , Tom Aernouts[1] , Jef Poortman[s1] , Michael Daenen[1]
[1]Department of Engineering Technology, Imec, Institute for Materials Research, Belgium, Hasselt University, Institute for Materials Research, Belgium, EnergyVille, Institute for Materials Research, Belgium
[2]Department of Electrical and Computer Engineering, PV Technology Laboratory, Department of Electrical and Computer Engineering, University of Cyprus, Cyprus, PHAETHON Centre of Excellence (CoE) for Intelligent, Efficient and Sustainable Energy Solutions, Cyprus

3CO.9 Perovskite Solar Cells & Modules: Scalable Processing and Photovoltaic Integration

Chair(s) Jun Hong Noh(Korea University)

3CO.9-IV-1 10:00-10:20

Crystallization Engineering for Large-Area Perovskite Modules

Jin Young Kim[1] *
[1]Department of Graduate School of Carbon Neutrality, Ulsan National Institute of Science and Technology, Republic of korea

3CO.9-IV-2 10:20-10:40

Solar Mobility Platform Technology

Byunghong Lee[1] * , So Yeon Ju[1] , Taehyun Kim[1] , Rira Kang[1] , Jae U Ko[1] , Juae Kim[1] , Chan Ui Kim[1] , Yeonghee Lee[1] , Taeho Jeong[1] , SungJoon Hong[1]
[1]Department of Carbon Neutrality Technology Innovation Team, Hyundai Motor Group, Solar Development Part, Republic of korea

3CO.9-IV-3 10:40-11:00

Development of Building Glass Integrated Perovskite Solar Cell

Taisuke Matsui[1] *
[1]Department of Perovskite PV Business Development Office, Panasonic holdings corporation, Japan

3CO.10 Perovskite Solar Cells & Modules: High Performance and Sustainability

Chair(s) Donghoe Kim(Korea University)

3CO.10-IV-1 13:30-13:50

Toward Sustainable Perovskite Solar Cells: Progress in Recycling, Green Processing, and Commercial Viability

Hyun Suk Jung[1,2]*
[1]School of Advanced Materials Science & Engineering, Sungkyunkwan University, Republic of Korea
[2]SKKU Institute of Energy Science & Technology, Sungkyunkwan University, Republic of Korea

3CO.10-IV-2 13:50-14:10

Efficient and Stable Inverted Perovskite Solar Cells and Modules

Zonghao Liu[1] *
[1]Department of Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China

3CO.10-IV-3 14:10-14:30

A Pathway Toward Highly Efficient and Stable Perovskite Solar Modules

Young Yun Kim[1] *
[1]Department of Division of Advanced Materials, Korea Research Institute of Chemical Technology, Hanyang University, Republic of korea

3CO.10-IV-4 14:30-14:50

Ionic Self-Assembled Monolayers for Inverted Perovskite Solar Cells

Kasparas Rakstys[1] *
[1]Department of Organic Chemistry, Kaunas University of Technology, Lithuania

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3CO.11 Perovskite Solar Cells & Modules: Scalable Processing and Application Versatility

Chair(s) Changsoon Cho(Pohang University of Science and Technology)

3CO.11-IV-1 15:00-15:20

Carbon-Based Multipourous-Layered-Electrodes Perovskite Solar Cells

Seigo Ito[1] *
[1]Department of Engineering, University of Hyogo, Japan

3CO.11-OP-2 15:20-15:35

Demonstrating Pb-to-Perovskite Conversion via One-Step Chemical Vapor Deposition

Gregory Wilson[1] * , Yong Li[1] , Faiazul Haque[1] , Adrian Element[1] , Emma Holder[1] , Callum Carroll[1] , Ange Chen[1] , Kenrick Anderson[1] , Benjamin Duck[1] , Timothy Jones[1] , Noel Duffy[2]
[1]Department of Newcastle Energy Centre, CSIRO, Australia
[2]Department of Energy, CSIRO, Australia

3CO.11-OP-3 15:35-15:50

Scalable Full-Process Development of Large-Area Rigid and Flexible Perovskite Modules Using Slot-Die Coating and Vacuum-Assisted Crystallization

Katsumi Araki[1] *
[1]Department of International Business Division, Alpha Precision Systems Inc, USA

3CO.11-OP-4 15:50-16:05

Batch-Capable Gas Phase Transport Deposition: High-Quality Solvent-Free α-Phase Perovskites in 15 Min

Robby Peibst[1] * , Roland Clausing[1] , Verena Barnscheidt[1] , Joachim Vollbrecht[1]
[1]Department of Photovoltaics, Institute for Solar Energy Research Hamelin, Germany

3CO.11-OP-5 16:05-16:20

Perovskite Solar Cells for Space Applications: A-Site Vulnerability and Passivation Engineering for Radiation Resilience

Hongjae Shim[1] , Jae Sung Yun[2] * , Seongrok Seo[3] , Jongsung Park[4] , Dohyung Kim[5] , Ju Won Kim[6] , Joo Hyung Park[7] , Jan Seidel[8] , Xiaojing Hao[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australian Centre for Advanced Photovoltaics, University of New South Wales, Australia
[2]Department of Electrical and Electronic Engineering, Advanced Technology Institute, University of Surrey, Australian Centre for Advanced Photovoltaics, University of New South Wales, Korea Institute of Science and Technology, Korea University, Republic of Korea
[3]Department of Physics, University of Oxford, UK
[4]Department of Energy Engineering, Gyeongsang National University, Republic of korea
[5]Department of Advanced Materials Engineering, Chungbuk National University, Republic of korea
[6]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea
[7]Department of Information, Electrical and Electronic Engineering, Anyang University, Republic of korea
[8]Department of School of Materials Science and Engineering, University of New South Wales, Australia

3CO.12 Perovskite Solar Cells & Modules: Optical Process Monitoring/ Characterization and Outdoor Performance

Chair(s) Young Yun Kim(Korea Research Institute of Chemical Technology)

3CO.12-IV-1 16:30-16:50

Inkjet-Printed and Slot-Die-Coated Perovskite Top Cells for Perovskite/Silicon Tandem Photovoltaics

Ulrich Paetzold[1] * , Raphael Pesch[1] , Theresa Kuechle[2] , Uma Kousalya Dangudubiyyam[2] , Kristina Geistert[1] , Renjun Guo[1]
[1]Department of Institute of Microstructure Technology, Karlsruhe Institute of Technology, Germany
[2]Department of Light Technology Institute, Karlsruhe Institute of Technology, Germany

3CO.12-OP-2 16:50-17:05

Rapid, High-Throughput, Multimodal Optical Characterization of Emergent PV Materials and Device Insights

Minhal Hasham[1] * , Brandon Motes[1] , Anthony Troupe[1] , James Motes[1] , Amy Louks[2] , Axel Palmstrom[1] , Joseph Berry[1] , Eric Oberholtz[4] , Maimur Hossain[4] , Ethan Schwartz[6] , J. Devin MacKenzie[6] , David Fenning[4] , Dane deQuilettes[5]
[1]Department of Engineering, Optigon Incorporated, USA
[2]Department of Materials Science, Colorado School of Mines, USA
[3]Department of Physics, National Laboratory of the Rockies, USA
[4]Department of Jacobs School of Engineering, University of California, San Diego, USA
[5]Department of Electrical and Computer Engineering, Princeton University, USA
[6]Department of Mechanical Engineering, University of Washington, USA

3CO.12-OP-3 17:05-17:20

From Hidden Phases to Production Control: Learnings from 5+ Years of Optical in-Situ and in-Line Monitoring for Perovskite Photovoltaics

Christian Camus[1] * , Lennart Reb[2] , Stephan Riepe[3] , Nasim Rezaei-Hartmann[1] , Adrian Adrian[1] , Enno Malguth[1] , Claudine Gross[1] , Florian Mathies[2] , Eva Unger[2] , Matthew Leyden[2] , Christian Kaspari[1] , Marcel Ross[2] , Lars Korte[2] , Ulrike Hatt[3] , Steve Albrecht[2]
[1]Department of LayTec AG, Product Management, Germany
[2]Department of Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, HySPRINT Innovation Lab, Germany
[3]Department of Fraunhofer-Institut für Solare Energiesysteme ISE, Perovskite-Silicon Tandem Cells Scaling, Germany

3CO.12-OP-4 17:20-17:35

Towards Standardised Outdoor Testing of Perovskite Photovoltaics: Best Practices, Current Challenges and Future Research Needs

Elias Peraticos[1] * , Sumeet Mujumdar[2] , Vasilki Paraskeva[1] , Matthew Norton[1] , Tom Aernouts[3] , Aranzazu Aguirre[3] , Markus Kohlstädt[4] , Marko Remec[5] , Carolin Ulbrich[6] , Rutger Schlatmann[6] , Iris Visoly-Fisher[7] , George E. Georghiou[1] , Maria Hadjipanayi[1] , Eugene A. Katz[7] , Mark Khenkin[6]
[1]Department of Electrical and Computer Engineering, University of Cyprus, PHAETHON Centre of Excellence for Intelligent, Efficient and Sustainable Energy Solutions, Cyprus
[2]Department of Mechanical and Manufacturing Engineering, University of Cyprus, PHAETHON Centre of Excellence for Intelligent, Efficient and Sustainable Energy Solutions, Cyprus
[3]Department of Institute for Materials Research, imec, UHasselt, EnergyVille, Belgium
[4]Department of Freiburg Materials Research Center FMF, Fraunhofer Institute for Solar Energy Systems, University of Freiburg, Germany
[5]Department of Faculty of Electrical Engineering, Helmholtz-Zentrum Berlin für Materialien und Energie, University of Ljubljana, Germany
[6]Department of HZB, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany
[7]Department of Ben-Gurion National Solar Energy Center, Ben-Gurion University of the Negev, Israel

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3CO.12-OP-5 17:35-17:50

Molecularly Passivated Interface for Stable Wide-Bandgap Inverted Perovskite Solar Cells

Myeongseung Kim[1] , Seongjun Park[1] , Nayoon Kwon[1] , Hyunjun Lee[1] , Jangwon Seo[1] *
[1]Department of CBE, KAIST, Republic of korea

4CO.6 Recent Advances in Organic Materials Design and Interface Engineering

Chair(s) Sung-Yeon Jang(Ulsan National Institute of Science and Technology)
Jianyu Yuan(Soochow University)

4CO.6-KN-1 08:30-09:00

The Fusion of Organic and Perovskite Solar Cells

Gang Li[1] *
[1]Department of Electrical and Electronic Engineering, Hong Kong Polytechnic University, China

4CO.6-IV-2 09:00-09:20

Navigate the Chemical Space of Organic Molecules to Inverse Design Photovoltaic Materials

Tom Wu[1] *
[1]Department of Physics and Materials, The Hong Kong Polytechnic University, China

4CO.6-OP-3 09:20-09:35

Synthesis and Application of Highly Conjugated Two-Dimensional Polymer as HTL in Organic Solar Cells

Ammar Nayfeh[1] * , Amaan Chougle[1] , Abdul Khayum Mohammed[2] , Wisnu Hadmojo[1] , Dinesh Shetty[2]
[1]Department of Electrical Engineering, Khalifa University, UAE
[2]Department of Chemical Engineering, Khalifa University, UAE

4CO.6-OP-4 09:35-09:50

Buried Interface Engineering Using Self-Assembled Material-Based Templating in Both Solution- and Vacuum-Processed Flexible Organic Photovoltaics

Jinwook Kim[1] , Moritz Riede[1] *
[1]Department of Physics, University of Oxford, UK

4CO.7 Recent Advances in Organic Light-Absorbing Materials and Functional Layers

Chair(s) Younghoon Kim(Kookmin University)
Quing Shen(The University of Electro Communications)

4CO.7-IV-1 10:00-10:20

Fused Selenophenes Enable Absorption Broadening and Morphology Control in Polymer Donors for Organic Solar Cells

BongSoo Kim[1] *
[1]Department of Chemistry, Ulsan National Institute of Science and Technology, Republic of korea

4CO.7-OP-2 10:20-10:35

Ultra-Thin PEDOT:PSS Interfacial Engineering for Enhanced Organic Solar Cell Performance

Ammar Nayfeh[1] * , Muhammad Salik Qureshi[1] , Wisnu Hadmojo[1]
[1]Department of Electrical Engineering, Khalifa University, UAE

4CO.7-OP-3 10:35-10:50

Low-Energy Electron Multiplication Layer on IBC-ZEBRA Solar Cells

Lejo Joseph Koduvelikulathu[1] * , Lazhar Rachdi[1] , Lacramioara Popescu[1] , Dominik Rudolph[1] , Mikael Hosatte[2] , Brice Rouffie[2]
[1]Department of R&D Solar cells, International Solar Energy Research Center, Konstanz e.V., Germany
[2]Department of Technology, Segton Adt, France

4CO.7-OP-4 10:50-11:05

Pigment-Protein Complex Extract from Philippine Cinnamomun Leaves as A Solution-Processed Organic Light Absorber

Bernice Mae Yu Jeco[1] * , Aris Larroder[2] , Stephen Sabinay[2] , November Yeo[3] , Yoshitaka Okada[1]
[1]Department of Research Center for Advanced Science and Technology, The University of Tokyo, Japan
[2]Department of Center for Research and Innovations in Science, Mathematics, and Education, West Visayas State University, Philippines
[3]Department of Plantsville Health, Bacolod, Philippines

4CO.7-OP-5 11:05-11:20

Mist Deposition and Multifunctional SPM for Nanoscale Evaluation of Organic Semiconductor Interfaces

Nobuo Satoh[1] * , Yuma Satioh[1] , Shigetaka Katori[2]
[1]Department of Faculty of Engineering, Chiba Institute of Technology, Japan
[2]Department of Electrical and Electronic Engineering, National Institute of Technology, Tsuyama College, Japan

4CO.8 Wide-Bandgap Emerging Chalcogenides for Tandem & Indoor PV

Chair(s) Qingbo Meng(Chinese Academy of Sciences)
Marit Kauk-Kuusik(Tallinn University of Technology)

4CO.8-KN-1 13:30-14:00

Reaction Pathway Engineering: Unlocking the Potential of Wide Bandgap Emerging Chalcogenide Thin Film Solar Cells

Xiaojing Hao[1] *, Chen Qian[1], Ao Wang[1], Zuoyun Wang[1], Xiaojie Yuan[1], Jialin Cong[1], Kaiwen Sun[1], Jialiang Huang[1]
[1]School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

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4CO.8-IV-2 14:00-14:20

Over 10% Efficient $Sb_2(S,Se)_3$ Solar Cells by Enhancing Depletion Width and Interface Passivation via Methanol-Assisted Surface Treatment

Byungha Shin[1] *
[1]Department of MSE, KAIST, Republic of korea

4CO.8-OP-3 14:20-14:35

Approaching 850 mV Certified Open-Circuit Voltage in Wide-Bandgap Cu_2ZnSnS_4 Solar Cells by Local Chemistry Engineering

Ao Wang[1] * , Xiaojing Hao[1] , Kaiwen Sun[1] , Martin Green[1]
[1]Department of School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australian Centre for Advanced Photovoltaics, Australia

4CO.8-OP-4 14:35-14:50

Tuning Wide Bandgap $(Cu,Ag)_2Zn(Sn,Ge)S_4$ Kesterite Type Material for Next Generation Indoor Photovoltaics

Edgardo Saucedo[1] * , Harris Goniotakis[1] , Outman El Khouja[1] , Alex Jimenez Arguijo[1] , Yuancai Gong[1] , Marcel Placidi[1] , Zacharie Jehl[1]
[1]Department of Electronic Engineering, Universitat Politecnica de Catalunya, Spain

4CO.9 Kesterite & Antimony Chalcogenides: From Defect Control to Modules

Chair(s) Edgardo Saucedo(Universitat Politècnica de Catalunya)
Shi Joon Sung(Daegu Gyeongbuk Institute of Science and Technology)

4CO.9-IV-1 15:00-15:20

Emerging Antimony Chalcogenide Thin-Film Solar Cells

Stela Canulescu[1] * , Harshvardhan Maheshkant Gupta[1] , Evgeniia Gilshtein[1] , Yazi Wang[2] , Juhee Lee[2] , Jules Chauvel[1] , Kion Norrman[3] , Karen Pantleon[4] , Ganesh Ghimire[1] , Andrea Maria Pierri Enevoldsen[1] , Fardin Ghaffari-Tabrizi[5] , Byungha Shin[2] , Daniel Abou-Ras[6] , Mirjana Dimitrievska[7]
[1]Department of Electrical and Photonics Engineering, Technical University of Denmark, Denmark
[2]Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Republic of korea
[3]Department of Center for Integrative Petroleum Research, King Fahd University of Petroleum & Minerals, Saudi arabia
[4]Department of Civil and Mechanical Engineering, Technical University of Denmark, Denmark
[5]Department of Energy Conversion and Storage, Technical University of Denmark, Denmark
[6]Department of Structure and Dynamics of Energy Materials, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany
[7]Department of Transport at Nanoscale Interfaces Laboratory, Swiss Federal Laboratories for Materials Science and Technology, Switzerland

4CO.9-OP-2 13:30-14:00

Stoichiometry-Controlled Defect Landscape in Kesterite CZTS Solar Cells

Jingwen Cao[1] , Ao Wang[1] , Minglei Sun[2] , Benyamin Motevalli[3] , Kaiwen Sun[1] , Jefferson Zhe Liu[2] , Xiaojing Hao[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of Mechanical Engineering, The University of Melbourne, Australia
[3]Department of CSIRO, Mineral Resources, Australia

4CO.9-OP-3 15:35-15:50

Phase Evolution Control via Reaction-Path Engineering for Over 11% Efficiency Cd-Free Wide-Bandgap Cu_2ZnSnS_4 Solar Cells

Hang Geng[1] , Kaiwen Sun[1] , Xiaojing Hao[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

4CO.9-OP-4 15:50-16:05

Solution Processed Kesterite Solar Module with 10.1% Certified Efficiency

Xiang Xu[1] , Xin Hao[1] *
[1]Department of School of Materials Science and Engineering, Nanjing University of Posts and Telecommunications, China

4CO.9-OP-5 16:05-16:20

Engineering Layer-Specific Lithium Incorporation in Solution-Processed CZTS Thin Films for High-Performance Outdoor and Indoor Photovoltaics

Marit Kauk-Kuusik[1] * , Annabel Saar[1] , Achmad Nasyori[1] , Idil Mengü Mercanlioğlu[1] , Reelika Kaupmees[1] , Valdek Mikli[1] , Mati Danilson[1] , Maarja Grossberg-Kuusk[1]
[1]Department of Materials and Envrionmental Technology, Tallinn University of Technology, Estonia

4CO.10 Kesterite and Beyond: Sb Chalcogenides, Chalco-Halides & SiGe

Chair(s) Hao Xin(Nanjing University of Posts and Telecommunications)
Stela Canulescu(Technical University of Denmark)

4CO.10-IV-1 16:30-16:50

The Pathway to Realize Highly Efficient Kesterite Solar Cells

Qingbo Meng[1] *
[1]Department of the Center for Clean Energy, Institute of Physics, Chinese Academy of Sciences, China

4CO.10-OP-2 16:50-17:05

In Situ Additive Strategy Enabling Certified 10.7% Efficiency Antimony Chalcogenide Solar Cells

Chen Qian[1] , Kaiwen Sun[1] , Jialiang Huang[1] , Tao Chen[2] , Xiaojing Hao[1] *
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of Materials Science and Engineering, University of Science and Technology of China, China

4CO.10-OP-3 17:05-17:20

Pnictogen Chalco-Halides Van Der Waals Compounds with Low Dimensionality for Energy Harvesting Applications

Edgardo Saucedo[1] * , David Rovira Ferrer1 , Alejandro Navarro Güell[1] , Edoardo Maggi[1] , Andrea Aroldi[1] , Joaquim Puigdollers[1]
[1]Department of Electronic Engineering, Universitat Politecnica de Catalunya, Spain

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4CO.10-OP-4 17:20-17:35

Understanding the Role of Sodium in the Cu_2ZnSnS_4 Growth on Bare FTO Substrate

Chenghan Zhao[1] * , Ao Wang[1] , Jialin Cong[1] , Zuoyun Wang[1] , Jialia Huang[1] , Xiaojie Yuan[1] , Hang Geng[1] , Xiaojing Hao[1] , Kaiwen Sun[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

4CO.10-OP-5 17:35-17:50

Grain-Templated Growth of Polycrystalline SiGe Thin-Film Absorbers for Multijunction Solar Cells

Akira Ogawa[1] , Shintaro Maeda[1] , Takashi Suemasu[1] , Kaoru Toko[1] *
[1]Department of Applied Physics, University of Tsukuba, Japan

5CO.8 PV Module Reliability, Environmental Degradation, and Mitigation Strategies

Chair(s) Ralph Gottschalg(Fraunhofer Institute CSP)

5CO.8-KN-1 08:30-09:00

Reliability by Design: Emerging Reliability Challenges and Mitigation Strategies for Advanced Silicon PV Modules

Eszter Voroshazi[1] * , Maxime Babics[1] , Hugo Lajoie[1] , Timea Bejat[1] , Marion Serasset[1] , Lucie Pirot-Berson[1] , Germain Rey[1] , Lionel Sicot[1] , Sandra Desvergne[1] , Jeremie Aime[1]
[1]Department of Solar Technologies, CEA, France

5CO.8-IV-2 09:00-09:20

PV Module Technology for Low-Carbon Circular Economy

Young Joo Eo[1] *
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea

5CO.8-OP-3 09:20-09:35

Fabrication and Characterization of a Superhydrophobic Bio-Coating Derived from Date Waste Biomass for Enhanced Efficiency and Self-Cleaning Performance of Solar Panels

Kashif Irshad[1] * , Asim Ahmad[1] , Faisal Hani Abdulatif Alhajji[1] , Shafiqur Rehman[1]
[1]Department of Mechanical Engineering Department, King Fahd University of Petroleum & Minerals, Interdisciplinary Research Centre for Sustainable Energy Systems, Research Institute, King Fahd University of Petroleum and Minerals, Saudi arabia

5CO.8-OP-4 09:35-09:50

Beyond Flat Membranes: Using Cupola and Semi-Cupola Geometries for Albedo Enhancement and Soiling Mitigation

Riccardo Adinolfi Borea[1] * , Giosuè Maugeri[1] , Gaetano Mannino[1]
[1]Department of Tecnologie di Generazione Materiali, Ricerca sul Sistema Energetico, Italy

5CO.9 Translating Accelerated Testing to Field Degradation in PV Modules

Chair(s) Giosuè Maugeri(Ricerca sul Sistema Energetico)
Tohru Kohno(Hitachi)

5CO.9-IV-1 10:00-10:20

A Virtual Laboratory Methodology for AI-Based Photovoltaic Module Degradation Assessment Using Long-Term Monitoring Data

Yaowanee Sangpongsanont[1] * , Dhirayut Chenvidhya[1] , Manit Seapan[1] , Tanokkorn Chenvidhya[1] , Chamnan Limsakul[1] , Nattakarn Sakarapunthip[1] , Usman Yahaya[1] , Krissanapong Kirtikara[1]
[1]Department of Ces Solar Cells Testing Center, Pilot Plant Development and Training Institute, King Mongkuts University of Technology Thonburi, Thailand

5CO.9-OP-2 10:20-10:35

Development and Reliability Assessment of Lightweight PV Modules for Textile Roof Applications

Bin Luo[1] * , Benedikt Fischer[1] , Fabienne Moll[1] , Henrike Gattermann[1] , Jan Mock[2] , Kai Zhang[1] , Karsten Bittkau[1] , Leon Appoldt[1] , Marvin Loy[3] , Jürgen Stabel[3] , Rongda Zhang[1] , Sergej Wagner[1] , Andreas Lambertz[1] , Christoph Brabec[1] , Kaining Ding[1]
[1]Department of PV-ThynC, Forschungszentrum Jülich, Germany
[2]Department of Seybold Technische Konfektionen GmbH & Co. KG, Germany
[3]Department of SunWare Solartechnik Produktions GmbH und Co. KG, Germany

5CO.9-OP-3 10:35-10:50

Translating Accelerated UV Testing to Field Degradation in TOPCon PV Modules

Phillip Hammer[1], Shukla Poddar[1] * , Muhammad Umair Khan[1] , Ho Yuet Rachel Yeung[1] , Bram Hoex[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

5CO.9-OP-4 10:50-11:05

Potential-Induced Degradation and UV-Driven Recovery in TOPCon Modules: Impact of Encapsulant

Delphine Petri[1] * , Hengyu Li[1] , Jacques Levrat[1] , Jonathan Champliaud[1] , Ludovic Vuithier[1] , Bénédicte Bonnet-Eymard[1] , Matthieu Despeisse[1] , Tonio Buonassisi[1]
[1]Department of Sustainable Energy, Swiss Center for Electronics and Microtechnology, Switzerland

5CO.9-OP-5 11:05-11:20

Accelerated Testing to Field Exposure: A Case Study of VOC Degradation Across Diverse Module Architectures

Mirra Rasmussen1 , Nicholas Moser-Mancewicz1 , Michael Martinez-Szewczyk[1] , Julia Medvedev[a2] , Mariana Bertoni[3] *
[1]Department of School for Engineering of Matter Transport and Energy, Arizona State University, USA
[2]Department of Physics, Missouri University of Science and Technology, USA
[3]Department of School of Electrical, Computer and Energy Engineering, Arizona State University, USA

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5CO.10 PV System Reliability: Fault Diagnosis, Degradation, and Accelerated Testing

Chair(s) Eszter Voroshazi(CEA INES)
Yaowanee Sangpongsanont(CES Solar Cells Testing Center)

5CO.10-IV-1 13:30-13:50

Data-Driven Assessment of Photovoltaic Performance and Reliability under Real Operating Conditions

Giosue Maugeri[1] *
[1]Ricerca sul Sistema Energetico SpA

5CO.10-OP-2 13:50-14:05

Investigation on the Thermal Stability of Laser-Assisted Fired TOPCon Solar Cells

Xutao Wang[1] * , Jing Yuan[2] , Jianjun Nie[2] , Yan Zhu[1] , Xiaoyan Zhang[2] , Ting Gou[2] , Daoxian Li[2] , Weiguang Yang[2] , Feng Li[2] , Xinyuan Wu[1] , Bram Hoex[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of Jolywood Solar Technology Co., Ltd., Jolywood Solar Technology Co., Ltd., China

5CO.10-OP-3 14:05-14:20

Rapid Screening of Bill of Materials with Pressure Cooker Test for Reliable High-Efficiency HJT Modules

Maxime Babics[1] * , Vincent Barth[1] , Sandra Desvergne[1] , Jérémie Aimé[1]
[1]Department of CEA LITEN, University Grenoble Alpes CEA Liten, France

5CO.10-OP-4 14:20-14:35

Investigation of the Persistence of Surface-Cleaning Effects on Photovoltaic Module Performance

Tetsuyuki Ishii[1] *
[1]Department of Energy Transformation Research Laboratory, Central Research Institute of Electric Power Industry, Japan

5CO.10-OP-5 14:35-14:50

Tracking 13 Years of Plant Aging: Performance Evaluation of PV Modules through Extraction Testing

Tohru Kohno[1] * , Jun Tsunoda[1] , Arata Matsukawa[2] , Koki Komatsu[2] , Yasuaki Ishikawa[2]
[1]Department of Green Power Electronics Research Department, Hitachi, Research and Development Group, Japan
[2]Department of Electrical Engineering and Electronics, Aoyama Gakuin University, College of Science and Engineering, Japan

5CO.11 Advanced Materials, Packaging, and Reliability of PV Modules

Chair(s) Anil Kottantharayil(Indian Institute of Technology Bombay)
Delphine Petri(Centre Suisse d'Électronique et de Microtechnique)

5CO.11-IV-1 15:00-15:20

Angle-of-Incidence-Agnostic Photovoltaics (AIA-PV) through Scalable Biomimetic Photon Management

Praveen C Ramamurthy[1] * , Varun Adiga[1]
[1]Department of Materials Engineering, Indian Institute of Science, India

5CO.11-OP-2 15:20-15:35

Enhanced Damp-Heat (DH 5000) Reliability of Full-Size Glass–Glass TOPCon PV Modules Using POE Encapsulation and Edge Sealing

Sung Ho Hwang[1] * , Sungcheol Park[2] , Eungryong Kim[2] , Euihwan Ryu[3] , Jinhyung Lee[4]
[1]Department of Research Institute for Energy Technology, Korea university, Republic of korea
[2]Department of EPPSCORE Co.,, Republic of korea
[3]Department of Korea Conformity Laboratories, Korea Conformity Laboratories, Republic of korea
[4]Department of Hanwha Qcells, Hanwha Qcells Corporation, Republic of korea

5CO.11-OP-3 15:35-15:50

A Lightweight Framework for EL Image Defect Detection in Photovoltaic Modules for Edge Deployment

Xiang Chen[1] * , Taixin Chen[1] , Kun Ding[1] , Quanru Chen[1] , Jingwei Zhang[1] , Bowen Shi[1]
[1]Department of College of Mechanical and Electrical Engineering, Hohai University, China

5CO.11-OP-4 15:50-16:05

Performance Evaluation of TOPCon, HJT, and IBC Mini Modules with Advanced Polymer Encapsulants

Baloji Adothu[1] * , Olatz Arriaga Arruti[2] , Baume Loann[2] , Ahmer AB Baloch[1] , Bhaskar Parida[1] , Shahzada Pamir Aly[1] , Sonali Bhaduri[1] , Ahmad Alheloo[1] , Omar Albadwawi[1] , Matthieu Despeisse[2] , Vivian Alberts[1]
[1]Department of Solar, DEWA R&D Center, Dubai Electricity and Water Authority, Dubai, UAE
[2]Department of Swiss Center for Electronics and Microtechnology, Sustainable Energy Centre, Neuchâtel, Switzerland, Switzerland

5CO.11-OP-5 16:05-16:20

Sustainable Cu/Ag Metallization and Twill Multi-Wire Interconnection for Reliable SHJ Mini-Modules

Mihir Mahajan[1], Hamed Javanbakht Lomeri[1] * , Valerie Depauw[1] , Jonathan Govaerts[1] , Bart Reekmans[1] , Yi Zheng[2] , Engin Özkol[2] , Olindo Isabella[2] , Hariharsudan SivaramakrishnanRadhakrishnan[1]
[1]Department of IUMAT, IMEC, UHasselt, EnergyVille, Belgium
[2]Department of Photovoltaic Materials and Devices group, TU Delft, Netherlands

5CO.12 Data-Driven Fault Diagnosis and Smart O&M for PV Fleets

Chair(s) Tetsuyuki Ishii(Central Research Institute of Electric Power Industry)

5CO.12-IV-1 16:30-16:50

Generation Losses in Photovoltaic Powerplants due to Soiling – Assessment and Mitigation

Anil Kottantharayil[1] *
[1]Department Electrical Engineering, Indian Institute of Technology Bombay, India

5CO.12-OP-2 16:50-17:05

From Alarm Flood to Actionable Cases: An Impact and Anomaly Type Driven Decision Support Framework for PV O&M

Giorgio Fighera[1] * , Sascha Lindig[1] , Julián Ascencio-Vásquez[1]
[1]Department of Data Analytics and AI, Univers AS, Norway

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5CO.12-OP-3 17:05-17:20

Circularity Oriented Monitoring for Photovoltaic Systems

João Gabriel Bessa[1] * , Eduardo Fernández[1] , Ricardo Ruther[2]
[1]Department of Electronic and Automatic Engineering, University of Jaén, Advances in Photovoltaic Technology, Spain
[2]Department of Civil Engineering, Universidade Federal de Santa Catarina, Brazil

5CO.12-OP-4 17:20-17:35

Early Detection of Reverse-Current Fuse Failures in a Utility-Scale PV Power Plant Using String Peer Comparison Analysis

Chamnan Limsakul[1] * , Usman Yahaya1 , Dhirayut Chenvidhya[1] , Yaowanee Sangpongsanont[1] , Tanokkorn Chenvidhya[1] , Chaiyawut Kanjanajongkon[1] , Nattakarn Sakarapunthip[1] , Manit Seapan[1]
[1]Department of CES SOLAR CELLS TESTING CENTER, King Mongkuts University of Technology Thonburi, Pilot Plant Development and Training Institute, Thailand

5CO.12-OP-5 17:35-17:50

Quantifying Solar Underperformance: AI-Informed Actionable Insights from Physics-Based Loss Categorization

Christopher Valdivia[1] * , T. J. Coathup[1] , R. F. H. Hunter[1] , N. Anderson[1] , J. F. Zonneveld[1] , J. Dunsmore[1] , E. Hussary[1] , K. Pollak[1]
[1]Enurgen Inc., Canada

6CO.7 AI and Data-driven PV Innovation

Chair(s) Chang Hun Kim(Korea Photonics Technology Institute)

6CO.7-OP-1 13:30-13:45

Unsupervised Transfer Fault Diagnosis of Photovoltaic Arrays Using a Multi-Scale Mamba Domain-Adversarial Network

Quanru Chen[1] , Kun Ding[1] * , Xiang Chen[1] , Fei Teng[1] , Zenan Yang[1] , Yuan Huang[1]
[1]Department of College of Mechanical and Electrical Engineering, Hohai University, China

6CO.7-OP-2 13:45-14:00

Physics-Aware Synthetic Data for PV Fault Detection

Zacharie Jehl LiKao[1] * , Sergio Giraldo[1] , Marcel Placidi[1] , Alex Jimenez Arguijo[1] , Outman El Khouja[1] , Edgardo Saucedo[1]
[1]Department of Electronic Engineering, Polytechnic University of Catalonia, Spain

6CO.7-OP-3 14:00-14:15

An I-V-Based Weakly Supervised Framework for PV Module Fault Diagnosis and Reuse/Recycling Assessment Using Attention Mil

Jungmin Moon[1] , Changheon Kim[1] * , Yonghyun Kim[1]
[1]Department of AI Energy Research Center, Korea Photonics Technology Institute, Republic of korea

6CO.7-OP-4 14:15-14:30

Sparse in, Full Spectrum out: CNN-Based EQE Reconstruction for Contactless Jsc Measurements

Zubair Abdullah-Vetter[1] *, Ziv Hameiri[1] , Arthur Julien[1] , Shuai Nie[1] , Felix Gayot[1]
[1]Department of School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australia

6CO.7-OP-5 14:30-14:45

Making Less More: A Generative AI Framework for Improving Image-Based Solar Cell Diagnostics

Gaia Maria Javier[1] * , Rama Sharma[1] , Zubair Abdullah-Vetter[1] , Ziv Hameiri[1] , Brendan Wright[1]
[1]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

6CO.8 PV-driven Energy Conversion and Hybrid Concepts

Chair(s) Uk Sim(Sungkyunkwan University)

6CO.8-IV-1 15:00-15:20

Efficient Photoelectrochemical Systems for Green Hydrogen Production and Solar Chemical Upcycling

Sanghan Lee[1] *
[1]Department of Materials Science and Engineering, Gwangju Institue of Science and Technology, Republic of korea

6CO.8-IV-2 15:20-15:40

A High-Efficiency Perovskite Betavoltaic Battery Based on Photovoltaic Device Architecture

Suil In[1] *
[1]Department of Energy Science and Engineering, DGIST, Republic of korea

6CO.8-OP-3 15:40-15:55

Effect of Band-Tail States on Thermoradiative Power Generation

Yukihiro Harada[1] * , Takashi Kita[1]
[1]Department of Electrical and Electronic Engineering, Kobe University, Japan

7CO.1 Economics, Industry & Policy

Chair(s) Izumi Kaizuka(RTS Corporation)
Ilhyun Cho(Korea Energy Economics Institute)

7CO.1-KN-1 08:30-09:00

32 Years After WCPEC-1: How Progress in PV Technology and Industry Development Together with Policy Implementation Enabled PV Electricity Generation to Become a Major Electricity Source

Arnulf Jaeger Waldau[1] *
[1]Department of DG JRC, European Commission, Italy

7CO.1-IV-2 09:00-09:20

Overcoming Policy and Regulatory Barriers to Solar PV Deployment in Korea: Grid Access, Siting, and Market Design

Seungheon Oh[1] *
[1]Kim&Chang Law office

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7CO.1-OP-3 09:20-09:35

Spaced out on the Prairies: Evaluating Wide-Row Agrivoltaic Economic Feasibility and Farmer-Developer Lease Structures for Large-Scale Irrigated Cropland in Southern Alberta

Valentyna Kyrychuk[1] *
[1]Department of Resource Economics and Environmental Sociology, University of Alberta, Canada

7CO.1-OP-4 09:35-09:50

Ex-Ante Techno-Economic Analysis of All-Perovskite Tandem Manufacturing at Gigawatt Scale

Matthew Hull[1] * , Lian Duan[2] , Van-Son Nguyen[2] , Iwan Zimmermann[2] , Lars Oberbeck[3] , Sebastien Lizin[1]
[1]Department of Center for Environmental Science, Universiteit Hasselt, Belgium
[2]Department of Industrialization, Institut Photovoltaïque d'Ile-de-France, France
[3]Department of OneTech, TotalEnergies, France

7CO.2 Innovation & Markets

Chair(s) Claudia Buerhop-Lutz(Forschungszentrum Jülich GmbH)
Sang min Cho(Tech University of Korea)

7CO.2-KN-1 10:00-10:30

Major PV Innovative Trends to Boost the Energy Transition Challenge

Daniel Mugnier[1] *
[1]Department of Auvergne Rhone Alpes, IEA PVPS, France

7CO.2-IV-2 10:30-10:50

Toward the Commercialization of Tandem Solar Cells: Challenges and Industrial Perspectives

Kihong Kim[1] , Sunghoon Han[1] *
[1]Department of Tandem commercialization advancement, Hanwha Qcells, Republic of korea

7CO.2-OP-3 10:50-11:05

A Threshold-Based Techno-Economic and Life Cycle Assessment of Perovskite-Silicon Tandem Modules Across Lifetime Scenarios

Elina Bosch[1] * , Ian Kenchington[1] , Damien Gautier[2] , Philippe Macé[1] , Gaëtan Masson[1]
[1]Department of Strategic Consulting, Becquerel Institute, Belgium
[2]Department of Strategic Consulting, Becquerel Institute France, France

7CO.3 PV Supply Chains & Industrial Resilience

Chair(s) Gaëtan Masson(Becquerel Institute)
Gyuchang Jeong(Hanhwa QCells)

7CO.3-IV-1 13:30-13:50

Global PV Supply Chains Under Geopolitical Realities

Youru Tan[1] *
[1]Department of Solar, BloombergNEF, China

7CO.3-IV-2 13:50-14:10

Pakistan's Distributed Solar Revolution: Dynamics, System Impacts, and Lessons for the Global South

Muhammad Mustafa Amjad[1] *
[1]Department of Program Director, Renewables First, Pakistan

7CO.3-OP-3 14:10-14:25

How Much Does Resilience Add to Solar PV Costs? An Empirical Analysis of PV Auctions in Italy and France

Elina Bosch[1] * , Ian Kenchington[1] , Philippe Macé[1] , Gaëtan Masson[1] , David Moser[2]
[1]Department of Strategic Consulting, Becquerel Institute, Belgium
[2]Department of Strategic Consulting, Becquerel Institute Italia, Italy

7CO.3-OP-4 14:25-14:40

Techno-Economic and Environmental Assessment of Renewable Electricity Integration for Polysilicon Production in Australia

Kha Doan[1] * , Nathan Chang[1] , Bin Lu[1] , Michelle Vaqueiro Contreras[1] , Rabin Basnet[1] , Anyao Liu[1] , Daniel Macdonald[1]
[1]Department of School of Engineering, Australian National University, Australia
[2]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

7CO.3-OP-5 14:40-14:55

Modelling the European and Multi-Region PV Supply Chain

Nathan Chang[1] * , Mohammad Dehghanimadvar[1] , Simao Lin[1] , David Moser[2] , Philippe Mace[2] , Ian Kenchington[2] , Elina Bosch[2]
[1]Department of SPREE, University of New South Wales, Australia
[2]Department of Italy, Becquerel Institute, Italy

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Time	ROOM		
	Session Room 1(101-102)	Session Room 2(103)	Session Room 3(105-106)
8:30	**08:30 - 10:00**	**08:30 - 10:00**	**08:30 - 10:00**
9:00	**2DO.9** Metallization and Back-Contact Cell Technologies	**7DO.4** PV Growth & Energy Transition	**4DO.11** Earth-Abundant Chalcogenide, Oxide & Phosphide Absorbers: From Defects to Devices
9:30			
10:00	**10:00 - 11:30**	**10:00 - 11:30**	**10:00 - 11:30**
10:30	**2DO.10** Advances in Silicon Cell Manufacturing (3): Industrial TOPCon and Module Integration	**7DO.5** "INDUSTRY FORUM I" Solar & Storage - Scaling Solar Through Storage	**4DO.12** Sustainable Kesterite, Emerging Absorbers & Spectral Conversion
11:00			
11:30			
12:00			
12:30	Break		
13:00			
13:30	**13:30 - 15:00**	**13:30 - 15:00**	**13:30 - 15:00**
14:00	**2DO.11** Korea–India Collaboration in Silicon PV: Materials, Manufacturing, and Circularity	**7DO.6** "INDUSTRY FORUM II" Power System Flexibility - Transforming Power Systems for a Solar-Dominated Future	Asia-Europe Emerging Materials for Thin Film Solar Cells
14:30			
15:00	**15:00 - 16:30**	**15:00 - 16:30**	
15:30	**2DO.12** Industrial Silicon Cell Technologies and Module Integration	**7DO.7** Sustainability & Recycling	
16:00			
16:30	**16:30 - 18:00**	**16:30 - 18:00**	**16:30 - 18:00**
17:00	**2DO.13** Interface and Optical Engineering for Advanced Photovoltaic Devices	**7DO.8** PV in Distributed Energy Systems	IEA PVPS: Task 12-PV Sustainability
17:30			
18:00	Poster Session		
18:30			
19:00			
19:30			

ROOM			
Session Room 4(107-108)	Session Room 5(201-202)	Session Room 6(204-205)	Session Room 7(301)
08:30 - 10:00	**08:30 - 10:00**	**08:30 - 10:00**	**08:30 - 11:30**
5DO.13 Advanced BIPV Design: Aesthetics, Performance, and Safety	**1DO.6** Si Based Tandem Cells and Modules	Asia-Europe Emerging Materials for Thin Film Solar Cells	Special Session
10:00 - 11:30	**10:00 - 11:30**	**10:00 - 11:30**	
5DO.14 Building and Infrastructure-Integrated PV: Field Performance and Impact	**1DO.7** Si Based Tandem Cells and Modules	Asia-Europe Emerging Materials for Thin Film Solar Cells	
	11:30 - 12:30 Plenary Session 4		
Break			
13:30 - 15:00	**13:30 - 15:00**	**13:30 - 15:00**	**13:30 - 18:00**
5DO.15 PV in Diverse Environments: Climate Resilience, Floating PV, and Agri-PV	**1DO.8** Si Based Tandem Cells and Modules / Field Test	**6DO.9** PV-driven Energy Conversion and Hybrid Concepts	Special Session
15:00 - 16:30	**15:00 - 16:30**	**15:00 - 16:30**	
5DO.16 Agri-PV and Floating PV: Design, Environmental Interaction, and Applications	**1DO.9** Si Based Tandem Cells and Modules	**6DO.10** PV-driven Energy Conversion and Hybrid Concepts	
16:30 - 18:00	**16:30 - 18:00**		
5DO.17 Advances in Integrated-PV Technology, Safety, and Implementation	**1DO.10** Reliability of Tandem Cells and Modules / Measurements		
Poster Session			

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Plenary Session 4

Chair(s) Kaining Ding(Forschungszentrum Jülich GmbH)

PI.4 11:30-12:30

Development of High-Efficiency Silicon-Based Photovoltaic Technology at LONGi

Xixiang Xu[1] * , Liang Fang[1] , Yunpeng Li[1] , Jiansheng Chen[1] , Hua Wu[1] , Mingzhe Yu[1] , Yang Zhang[1] , Junzhe Wei[1] , YC Wang[2] , Yunlai Yuan[1] , Xiaoning Ru[1] , Hongbo Tong[1] , Feng Ye[1] , Miao Yang[1] , Yongcai He[1], Peng Li[1] , Bo He[1] , Chaowei Xue[1] , Junxiong Lu[1] , Zhenguo Li[1]

[1]Department of LONGi Central RD Institute, LONGi Green Energy Technology, China

2Department of Wafer business unit, LONGi Green Energy Technology, China

1DO.6 Si Based Tandem Cells and Modules

Chair(s) Hyunju Lee(Meiji University)

1DO.6-IV-1 08:30-08:50

Qcells Tandem Technology

Marco Ruiz[1], Fabian Fertig[1] *

[1]Department of Research and Development, Hanwha Q CELLS GmbH, Germany

1DO.6-IV-2 08:50-09:10

Stability and Filed Demonstration of Perovskite/Silicon Tandem Solar Cells

Mengmeng Chen[1] , Takeshi Gotanda[1] *

[1]Department of High Performance Photovoltaics Development Department, Energy Aggregation Division, Toshiba Corporation, Japan

1DO.6-OP-3 09:10-09:25

Novel Electron Contact Designs for Perovskite/Silicon Tandem Solar Cells

Oussama Er-raji[2] * , Christoph Messmer[2] , Oliver Fischer[2] , Vladyslav Hnapovskyi[3] , Adi Prasetio[3] , Armin Richter[1] , Eliot Goodman[1] , Marco Marengo[3] , Mohamed Mahmoud[2] , Johanna Modes[2] , Badri Vishal[3] , Martin Bivour[2] , Jonas Schön[2] , Florian Schindler[1] , Martin Hermle[1] , Martin C. Schubert[1] , Patricia S. C. Schulze[1] , Stefaan De Wolf[3] , Stefan W. Glunz[2] , Juliane Borchert[2]

[1]Department of Photovoltaics, Fraunhofer ISE, Germany

[2]Fraunhofer ISE & University of Freiburg, Germany

[3]KAUST, Saudi arabia

1DO.6-OP-4 09:25-09:40

High-Performance Perovskite/Silicon Tandem Solar Cells Enabled by Multifunctional Titanium Oxynitride Recombination Layers

Fengxian Cao[1] , Yao Li[1] , Shibo Wang[1] , Kin Long Wong[2] , Xinbo Yang[1] *

[1]Department of College of Energy, Soochow University, China

[2]Department of Applied Physics, Research Center for Organic Electronics, The Hong Kong Polytechnic University, China

1DO.6-OP-5 09:40-09:55

Interfacial Engineering Strategies for High-Efficiency Perovskite/Silicon Tandem Solar Cells and Perovskite/Perovskite/Silicon Triple-Junction Solar Cells

Ulrich Paetzold[1] * , Lingyi Fang[2] , Hang Hu[2] , Ting Pan[2] , Renjun Guo[1] , Paul Faßl[1]

[1]Department of Institute of Microstructure Technology, Karlsruhe Institute of Technology, Germany

[2]Department of Light Technology Institute, Karlsruhe Institute of Technology, Germany

1DO.7 Si Based Tandem Cells and Modules

Chair(s) Myunghun Shin(Korea Aerospace University)

1DO.7-KN-1 10:00-10:30

From Single Junction Silicon to Tandem and Triple Junction with Perovskites: the Challenge of Chasing Both Efficiency and Stability.

Christophe Ballif[1] *

[1]Department of Institute of Electrical and Microengineering, Photovoltaics and Thin Film Electronics Laboratory, Switzerland

1DO.7-IV-2 10:30-10:50

Industrialisation of Perovskite-Silicon Tandem Photovoltaics: Challenges and Progress in Volume Manufacturing

Edward Crossland[1] *

[1]Department of Technology, Oxford Photovoltaics ltd, UK

1DO.7-OP-3 10:50-11:05

33.6%-Efficient Flexible Perovskite/Silicon Tandem Solar Cells

Shibo Wang[1] , Xinbo Yang[1] *

[1]Department of College of Energy, Soochow University, China

1DO.7-IV-4 11:05-11:25

Highly Efficient Perovskite/Silicon Tandem Solar Cells

Mingzhen Liu[1] *

[1]Department of School of Materials and Energy, University of Electronic Science and Technology of China, China

1DO.8 Si Based Tandem Cells and Modules

Chair(s) Taejun Kim(HD Hyundai Energy Solutions)

1DO.8-IV-1 13:30-13:50

Outdoor Durability Evaluation of Perovskite/Si Tandem Solar Cells

Makoto Konagai[1] * , Ryousuke Ishikawa[1] , Hanae Yamazaki[2] , Kazuhiro Gotoh[2] , Atsushi Masuda[2] , Miyuki Shiokawa[3] , Takeshi Gotanda[3]

[1]Department of Advanced Research Laboratories, Tokyo City University, Japan

[2]Department of Graduate School of Science and Technology, Niigata University, Japan

[3]Department of High-Performance Photovoltaics Strategy Group, Energy Aggregation Division, Toshiba Corporation, Japan

1DO.8-IV-2 13:50-14:10

Technology Development Toward Industrial Application of Perovskite/HJT Tandem Solar Cells

Sephin Cho[1] * , Sangho Kim[1] , Taejun Kim[1]

[1]Department of PV Cell Development Team, HD Hyundai Energy Solutions, Republic of korea

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1DO.8-OP-3 14:10-14:25

Interlayer Work Function Modulation Toward High Efficiency Perovskite/Silicon Tandem Solar Cells

Liping Zhang[1] * , Yutao Wang[1] , Yijie Wang[1] , Fei Wang[1] , Changcun Liu[1] , Yunren Luo[1] , Zhengyu Lei[1] , Junjun L[!1] , Jiakai Liu[2] , Jingjing Xu[3] , Fanying Meng[1] , Wenzhu Liu[1] , Zhengxin Liu[1]

[1]*Department of State Key Laboratory of Materials for Integrated Circuits, Shanghai Institute of Microsystem and Information Technology Chinese Academy of Sciences, China*

[2]*Department of Laboratory of Environmental Sciences and Technology, Xinjiang Technical Institute of Physics & Chemistry, China*

[3]*Department of School of Mechatronic Engineering and Automation, Shanghai University, China*

1DO.8-OP-4 14:25-14:40

Efficient Annual Yield Modelling Guides Bandgap Selection in Two-Terminal Perovskite-Silicon Tandems

Zihui Zhang[1] , Shukla Poddar[1] , Fiacre Rougieux[1] , Phillip Hammer[1] * , Bram Hoex[1]

[1]*Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia*

1DO.9 Si Based Tandem Cells and Modules / Field Test

Chair(s) Jongchul Lim(Chungnam National University)

1DO.9-OP-1 15:00-15:15

Micro- Versus Nanotextured Silicon Pyramid: Impact on the Performance and Stability of Perovskite–Silicon Tandem Solar Cells

Michael Kamel[1, 2] , Hongjae Shim[3] , Minkyu Kim[4] , Jongchul Lim[4] , Jae Sung Yun[3, 5] , Dohyung Kim[1] *

[1]*Department of Advanced Materials Engineering, Advanced Energy Research Institute Chungbuk National University, Republic of korea*

[2]*Department of Physics, Physics 3Department, Faculty of Science, Minia University, Egypt*

[3]*Department of School of Photovoltaic and Renewable Energy Engineering, Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia*

[4]*Department of Graduate School of Energy Science and Technology, Chungnam National University, Republic of Korea*

[5]*Department of School of Computer Science and Engineering, Advanced Technology Institute, University of Surrey, UK*

1DO.9-OP-2 15:15-15:30

Hydrogen Plasma Treatment for Post-Thermal Passivation Recovery in Poly-Si Based Silicon Bottom Cells for Tandem Applications

Zhongshu Yang[1] * , Rabin Basnet[1] , Viqar Ahmad[1] , Yihui Hou[1] , Malak Shariff[1] , James Bullock[2] , Heping Shen[1] , Klaus Weber[1] , Daniel Macdonald[1]

[1]*Department of School of Engineering, Australian National University, Australia*

[2]*Department of Electrical and Electronic Engineering, University of Melbourne, Australia*

1DO.9-OP-3 15:30-15:45

Design Considerations for Scalable Transparent Conducting Electrodes in Perovskite/Silicon Tandem Solar Cells

John OSullivan[1] * , Matthew Wright[1] , Bruno Vicari Stefani[2] , Paul LLontop[3] , Abderrahime Sekkat[4] , Robert L. Z. Hoye[1] , Monica Morales-Masis[3] , Ruy Sebastian Bonilla[1]

[1]*Department of Materials, University Of Oxford, UK*

[2]*Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia*

[3]*Department of Materials to Optoelectronic Devices Group & Institute for Complex Molecular Systems, Eindhoven University of Technology, Netherlands*

[4]*Department of Toulouse INP, CNRS, LGC, Univ. Toulouse, France*

1DO.9-OP-4 15:45-16:00

Volatility-Guided Vacuum Passivation for Low-Loss Perovskite/Silicon Tandems

Jeewon Park[1] , Changduk Yang[1] *

[1]*Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of korea*

1DO.10 Reliability of Tandem Cells and Modules / Measurements

Chair(s) Quentin Jeangros(Swiss Center for Electronics and Microtechnology)
Seungkyu Ahn(Korea Institute of Energy Research)

1DO.10-IV-1 16:30-16:50

The Role of TCOs and Metallization for the Stability of Perovskite-Silicon Tandem Solar Cells.

Bernd Stannowski[1] * , Angelika Harter[1] , Freya Leyland[1] , Jannik Kleesiek[1] , Quiterie Emery[1] , Darja Erfur[t1] , Marlene Haertel[1] , Xuan Li[1] , Jona Kurpiers[1] , Carolin Ulbrich[1] , Rutger Schlatmann[1]

[1]*Department of Solar Energy Devision, Helmholtz Zentrum Berlin, Germany*

1DO.10-IV-2 16:50-17:10

Accelerated Aging and Outdoor Monitoring of Perovskite-Silicon Tandem Photovoltaics

Helen Bristow[1] *

[1]*Department of Savoie, French Alternative Energies and Atomic Energy Commission, National Institute for Solar Energy, France*

1DO.10-OP-3 17:10-17:25

Operational Stability of Wide-Bandgap Perovskite Tandem Solar Cells under Extreme Thermal Cycling

Wookyung Jeon[1] , Yohan Yoon[1] * , Sihyun Kim[1] , Gilsang Han[2]

[1]*Department of Materials Engineering, Korea Aerospace University, Republic of korea*

[2]*Department of Division of Advanced Materials, Korea Research Institute of Chemical Technology, Republic of korea*

1DO.10-OP-4 17:25-17:40

Unravelling Perovskite Degradation Mechanisms on Textured Silicon for Tandem Photovoltaics

Hongjae Shim[1] * , Mingrui He[1] , Jae Sung Yun[2] , Xiaojing Hao[1]

[1]*Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia*

[2]*Department of Guildford, University Of Surrey, UK*

1DO.10-OP-5 17:40-17:55

Development of an Efficiency Measurement System for Large-Area Tandem Photovoltaic Modules

Yongjin Choi[1] * , Wonki Kim[1] , Jiyoung Kim[1] , Giseon Yu[1]

[1]*Department of R&D Center, TNE TECH, Republic of korea*

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2DO.9 Metallization and Back-Contact Cell Technologies

Chair(s) Praveen Ramamurthy(Indian Institute of Science)

2DO.9-IV-1 08:30-08:50

The Race Beyond Silver: Metallization and Interconnection Innovations for Heterojunction Cells and Modules

Maxime Babics*, Rémi Monna[1], Gustavo Rodrigues Lopes[1], Anne-Sophie Ozanne[1], Jules Clerjon[1], Didier Therme[1], Johann Jourdan[1], Bertrand Hladys[1]
[1]Wilfried Favre and Eszter Voroshazi

2DO.9-IV-2 08:50-09:10

Scalable Hybrid Solar Window with High Transparency, High Efficiency, and Superior Color Rendering

Yongseok Jun[1] * , Yongki Kim[2] , Chanyong Lee[3] , Gumin Kang[4] , Taemin Kim[3] , Woon Cho[3] , Ye Charn Shin[3] , Woonggeol Yi[3] , Yoonmook Kang[3] , Hyungduk Ko[5] , Myunghun Shin[2]
[1]Department of Energy Environment Policy and Technology, Graduate School of Energy and Environment, Korea University, Republic of Korea, Energy Materials Research Center, Clean Energy Research Division, Korea Institute of Science and Technology, Republic of Korea, Department of Integrative Energy Engineering, College of Engineering, Korea University, Republic of korea
[2]School of Electronics and Information Engineering and Interdisciplinary Program in Space Systems Engineering, Korea Aerospace University, Republic of korea
[3]Department of Energy Environment Policy and Technology, Graduate School of Energy and Environment, Korea University, Republic of korea
[4]Department of Nanophotonic System Research Center, Korea Institute of Science and Technology, Republic of korea
[5]Department of Nanophotonic System Research Center, Korea Institute of Science and Technology, Republic of Korea, KHU-KIST Department of Converging Science and Technology, Kyung Hee University, Republic of korea

2DO.9-OP-3 09:10-09:25

Cu/Ni Electroplating on Pyrolytic Carbon for Solar Cell Metallization

Jens Munk Nielsen[1] , Rasmus Schmidt Davidsen[2] , Stephan Sylvest Keller[1] *
[1]Department of DTU Nanolab – National Centre for Nano Fabrication and Characterization, Technical University of Denmark, Denmark
[2]Department of Electrical and Computer Engineering, Aarhus University, Denmark

2DO.9-OP-4 09:25-09:40

Enhanced Passivation via Boron In-Diffusion Suppression through Multilayer p+ Poly-Si Passivated Contacts for TBC Solar Cells

Zichen Wang[1] * , Yalun Cai[1] , Yuhao Cheng[1] , Shuo Deng[1] , Lizhi Sun[1] , Shona McNab[1] , Fiacre Rougieux[1] , Martin Green[1] , Ning Song[1]
[1]Department of School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australia

2DO.9-OP-5 09:40-09:55

Light-Trapping in C-Si IBC Cells: the Cases of Low and High Thermal Budget Architectures

Engin Ozkol[1] * , Katarina Kovačević[1] , Udo Römer[2] , Yifeng Zhao[1] , Robby Peibst[3] , Olindo Isabella[1]
[1]Department of Photovoltaic Materials and Devices, Photovoltaic Materials and Devices group Delft University of Technology Delft The Netherlands, Netherlands
[2]Department of ISFH, Institute for Solar Energy Research Hamelin, Germany
[3]Department of Institute of Electronic Materials and Devices, Institute of Electronic Materials and Devices, Leibniz Universität Hannover, Germany

2DO.10 Advances in Silicon Cell Manufacturing (3): Industrial TOPCon and Module Integration

Chair(s) Yongseok Jun(Korea University)
Vick Peng(Suzhou Maxwell Technologies Co., Ltd.)

2DO.10-KN-1 10:00-10:30

Mass Production Technology of High-Efficiency N-Type Silicon Modules and Feasibility Studies on Tandem Cells

Taejun Kim[1] * , Sangho Kim[1] , Sephin Cho[1] , Sangkyun Kim[1] , Jinhyung Ahn[1]
[1]Department of RD division, HD Hyundai Energy Solutions, Republic of korea

2DO.10-IV-2 10:30-10:50

High-Efficiency Large-Area p-PERC & TOPCon Cells: Cu-Contacting via LECO Process

Young Woo Ok[1] * , Ajeet Rohatgi[1]
[1]Department of Electrical and Computer Engineering, Georgia Institute of Technology, University Center of Excellence for Photovoltaics, USA

2DO.10-OP-3 10:50-11:05

Edge Passivation in TOPCon Shingle Solar Cells: Combined Evaluation of Junction-Free Edge Technology and Passivated Edge Technology

Alexander Goebel[1] * , Elmar Lohmüller[2] , Jonas De Rose[2] , Rene Haberstroh[2] , Andreas Brand[2] , Sabrina Lohmüller[2] , Sebastian Mack[2] , Ralf Preu[2]
[1]Department of Photovoltaics, Fraunhofer Institute for Solar Energy Systems, University of Freiburg, Department of Sustainable Systems Engineering, Germany
[2]Department of Photovoltaics, Fraunhofer Institute for Solar Energy Systems, Germany

2DO.10-OP-4 11:05-11:20

Spatially Resolved Ultrasonic Encapsulant Characterization in Glass–Glass Photovoltaic Laminates

Rico Meier[1] , Christopher Konu[1] *
[1]Department of Faculty 1 Engineering Sciences Energy and Information, HTW Berlin University of Applied Sciences, Germany

2DO.11 Korea–India Collaboration in Silicon PV: Materials, Manufacturing, and Circularity

Chair(s) Somasundaram Saravanan(EMMVEE Solar Group)
Kwanyong Seo(Ulsan National Institute of Science and Technology)

2DO.11-IV-1 13:30-13:50

India-Korea Scientific Collaboration: Past, Present and Future

Vineet Saini[1]* Dhirendra Tiwari
[1]Department of Science & Technology, Government of India, New Delhi

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2DO.11-IV-2 13:50-14:10

Bridging Research and Industry for Advanced Silicon Photovoltaics at the CAST (Center for Advanced Solar Technology)

Sang Hee Lee[1] * , Munse Kim[1] , Jin Young Lee[1] , Seo Woo Sim[1] , Do Hoe Kim[1] , Yong-Jin Kim[1] , Kyuhyeon Im[1] , Kwan Hong Min[1] , Hee-eun Song[1] , Yunae Cho[1] , Unsoo Kim[1] , Hyungwoo Kim[1] , Kyung Taek Jeong[1] , Hae-Seok Lee[2] , Ka-Hyun Kim[3]

[1]*Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea*

[2]*Department of Graduate School of Energy and Environment (KU-KIST Green School), Korea University, Republic of korea*

[3]*Department of Physics, Chungbuk National University, Republic of korea*

2DO.11-IV-3 14:10-14:30

Development of Silicon Ingots and Solar Cell Fabrication: Modeling & Machine Learning

Srinivasan Manickam[1] *

[1]*Department of Physics, School of Advanced Sciences, Vellore Institute of Technology, India*

2DO.11-IV-4 14:30-14:50

CAST: An Open Innovation Platform for Next-Generation Photovoltaic Technology

Young Joo Eo[1] *

[1]*Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea*

2DO.12 Industrial Silicon Cell Technologies and Module Integration

Chair(s) Sang Hee Lee(Korea Insititute of Energy Research)
Manickam Srinivasan(Vellore Institute of Technology)

2DO.12-IV-1 15:00-15:20

Research and Development of Silicon Heterojunction Solar Cells

Vamsi K Komarala[1] *, Sonpal Singh[1] , Sourav Mandal[1] , Ashutosh Pandey[1] , Shrestha Bhattacharya[1] , Shahnawaz Alam[1] , Silajit Manna[1] , Arnab J Mandal[1] , Kishan Bajpai[1]

[1]*Department of Energy Science and Engineering, Indian Institute of Technology Delhi, India*

2DO.12-IV-2 15:20-15:40

A Highly Fire-Resistant BIPV Module

Ian Lee[1] *

[1]*Department of Sales Marketing, KOES, Republic of korea*

2DO.12-IV-3 15:40-16:00

TOPCon Technology: Driving the Next Generation of Silicon Solar Cells

Saravanan Somasundaram[1] *

[1]*EMMVEE Energy Pvt Ltd, India*

2DO.12-IV-4 16:00-16:20

Redefining Interfacial Defects Dynamics in Silicon Heterojunctions via Decomposition of Dual-Phase Capacitance Transients

Ka-Hyun Kim[1] * , Dohoe Kim[1] , Si Hyeong Lee[1] , Joon-Ho Oh[2] , Hee-eun Song[3]

[1]*Department of Physics, Chungbuk National University, Republic of korea*

[2]*Department of Ulsan Advanced Energy Technology R&D Center, Korea Institute of Energy Research, Republic of korea*

[3]*Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea*

2DO.13 Interface and Optical Engineering for Advanced Photovoltaic Devices

Chair(s) Ka-hyun Kim(Chungbuk National University)
Vamsi K. Kormarala(Indian Institute of Technology Delhi)

2DO.13-IV-1 16:30-16:50

Bridging the Energy Yield Gap in India's Solar Photovoltaic Installations: System-Specific Generation Bottlenecks and Mitigation via Quality Assurance, AI/ML, and Digital Twins

Chandan Banerjee[1] *, Arup Dhar[1]

[1]*Department of R&D, Ministry of New and Renewable Energy, Govt. of India*

2DO.13-IV-2 16:50-17:10

Beyond Transparency: Optically Engineered Crystalline Silicon Solar Cells and Modules

Kwanyong Seo[1] *

[1]*Department of School of Energy and Chemical Engineering, UNIST, Republic of korea*

2DO.13-IV-3 17:10-17:30

Czochralski Mono-Silicon Ingot Manufacturing at Gigawatt Scale for High-Efficiency Solar Cells

Avinash Kumar Meenachi Sundaram*, Rajasekar Elavarasan

[1]*Department of Technology, Raana Semiconductors Private Limited, India*

2DO.13-IV-4 17:30-17:50

Impact of Short Circuit Current Deviation on the Performance of Perovskite and Colored c-Si Photovoltaic Modules

Hyung Jun Song[1] * , Eui Young Oh[1] , Chngil Kim[1] , Jaehwan Ko[1]

[1]*Department of Safety Engineering, Seoul National Univ of Science and Technology, Republic of korea*

4DO.11 Earth-Abundant Chalcogenide, Oxide & Phosphide Absorbers: From Defects to Devices

Chair(s) Maarja Grossberg-Kuusk(Tallinn Univ. of Technology)
Dae-Kue Hwang(Daegu Gyeongbuk Institute of Science and Technology)

4DO.11-IV-1 08:30-08:50

From Structure to Function in Emerging Chalcogenide Semiconductors for Energy Conversion

Mirjana Dimitrievska[1] *

[1]*Department of Nanomaterials Spectroscopy and Imaging, Swiss Federal Laboratories for Materials Science and Technology, University of Zurich, Switzerland*

4DO.11-OP-2 08:50-09:05

Extending Minority-Carrier Lifetime in Cu_2O through Stoichiometry Control

Kosuke Matsuzaki[1] * , Thi Ngoc Huyen Vu[2] , Shota Nunomura[1] , Hitoshi Tampo[1] , Takehiko Nagai[3] , Yu Kumagai[2]

[1]*Department of Core Electronics Technology Research, Institute National Institute of Advanced Industrial Science and Technology, Japan*

[2]*Department of Institute for Materials Research, Tohoku University, Japan*

[3]*Department of Electronic Engineering and Computer Science, Kindai University, Japan*

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4DO.11-OP-3 09:05-09:20

Effect of Composition and Preparation Temperature on Crystal Structure and Optoelectronic Properties of $BaCu_2S_2$ Thin Films

Valentin JaegerWaldau[1] , Galina Gurieva[2] , Lars Steinkopf[2] , Rene Schwiddessen[2] , Thomas Unold[2] , Susan Schorr[3] , Marin Rusu[2] *

[1]Department of Structure and Dynamics of Energy Materials, Helmholtz Zentrum Berlin, University of Groningen, Germany

[2]Department of Structure and Dynamics of Energy Materials, Helmholtz Zentrum Berlin, Germany

[3]Department of Structure and Dynamics of Energy Materials, Helmholtz Zentrum Berlin, Freie Universität Berlin, Germany

4DO.11-OP-4 09:20-09:35

Reactive Epitaxial Growth of Ternary Group-Ii Zinc Phosphides on Zn_3P_2 Toward Earth-Abundant and Environmentally Benign Photovoltaics

Ryoji Katsube[1] *

[1]Department of Materials Process Engineering, Nagoya University, Japan

4DO.11-OP-5 09:35-09:50

Optimization of Aluminum Wet Etching Process in Flexible Thin-Film Solar Cells with Integrated Barrier Layer

Peer Sluijs[1] * , Andres Cruz[1] , Paula Perez-Rodriguez[1] , Malte Vogt[1] , Arno Smets[1]

[1]Department of Photovoltaic Materials and Devices, Delft University of Technology, Netherlands

4DO.12 Sustainable Kesterite, Emerging Absorbers & Spectral Conversion

Chair(s) Mirjana Dimitrievska(University of Zurich (EMPA))
Ryoji Katsube(Nagoya University)

4DO.12-IV-1 10:00-10:20

Recent Advances in Sustainable Cu_2ZnSnS_4 High-efficiency Thin Film Photovoltaics Development

Maarja Grossberg-Kuusk[1] * , Achmad Nasyori[1] , Idil Mengü Mercanlioğlu[1] , Reelika Kaupmees[1] , Valdek Mikli[1] , Mati Danilson[1] , Jüri Krustok[1] , Liisa Kumar[1] , Annabel Saar[1] , Marit Kauk-Kuusik[1]

[1]Department of Materials and Environmental Technology, Tallinn University of Technology, Estonia

4DO.12-OP-2 10:20-10:35

Large-Area Multi-layer MoS_2 Film Growth by Reactive Sputtering for Solar Cell Application

Maarja Grossberg-Kuusk[1] * , Achmad Nasyori[1] , Idil Mengü Mercanlioğlu[1] , Reelika Kaupmee[s1] , Valdek Mikli[1] , Mati Danilson[1] , Jüri Krustok[1] , Liisa Kumar[1] , Annabel Saar[1] , Marit Kauk-Kuusik[1]

[1]Department of Research Center for Advanced Science and Technology, The University of Tokyo, Japan

[2]Department of Polytechnique's engineer program, Ecole Polytechnique, France

4DO.12-OP-3 10:35-10:50

Up-Conversion and down-Conversion Equivalent Circuits to Boost Current in Silicon Solar Cells

Hyunsun Song[1], Gavin Conibeer[1] * , Santosh Shrestha[1] , Yuanxun Liao[1] , Young Hyun Cho[1] , Kai-Yuen Chan[1], Siyuan Ren[1], Siyu Kuang[1]

[1]Department of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australia

4DO.12-OP-4 10:50-11:05

Thin-Film Growth and Defect Engineering of BaS towards Hole Transport Layers for $BaSi_2$ (η~24%) Solar Cells

Ammara Firdous[1] , Koki Hayashi[1] , Nurfauzi Abdillah[1] , Yoichiro Koda[2] , Hikaru Takeshima[2] , Kaoru Toko[3] , Takashi Suemasu[3] * , Masami Mesuda[2]

[1]Department of Degree Program in Pure and Applied Sciences, Graduate School of Science and Technology, University of Tsukuba, Japan

[2]Department of Advanced Materials Research Laboratory, Tosoh Corporation, Japan

[3]Department of Applied Physics, Faculty of Pure and Applied Sciences,, University of Tsukuba, Japan

4DO.12-OP-5 11:05-11:20

Thickness Engineering of $CsPb(Br_{1-x}Cl_x)_3:Yb^{3+}$ Thin Films for Enhanced Near-Infrared Quantum-Cutting Emission toward QC-LSC Applications

Keita Fujimoto[1] , Shinsuke Miyajima[1] *

[1]Department of School of Engineering, Institute of Science Tokyo, Japan

5DO.13 Advanced BIPV Design: Aesthetics, Performance, and Safety

Chair(s) André Augusto(Dalarna University)

5DO.13-KN-1 08:30-09:00

Shaping Urban and Agricultural Futures: The Rise of New Generation Integrated Photovoltaics

Despeisse Matthieu[1] * , Bonnet Eymard Bénédicte[1] , Levrat Jacques[1] , Li Hengyu[1] , Champliaud Jonathan[1] , Petri Delphine[1] , Escarre Jordi[1] , Vuithier Ludovic[1] , Buonassisi Tonio[1] , Ballif Christophe[1] , Bugnon Gregory[2] , Dubail Sebastien[1] , Clauss Frederic[2] , Eberhard Sebastien[2] , Roger Claire[1] , Roch Jonas[3] , Thievent Maeva[3]

[1]Department of Sustainable Energy, CSEM SA, Switzerland

[2]Department of Energy, Solaxess, Switzerland

[3]Department of Agrivoltaics, VOLTIRIS, Switzerland

5DO.13-IV-2 09:00-09:20

Engineering Sunlight into the Urban Fabric: BIPV in Singapore

Carlos Clement[1] *

[1]Department of Solar Energy Research Institute of Singapore, National University of Singapore, Singapore

5DO.13-OP-3 09:20-09:35

Small-Area High-Voltage Photovoltaic Module with High Power and Safety for Urban Applications

Luthfan Fauzan[1] , Min Ju Yun[1] , Hyekyoung Choi[1] , Dong Yoon Lee[1] , Seung I. Cha[1] *

[1]Department of Energy Conversion Research Center, Korea Electrotechnology Research Institute, Republic of korea

[2]Department of Electro-functionality Materials Engineering, University of Science and Technology, Republic of korea

5DO.13-OP-4 09:35-09:50

Analysis of Fire Safety and Combustion Characteristics of BIPV Modules Depending on Lamination Structure and Glass Properties BIPV

Moojoon Kim[1] *

[1]Department of Risk and Safety Research Center, Korean Fire Protection Association, Republic of korea

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5DO.14 Building and Infrastructure-Integrated PV: Field Performance and Impact

Chair(s) Carlos Clement(Solar Energy Research Institute of Singapore)
Ian Lee(KOES)

5DO.14-IV-1 10:00-10:20

BIPV in the Environmental and Energy Labelling

Momir Tabakovic[1] *
[1]Department of Industrial Engineering, FH Technikum Wien, Austria

5DO.14-OP-2 10:20-10:35

Long-Term Field Performance of Cylindrical Photovoltaics in Urban Building Applications

Kento Honma[1] , Shuzi Hayase[2] , Masaki Nakamura[2] , Shinji Yokogawa[2] *
[1]Department of Informatics, Graduate School of Informatics and Engineering, The University of Electro-Communications, Japan
[2]Department of Info-Powered Energy System Research Center, The University of Electro-Communications, Japan

5DO.14-OP-3 10:35-10:50

Long-Term Performance of Building-Attached and Grid-Connected PV Systems in Nordic Climates: Sweden'S Oldest 30+ and 40+ Year-Old PV Systems

André Augusto[1] * , Yusuf Rostom[1] , Emmanouil Psimopoulos[1]
[1]Department of Sustainable Energy Research Centre, Dalarna University, Sweden

5DO.14-OP-4 10:50-11:05

Outdoor Thermal Comfort and Public Acceptance of an Integrated PV Pavilion in the Netherlands: Field Measurements and User Surveys

Yingxin Feng[1] * , Guang Hu[1] , Roel Loonen[2] , Angele Reinders[1]
[1]Department of Mechanical Engineering, Eindhoven University of Technology, Netherlands
[2]Department of Built Environment, Eindhoven University of Technology, Netherlands

5DO.14-OP-5 11:05-11:20

Photovoltaic Noise Barriers: Systematic Comparison of Eight Integration Concepts on a Full-Scale Test Structure

Jacob Forster[1] * , Dr. Martin Heinrich[1] , Giorgi Tsutskiridze[1] , Dr. Christian Reise[1] , Felix Basler1 , Prof. Dr. Holger Neuhaus[1] , Reinhard Kohlhauer[2] , Davide Avantaggiato[3] , Dr. Fabio Strigari[4] , Dr. Wolfram Bartolomäus[4]
[1]Department of PV Module Technology, Fraunhofer Institute for Solar Energy, Germany
[2]Department of CEO, R. Kohlhauer GmbH, Germany
[3]Department of Engineering, etway s.r.l., Italy
[4]Department of Referat V3, Umweltschutz und Immissionen, Bundesanstalt für Straßenwesen, Germany

5DO.15 PV in Diverse Environments: Climate Resilience, Floating PV, and Agri-PV

Chair(s) Jae-hak Jung(Yeungnam University)
Ulrike Jahn(Fraunhofer CSP)

5DO.15-KN-1 13:30-14:00

Climate-Resilient Design and Operation of Photovoltaic Systems: Environmental Risks and Mitigation Strategies

Leonardo Micheli[1] *
[1]Department of Electrical and Energy Engineering, Sapienza University of Rome, Italy

5DO.15-IV-2 14:00-14:20

Present and Future of AX/DX in the Floating PV Industery(from Floating Power Plants to Intelligent Water Energy Platforms)

Janghee Kang[1] *
[1]Department of New Business and Fusion Lab, Scotra, Republic of korea

5DO.15-OP-3 14:20-14:35

Global Assessment of Wave-Induced Losses for Offshore Floating PV using the SWIFT Surrogate Model

Sri Sathya Sai Shanka Vasuki[1] * , Teddy Simanjuntak[2] , Olindo Isabella[1] , Rudi Santbergen[1]
[1]Department of Faculty Electrical Engineering Mathematics and Computer Science, Photovoltaic Materials and Devices, Delft University of Technology, Netherlands
[2]Department of Shell Global Solutions International B.V, Shell Global Solutions International B.V, Netherlands

5DO.15-OP-4 14:35-14:50

A GIS-AHP Framework for Agrivoltaic Site Suitability Assessment in Japan

Pawita Bunme[1] * , Takumi Takashima[1] , Takashi Oozeki[1]
[1]Department of Renewable Energy Advanced Research Center, National Institute of Advanced Industrial Science and Technology, Japan

5DO.16 Agri-PV and Floating PV: Design, Environmental Interaction, and Applications

Chair(s) Jae-hak Jung(Yeungnam University)
Leonardo Micheli(Sapienza University of Rome)

5DO.16-IV-1 15:00-15:20

Research on Plant Growth and Potential Analysis in Agripv Systems

Matthias MeierGruell[1] * , Christoph Jedmowski[1] , Onno Muller[1] , Erekle Chakhvashvili[1] , Avinash Agarwal[1] , Chantal Kierdorf[2] , Sandra Venghaus[3]
[1]Department of Plant Sciences, Research Center Juelich, Germany
[2]Department of Systems Analysis, Research Center Juelich, Germany
[3]Department of School of Business and Economics, RWTH Aachen University, Germany

5DO.16-IV-2 15:20-15:40

Technological Trends in Floating Solar Power Systems

Changsub Won[1] *
[1]Mirae Solar power, Republic of korea

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5DO.16-OP-3 15:40-15:55

Development of an Offshore Floating Photovoltaic Floater Concept Optimized for Marine Environments with a Shared Mooring Scheme

Sanggil Lee[1] * , Donghwan Lee[2]
[1]Department of CEO, ZENTECH Engineering And Consultant, Republic of korea
[2]Department of Marine Department, ZENTECH Engineering And Consultant, Republic of korea

5DO.16-OP-4 15:55-16:10

Combining Semi-Transparent c-Si PV Modules and Apple Orchards in Agrivoltaic Systems

Shu-Ngwa Asa'a[1] *
[1]Department of Engineering Technology, Hasselt University, Imec, EnergyVille, Belgium

5DO.16-OP-5 16:10-16:25

AI-Based Adaptive Agrivoltaic Photovoltaic System for Climate-Resilient Vineyard Energy and Microclimate Management

DaiHwan Lim[1] , Jinsung Kim[2] , Youngyun Jung[2] , HyunHo Hwang[3] *
[1]Department of Smart AI Data Lab, Hoseo university, Republic of korea
[2]Department of laboratory, Dongyang Union Engineering Co., Ltd., Republic of korea
[3]Department of Defense Convergence Technology, Hanyang Cyber University, Republic of korea

5DO.17 Advances in Integrated-PV Technology, Safety, and Implementation

Chair(s) Delfina Muñoz(CEA INES)
Matthieu Despeisse(CSEM SA)

5DO.17-IV-1 16:30-16:50

A Nearshore Offshore Floating Photovoltaic Test Infrastructure for Technology Validation: Lessons Learned from the EKIOCEAN and NATURSEA Projects

Eduardo Román[1] *
[1]TECNALIA RESEARCH & INNOVATION

5DO.17-IV-2 16:50-17:10

A Highly Fire-Resistant BIPV Module

Ian Lee[1] *
[1]Department of Sales Marketing, KOES, Republic of korea

5DO.17-IV-3 17:10-17:30

Recent BIPV Technology Trends and Construction Cases in Korea

Cheolho Kim[1] *
[1]Department of Business Development, Sejong International Co Ltd, Republic of korea

5DO.17-IV-4 17:30-17:50

Development and Implementation of a PV Roll-Screen System

Hisashi Ishii[1] *
[1]LIXIL Corporation

6DO.9 PV-driven Energy Conversion and Hybrid Concepts

Chair(s) Uk Sim(Sungkyunkwan University)

6DO.9-KN-1 13:30-14:00

Perovskite Quantum Dots for Solar Cells and Beyond

Lianzhou Wang[1] *
[1]Department of Chemistry, The Hong Kong Polytechnic University, China

6DO.9-IV-2 14:00-14:20

Layered Mixed-Anion Photocatalysts for Solar Water Splitting

Hajime Suzuki[1] *
[1]Department of Depertment of Chemical Science and Engineering, Kyoto University, Japan

6DO.9-OP-3 14:20-14:35

Numerical Study and Sustainable Evaluation of a PVT-Powered Desalination System Hybrid with PEM Electrolysis for Green Hydrogen and Freshwater Co-Production

Ahmed S. Alsaman[1] * , Ehab S. Abdelaal[1] , Rached Ben-Mansour[1] , Ridha Ben Mansour[1]
[1]Department of Interdisciplinary Research Center for Sustainable Energy Systems, Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals, Saudi arabia

6DO.9-OP-4 14:35-14:50

Photovoltaic Conversion Efficiency of a GaAs Solar Cell Module with a Cross-Wiring Structure under Non-Uniform Laser Irradiation

Shion Kosugi[1] , Riku Maeno[1] , Gin Hirano[1] , Haruto Sato[1] , Ryoga Kakiuchi[1] , Yuto Kaneko[1] , Kenta Mutsuzaki[1] , Riku Jinno[1] , Sawane Nabekura[1] , Masaki Ayukawa[2] , Masaki Maeda[2] , Kazuyuki Iizuka[2] , Toshihiko Fukamachi[2] , Kouichi Akahane[3] , Shiro Uchida[1] *
[1]Department of Advanced Materials Science and Engineering Course, Chiba Institute of Technology, Japan
[2]Department of Optical Process Division, Ushio Inc., Japan
[3]Department of Corporate Planning, NICT, Japan

6DO.10 PV-driven Energy Conversion and Hybrid Concepts

Chair(s) Uk Sim(Sungkyunkwan University)

6DO.10-IV-1 15:00-15:20

High-Performance Semiconducting Polymers for Organic Photovoltaics and Organic Photocatalysts

Tsubasa Mikie[1] *
[1]Department of Graduate School of Advanced Science and Engineering, Hiroshima University, Japan

6DO.10-IV-2 15:20-15:40

Breaking the Limitations of Ab Initio Methods in Photochemical Reaction Modeling - Combinations of Statistics Mechanics, Analytic Models, and DFT Calculations

Heechae Choi[1] *
[1]Department of Chemistry and Materials Science, Xian Jiaotong Liverpool University, China

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Thursday, November 19

6DO.10-OP-3 15:40-15:55

Technical-Economic Evaluation of the Implementation of a Green Hydrogen Storage System Based on Photovoltaic Unserved Energy

Patricio Lefort[1] * , Matias Mendez[1]
[1]Department of Electrical Engineering, University of Santiago of Chile, Chile

6DO.10-OP-4 15:55-16:10

Stabilizing Silicon Photoelectrodes for Efficient and Scalable Solar Fuel Production

Ilhyung Choi[1] , Thomas F. Jaramillo[1] , Kwanyong Seo[1] , Ji-Wook Jang[1]
[1]Ulsan National Institute of Science and Technology

7DO.4 PV Growth & Energy Transition

Chair(s) Youru Tan(BloombergNEF)
Changyeol Yun(Korea Institute of Energy Research)

7DO.4-KN-1 08:30-09:00

Dawn of the Solar Age: Photovoltaics as the Core for a Sustainable Civilisation

Christian Breyer[1] *
[1]Lappeenranta–Lahti University of Technology

7DO.4-IV-2 09:00-09:20

Integrating Climate-Change-Based Renewable Energy Potential into Korea's Net-Zero 2050 Energy Planning

Chang Ki Kim[1] * , Changyeol Yun[2] , Jin Young Kim[2]
[1]Department of Energy Engineering, University of Science and Technology, Korea Institute of Energy Research, Republic of korea
[2]Department of Renewable Energy Big Data Laboratory, Korea Institute of Energy Research, Republic of korea

7DO.4-IV-3 09:20-09:40

Sustainable Penetration of Photovoltaics for Carbon Neutrality

Shigeru Niki[1] * , Yasuaki Akagi[1] , Shigeki Hara[1]
[1]New Energy and Industrial Technology Development Organization

7DO.4-IV-4 09:40-09:55

Trends of PV Market and Industry

Izumi Kaizuka[1] * , Melodie de l'Epine[2] , Johan Lindahl[3] , Arnulf Jaeger-Waldau[4] , Jose Donso[5]
[1]RTS Corporation, IEA PVPS Task1, Japan
[2]IEA PVPS Task1, Co-manager, France
[3]Becquerel Sweden, Sweden
[4]EC Joint Research Center, Italy
[5]UNEF, Spain

7DO.5 "INDUSTRY FORUM I" Solar & Storage - Scaling Solar Through Storage

Chair(s) Arnulf Jäger-Waldau(European Commission Joint Research Centre)
Laurie Burnham(Sandia National Laboratories)

These sessions were partially supported by Korea Institute of Energy Research (KIER) and Korea Environment Industry & Technology Institute (KEITI) through National R&D program on Integrated Management Technology Carbon Regulations, funded by Ministry of Climate, Energy, and Environment (MCEE), and was carried out by the GHG Reduction Potential Assessment Consortium based on the Technology Database for Carbon Neutrality(RS-2025-02213126)

7DO.5-KN-1 10:00-10:30

Scaling Solar Through Storage: How Low-Cost Battery Manufacturing Can Accelerate Global PV Deployment

Peter Fath[1] *
[1]RCT Power

7DO.5-KN-2 10:30-11:30

Panel Discussion

Gaëtan Masson, Becquerel Institute
Danielle Merfeld, Hanwha Qcells
Sungtaek Lim, OCI Power
Shin Han ,H2 Inc.

7DO.6 "INDUSTRY FORUM II" Power System Flexibility - Transforming Power Systems for a Solar-Dominated Future

Chair(s) Christian Breyer(Lappeenranta–Lahti University of Technology)
Junhyun Cho(Korea Institute of Energy Research)

These sessions were partially supported by Korea Institute of Energy Research (KIER) and Korea Environment Industry & Technology Institute (KEITI) through National R&D program on Integrated Management Technology Carbon Regulations, funded by Ministry of Climate, Energy, and Environment (MCEE), and was carried out by the GHG Reduction Potential Assessment Consortium based on the Technology Database for Carbon Neutrality(RS-2025-02213126).

7DO.6-IV-1 13:30-13:50

Economic Impacts of Distributed Energy Resources for Utility Scale and Commercial and Industrial Scale Photovoltaics Plus Battery Energy Storage Systems for Power Grid Stability

Benjamin Damiani[1] * , Graham McClone[1]
[1]Department of Engineering, Cherry Street Energy, USA

7DO.6-IV-2 13:50-14:10

Flexibility, Storage and Curtailment in High VRE Power Grids

Jan Remund[1], Marc Perez[4] * , Marco Pierro[2] , Richard Perez[3]
[1]Department of Solar Energy & Climatology, Meteotest, Switzerland
[2]Department of Research, EURAC, Italy
[3]Department of Atmospheric Science, State University of New York at Albany, USA
[4]Department of Research, Clean Power Research, USA

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7DO.6-IV-3 14:10-14:30

From "How Much" to "What, When, and What to Prepare": the Right Questions for Power System Models in the Solar Century

Seung Wan Kim[1] *
[1]Department of Energy Policy Institute, Korea Institute of Energy Technology, Republic of korea

14:30-15:00

Q&A

7DO.7 Sustainability & Recycling

Chair(s) Moonyong Kim(University of New South Wales)
Jin Seok Lee(Korea Institute of Energy Research)

7DO.7-IV-1 15:10-15:30

Hydrometallurgical Recovery of Metals from End-of-Life Silicon Solar Cells

Meng Tao[1] * , Randall Adcock[1] , Elijah Effah[1]
[1]Department of School of Electrical, Computer and Energy Engineering, Arizona State University, USA

7DO.7-OP-2 15:30-15:45

Integrated Backsheet Removal and Pyrolysis in a Single Furnace for Photovoltaic Recycling

Ke Li[1] , Yansong Shen[1] *
[1]Department of Engineering, University of New South Wales, Australia

7DO.7-OP-3 15:45-16:00

Circular and Sustainable Pathways for Photovoltaic Modules

Urvashi Bothra[1] * , Sebastian Weemaes[1] , Amr Ghazy[2] , Yi Zheng[1] , Thomas Rijsman[1] , Alberto Poli[3] , Ian Lin[3] , Engin Özkol[1] , Siemen Brinksma[3] , Olindo Isabella[1] , Malte Ruben Vogt[1]
[1]Department of EEMCS, Delft University of Technology, Netherlands
[2]Department of ALD, Kalpana Systems, Netherlands
[3]Department of PV Module, Biosphere Solar, Netherlands

7DO.7-OP-4 16:00-16:15

PV Module Recycling Technologies in Japan: Current Capabilities and Remaining Technical Challenges

Keiichi Komoto[2] , Mei Nagase[1] * , Ami Togami[1]
[1]Department of Energy and Sustainability Unit, Mitsubishi Research Institute Inc, Japan
[2]Department of The Headquarters of Advanced Research Promotion, University of Miyazaki, Japan

7DO.8 PV in Distributed Energy Systems

Chair(s) Christian Breyer(Lappeenranta–Lahti University of Technology)
Seungwan Kim(Korea Institute of Energy Technology)

7DO.8-OP-1 16:25-16:40

Real-World Adoption and Energy Performance of Vehicle-to-Home Systems in the Transition toward SolarEV City

Takuro Kobashi[1] * , Yuto Ishii[1] , Yuki Ogawa[2]
[1]Department of Graduate School of Environmental Studies, Tohoku University, Japan
[2]Department of E-konzal, E-konzal, Japan

7DO.8-OP-2 16:40-16:55

Aggregator-Mediated Utilization of Residential PV Surplus for Electric Bus Charging and Local Energy Circulation

Hiroyuki Ohtsuka[1] * , Yuzuru Ueda[1] , Jindan Cui[1]
[1]Department of Electrical engineering, Tokyo University of Science, Japan

7DO.8-OP-3 16:55-17:10

Energy Hubs for Balancing Local Energy Demand and Supply from Renewables

Miroslav Zeman[1] * , G. Rituraj[1] , L. van Trigt[1] , M. Kreijns[1] , A. van der Zee[1]
[1]Department of The Green Village, Delft University of Technology, Netherlands

7DO.8-OP-4 17:10-17:25

Cost-Optimal Utilization of Surplus Renewable Power via Batteries and a Multi-Carrier Hydrogen System in Japan's 2050 Power System Scenario

Taiyo Fujisaka[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
[1]Department of Electrical Engineering, Tokyo University of Science, Japan

7DO.8-OP-5 17:25-17:40

Resilience to natural disasters with PV and EV: Probability model enhanced by social science dynamics

Kenji Araki[1] * , Keiichi Komoto[1] , Yasuyuki Ota[1] , Kensuke Nishioka[1]
[1]Department of GX Research Center, University of Miyazaki, Japan

7DO.8-OP-6 17:40-17:55

Detection and Quantification of Rogue Grid-Connected PV Systems by Remote Sensing in Sweden, Belgium, and South Africa

Johan Lindahl[1] * , Erik Lindvall[1] , Lynette D'Emiljo[2] , Elina Bosch[3] , Miguel Lezana Pascual[1] , Gaëtan Masson[3]
[1]Department of Corporate Office, Becquerel Sweden, Sweden
[2]Department of Geographic Information Services, City of Cape Town, South africa
[3]Department of Corporate Office, Becquerel Institute, Belgium

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	ROOM		
Time	Session Room 1 (101-102)	Session Room 2 (103)	Session Room 4 (107-108)
8:30	**08:30 - 10:00**	**08:30 - 10:00**	**08:30 - 10:00**
9:00	**2EO.14** Diagnostics, Degradation and Modelling of Silicon Solar Cells	**7EO.9** Reliability & Circularity	**5EO.18** Integrated PV Applications: From Buildings to Agriculture
9:30			
10:00			
10:30			
11:00			
11:30			
12:00			

ROOM		
Session Room 5(201-202)	Session Room 6 (204-205)	
08:30 - 10:00	**08:30 - 10:00**	
1EO.11 Si Based Tandem Cells and Modules	**6EO.11** PV-driven Energy Conversion and Hybrid Concepts	
10:00 - 11:00		
Plenary Session 5		
11:00 - 12:30		
Closing Ceremony		

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Friday, November 20

Plenary Session 5

Chair(s) Haeseok Lee(Korea University)

PI.5 10:00-11:00

Building the Next Generation of Solar: Qcells' Path from Silicon Innovation to Perovskite-Silicon Tandem

Danielle Merfeld[1] *
[1]Department of Technology Group, Hanwha Qcells, USA

1EO.11 Si Based Tandem Cells and Modules

Chair(s) Beom-Soo Kim(Korea Research Institute of Chemical Technology)

1EO.11-OP-1 08:30-08:45

Wafer-Sized Bifacial Perovskite/Si Tandem Solar Cells: Research Activities at KIER

SeJin Ahn[1] , Junseop Byeon[1] , Ahreum Lee[1] , Yu Jin Kim[1] , Yimhyun Jo[1] , Minjin Kim[2] , Junyeong Lee[2] , Sungjum Hong[1] *
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea
[2]Department of Ulsan Advanced Energy Technology R&D Center, Korea Institute of Energy Research, Republic of korea

1EO.11-OP-2 08:45-09:00

Wide Gap Chalcopyrites as Top Cells: Recent Progress in Tandem Cells

Susanne Siebentritt[1] * , Kulwinder Kaur[1] , Trong Tien Le[1] , Boaz Koren[1] , Michele Melchiorre[1]
[1]Department of Laboratory of Photovoltaics Department of Physics and Material Science, University of Luxembourg, Luxembourg

1EO.11-OP-3 09:00-09:15

Imaging Local Distribution of Series Resistance of Monolithic Perovskite/Silicon Tandem Solar Cells Using Photoluminescence

Anh Bui[1] , Oliver Fischer[3] , Yan Zhu[2] , Shuai Nie[2] , Tanushree Nath[2] , Yi Hui Hou[1] , Wei Wang[1] , Khoa Nguyen[1] , Ary Anggara Wibowo[1] , Jann Landgraf[3] , Juliane Borchert[3] , Florian Schindler[3] , Heping Shen[1] , Hieu Nguyen[1] , Stefan Glunz[3] , Ziv Hameiri[2] , Martin Schubert[3] , Daniel Macdonald[1] *
[1]Department of School of Engineering, The Australian National University, Australia
[2]Department of School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[3]Department of Department Quality Assurance, Characterization and Simulation, Fraunhofer Institute for Solar Energy Systems ISE, Germany

1EO.11-OP-4 09:15-09:30

Understanding UV-Induced Changes in Transparent Conductive Oxides for Tandem Photovoltaics

Francesc Puchal Salat[1] * , Emma Lee[1] , William S. J. Skinner[1] , Theodore D. C. Hobson[1] , John O'Sullivan[1] , Yuelin Xiong[1] , Juan Gutierrez[1] , Robert S. Weatherup[1] , Ruy S. Bonilla[1]
[1]Department of Materials, University of Oxford, UK

1EO.11-OP-5 09:30-09:45

Molecularly Engineered Fullerenes Enables Efficient and Robust Perovskite/Silicon Tandem Solar Cells

Henning Richter[2] , Adi Prasetio[1] , Ahmed Ali Said[1] , Muhibullah Al Mubarok[1], Edward A. Jackson[3], Bryan C. Schofield[2] , Thomas G. Allen[1] , Stefaan De Wolf[1] *
[1]Department of Center for Renewable Energy and Storage Technologies, King Abdullah University of Science and Technology, Saudi arabia
[2]Nano-C, Inc., USA
3Nano-C, Inc., 33 Southwest Park, Westwood, USA

2EO.14 Diagnostics, Degradation and Modelling of Silicon Solar Cells

Chair(s) Thien Truong(National Laboratory of the Rockies)

2EO.14-IV-1 08:30-08:50

Development of TOPCon Structures for Bottom Cell Applications

Rabin Basnet[1] * , Zhongshu Yang[1] , Anita Rose Varghese[1] , Viqar Ahmad[1] , Menglei Xu[2] , Daniel Macdonald[1]
[1]Department of School of Engineering, The Australian National University, Australia
[2]Department of Cell R&D, Zhejiang Jinkosolar, China

2EO.14-IV-2 08:50-09:10

Multistage Regression Models for the Design of Multilayer Thin Films in Heterojunction Solar Cells

Noritaka Usami[1] *
[1]Department of Graduate School of Engineering, Nagoya University, Japan

2EO.14-OP-3 09:10-09:25

Role of Confined Molecular H_2 in the Passivation of Defective Silicon Revealed by First-Principles Simulations

Hania Azzam[1] * , Tobias Binninger[1] , Uwe Rau[2] , Michael Eikerling[3]
[1]Department of Institute of Theory and Computation of Energy Materials, Forschungszentrum Jülich, Germany
[2]Department of Institute of Energy Materials and Devices - Photovoltaics, Forschungszentrum Jülich, Germany
[3]Department of Chair of Theory and Computation of Energy Materials, Faculty of Georesources and Materials Engineering, RWTH Aachen University, 52062 Aachen, Institute of Theory and Computation of Energy Materials, Forschungszentrum Jülich, Germany

2EO.14-OP-4 09:25-09:40

Understanding Damp-Heat Degradation of AZO Transparent Conducting Oxides for Sustainable Solar Cells

John OSullivan[1] * , Matthew Wright[1] , Soumyajit Maitra[1] , Francesc Puchal Salat[1] , Yuelin Xiong[1] , Theodore Hobson[1] , Juan Gutierrez[1] , Veronica Celorrio[2] , Dave Grinter[2] , Pilar Ferrer[2] , Karl-Augustin Zaininger[3] , Henry Snaith[3] , Ruy Sebastian Bonilla[1]
[1]Department Of Materials, University Of Oxford, UK
[2]Department of Diamond Light Source, Harwell Science and Innovation Campus, UK
[3]Department of Physics, University Of Oxford, UK

2EO.14-OP-5 09:40-09:55

Analytical Mapping from Open Circuit to Maximum-Power-Point Lifetime in Silicon Solar Cells

Alfredo Sanchez Garcia[1] *
[1]Department of Sustainable Energy Technology, SINTEF, Norway

Technical Program

Friday, November 20

5EO.18 Integrated PV Applications: From Buildings to Agriculture

Chair(s) Jae-hak Jung(Yeungnam University)
Young-Su Kim(Research Institute of Industrial Science & Technology)

5EO.18-IV-1 08:30-08:50

Integrating BIPV Systems for Safety and Performance: Practical Implementation and Future Extensions

Yong Jun Park[1] , Mun Su Han[2] *
[1]Department of Executive Office, Hanbit Innotech Co Ltd, Republic of korea
[2]Department of Strategy Planning Office, Hanbit Innotech Co Ltd, Republic of korea

5EO.18-IV-2 08:50-09:10

Development and Performance Evaluation of Vertical Fence-Type Agrivoltaic Photovoltaic Systems in Rural Areas

Hyeongno Lee[1] *
[1]Department of R&D, GrandSun Technology Co., Ltd, Republic of korea

5EO.18-IV-3 09:10-09:30

Energy and BIPV Application Technologies of EnergyX DY Building, Korea's First Private Building to Achieve ZEB Plus Certification and LEED Gold

Duhwan Lee[1] *, Seulki Sung[1]
[1]Team Leader, Technology Strategy Team, Eco-Friendly Technology Group, EnergyX Inc., Seoul, Korea

5EO.18-IV-4 09:30-09:50

Floating Solar: Calm Waters or Stormy Seas? Status and Outlook of Floating PV

Thomas Reindl[1]
[1]Solar Energy Research Institute of Singapore (SERIS)

6EO.11 PV-driven Energy Conversion and Hybrid Concepts

Chair(s) Uk Sim(Sungkyunkwan University)

6EO.11-KN-1 08:30-09:00

Photovoltaic-Electrocatalysis for Unassisted Solar Fuel Generation

Ho Won Jang[1] *
[1]Department of Materials Science and Engineering, Seoul National University, Republic of korea

6EO.11-KN-2 09:00-09:30

Toward Practical Photoelectrochemical Solar Fuel Production Using PV Materials

Ji-Wook Jang*
[1]Ulsan National Institute of Science and Technology

6EO.11-OP-3 09:30-09:45

Epitaxial Growth of 2D-GaSe on Si Substrates for Mechanical ELO of GaAs Layers

Nobuaki Kojima[1] * , Seigo Kuriyama[1]
[1]Department of Research Center for Smart Energy Technology, Toyota Technological Institute, Japan

7EO.9 Reliability & Circularity

Chair(s) Soo Young Oh(Yeungnam University)
Young Joo Eo(Korea Institute of Energy Research)

7EO.9-IV-1 08:30-08:50

Reliability and Quality Assurance as a Foundation for Bankability, Risk Assessment, and Scalable Deployment of Photovoltaics

Claudia Buerhop-Lutz[1] * , Ian Marius Peters[1]
[1]Department of HI ERN, Forschungszentrum Juelich GmbH, Germany

7EO.9-IV-2 08:50-09:10

PV Plant Reliability: A Global Snapshot Across Six-Continents

Laurie Burnham[1] *
[1]Sandia National Laboratories

7EO.9-OP-3 09:10-09:25

Barriers and Strategies for Repair in Integrated Photovoltaic Systems: An Analysis of Non-Technical Constraints and Maintainers Survey

Melodie de l'Epine[1] * , Jose M Vega de Seoane[2] , Elina Bosch[3] , Anna Barguès[1] , Juan Ignacio Martinez[2]
[1]Department of Becquerel Institute France, Becquerel Institute France, France
[2]Department of Becquerel Institute Espana, Becquerel Institute Espana, Spain
[3]Department of Becquerel Institute, Becquerel Institute, Belgium

7EO.9-OP-4 09:25-09:40

Electrical Safety Qualifications of Decommissioned PV Modules for Scalable Second-Life Deployment

Rabin Basnet[1] * , Gabriel Nelson[2] , Guy Beaucarne[3] , Michelle McCann[2] , Marco Ernst[1]
[1]Department of School of Engineering, The Australian National University, Australia
[2]Department of PV Lab, PV Lab Australia, Australia
[3]Department of Building and Infrastructure support & Development, DOW Silicones, Belgium

Poster Session

Monday, November 16

Area 2-1. Silicon Materials, Processing and Engineering

2-1-AP-01 **Chemically Relevant Damp-Heat Accelerated Ageing for Linking Cell-Level Degradation to Module Reliability in TOPCon Solar Cells**

Xinyuan Wu[1] * , Wei Wu[2] , Weiguang Yang[2] , Yan Zhang[2] , Jiexi Fu[1] , Xutao Wang[1] , Jing Yuan[2] , Jianjun Nie[2] , Zhencong Qiao[2] , Chao An[2] , Feng Li[2] , Lin Lv[2] , Baochen Liao[3] , Bram Hoex[1]
[1]Department of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia
[2]Department of R&D Department, Jolywood Solar Technology Co., Ltd, China
[3]Department of Information Science and Technology, Nantong University, China

2-1-AP-02 **Ultra-High-Intensity Laser Light Soaking of Silicon Heterojunction Solar Cells: From Localized Fundamental Studies to Full-Area Processing**

Benedikt Fischer[1] * , Hitoshi Sai[1] , Zhihao Xu[1] , Maurice Nuys[1] , Andreas Lambertz[1] , Volker Lauterbach[1] , Kaining Ding[1] , Uwe Rau[1] , Takuya Matsui[1]
[1]Department of IMD-3, Forschungszentrum Juelich GmbH, Germany
[2]Department of Global Zero Emission Research Center, National Institute of Advanced Industrial Science and Technology, Japan
[3]Department of Energy Building Services Environmental Engineering, University of Applied Sciences Muenster, Germany

2-1-AP-03 **Assessment of Cu-Induced Effects in n+ and p+ Poly-Si Passivated Contacts: Evidence of Passivation Recovery and Thermal Robustness**

Farouk Badr[1] * , Farouk Badr[3] , Tom Ratcliff[2] , Zhongshu Yang[1] , Daniel MacDonald[1] , Anyao Liu[1]
[1]Department of Engineering, Australian National University, Australia
[2]Department of Research School of Physics, Electronic Materials Engineering, Research School of Physics, Australian National University, Australia
[3]Department of Faculty of Engineering, Mansoura University, Mechanical Power Engineering Department, Faculty of Engineering, Mansoura University, Egypt

2-1-AP-04 **Comparing Sb- and P-doped n-type Industrial RCz Silicon Wafers for High-Efficiency Solar Cells**

Afsaneh Kashizadeh[1] * , Rabin Basnet[1] , AnYao Liu[1] , Wei Han[2] , Yichun Wang[2] , Daniel MacDonald[1]
[1]Department of Engineering, Australian National University, Australia
[2]Department of R&D Center-Wafer Business Unit, LONGi Green Energy Technology, China

2-1-AP-05 **SMART: Selective Masking Anodic Refined Texturing for Advanced Light Trapping in Silicon Solar Cells**

Sanchuan Wang[1] * , Pei-Chieh Hsiao[1] , Zibo Zhou[1] , Zhiyuan Chen[1] , Martin Green[1] , Jessica Jiang[1]
[1]Department of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

2-1-AP-06 **A Theoretical-Experimental Model for High-Temperature Nitrogen Diffusion and Defect Suppression in Monocrystalline Silicon Wafers**

Veronica Gonzalez[1] , Marija Demicoli[1] , Luciano Mule' Stagno[1] *
[1]Department of Institute for Sustainable Energy, University of Malta, Malta

2-1-AP-07 **Multi Inlet Argon Gas Flow for Enhanced Thermal Stability and Reduced Thermal Stress in Czochralski Silicon Crystal Growth for PV Applications**

Gokul Jayavel[1] , Srinivasan Manickam[1] *
[1]Department of Physics, Sri Sivasubramaniya Nadar College of Engineering, Research Centre Sri Sivasubramaniya Nadar College of Engineering, India

2-1-AP-08 **Passivation Properties of Tunnel Oxide Passivated Contacts for High-Efficiency Rear-Emitter p-Type Crystalline Silicon Solar Cells**

YongJin Kim[1] , Seo Woo Sim[2] , Minsoo Jeong[3] , Munse Kim[3] , Dohyung Kim[4] , Unsoo Kim[1] , Yunae Cho[1] , Sang Hee Lee[1] , Hyungwoo Kim[1] , Kyung Taek Jeong[1] , Ka-Hyun Kim[2] , Hee-eun Song[1] *
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of Korea
[2]Department of Physics, Chungbuk National University, Republic of Korea
[3]Department of Energy and Environment, Korea University, Republic of Korea
[4]Department of Advanced Materials Engineering, Chungbuk National University, Republic of Korea

2-1-AP-09 **Thermal Treatment of Silver Catalysts for Enhanced Anisotropic Metal-Assisted Chemical Etching of Silicon**

Yejin Han[1] , Jihwan Jeong[1] , Soohyeok Park[1] , Han-don Um[1] *
[1]Department of Chemical Engineering, Kangwon National University, Republic of korea

2-1-AP-11 **Demonstration of Control over the Initiation Point of Explosive Crystallization via Laser-Assisted FLA and Exploration of Optimal Conditions**

Souma Shimabukuro[1] * , Kensaku Maeda[1] , Keisuke Ohdaira[1]
[1]Department of Advanced Science and Technology, Japan Advanced Institute of Science and Technology, Japan

2-1-AP-12 **Cost Reduction Approaches for Silicon Heterojunction Solar Cells**

Maha Aida[1] , Muhammad Quddamah Khokhar[2] , Mengmeng Chu[3] , Hyejeong Jin[2] , Junsin Yi[2] *
[1]Department of Future Energy Engineering, Sungkyunkwan University, Republic of korea
[2]Department of Electrical and Computer Engineering, Sungkyunkwan University, Republic of korea
[3]Department of Interdisciplinary Program in Photovoltaic System Engineering, Sungkyunkwan University, Republic of korea

2-1-AP-13 **Indium-Lean Silicon Heterojunction Solar Cells Enabled by Magnetron-Sputtered SnOX-Based Contact Layers**

Alexandr Zamchiy[1] , Hassan Osman[1] , Alexander Eberst[1] * , Benjamin Klingebiel[1] , Karsten Bittkau[1] , Andreas Lambertz[1] , Kaining Ding[1]
[1]Department of Institute of Energy, Materials and Devices - Photovoltaics, Forschungszentrum Jülich GmbH, Germany

2-1-AP-14 **Enhancing the Passivation Properties of Intrinsic Hydrogenated Amorphous Silicon for Silicon Heterojunction Solar Cells**

Soo-Won Choi[1] , Jungdae Kwon[1] * , Kwanyong Seo[2]
[1]Department of Energy Environment Materials Research Division, Korea Institute of Materials Science, Republic of korea
[2]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of korea

2-1-AP-15 **Effect of Two-Step Sputtering Power Scaling on the Structural Reversibility and Carrier Lifetime of Silicon Heterojunctions**

Keerthivasan Thamotharan[1] , Hiroto Yamaguchi[1] , Noritaka Usami[1] *
[1]Department of Materials Process Engineering, Nagoya University, Japan

2-1-AP-16 **Transparent Beads Mitigate Incident-Angle Loss in Silicon Microwire Solar Cells**

Youri Lee[1] , Kangmin Lee[2] , Kwanyong Seo[1] *
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of korea
[2]Department of Energy and Environmental Engineering, The Catholic University of Korea, Republic of korea

2-1-AP-17 **Progress of crystal growth technology of solar silicon: the most dynamic sector in PV industry**

Chungwen Lan[1] *
[1]Department of Chemical Engineering Department, National Taiwan University, Chinese taipei

2-1-AP-18 **Novel Design of Transparent Crystalline Silicon Solar Cells for a Wide Viewing Angle**

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2-1-AP-19 **Scalable Transparent Silicon Solar Cells via Conventional-Compatible Processes**

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2-1-AP-20 **Modularization of Transparent Crystalline Silicon Solar Cells for Window Applications**
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2-1-AP-21 **From Planar to Spherical Photovoltaics for Advanced Single Junction and Tandem Solar Cells**
Rafi Ur Rahman[1] , Junsin Yi[1] * , Muhammad Quddamah Khokhar[1] , Hasnain Yousuf[2] , Alamgeer[2]
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2-1-AP-22 **Maskless Inkjet Printing of n+ Poly-Si Fingers for TOPCon Solar Cells**
Jiali Wang[1] * , Zhongshu Yang[1] , Gabriel Bartholazzi Lugao De Carvalho[1] , Anh Dinh Bui[1] , Menglei Xu[2] , Peiting Zheng[2] , Jie Yang[2] , Xinyu Zhang[2] , AnYao Liu[1] , Daniel Macdonald[1]
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2-1-AP-23 **Surface, Doping and Temperature Control of Hydrogen Charge States, Diffusion and Boron Deactivation in Silicon**
Riley Fittock[1] * , Lahiruni Ranasinghe[1] , Shona McNab[1] , Muhammad Umair Khan[1] , Alison Ciesla[1]
[1]Department of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australia

2-1-AP-24 **Bond-Resolved Hydrogen Dynamics in PECVD SiN_x:H: Linking Local N–H Configuration to Passivation Performance**
Lahiruni Ranasinghe[1] * , Muhammad Umair Khan[1] , Shona McNab[1] , Alvin Mo[1] , Shuo Deng[1] , Phillip Hammer[1] , Saul Winderbaum[1] , Alison Ciesla[1]
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2-1-AP-25 **Effect of SiOx Interlayer Formation on AlOx Passivation for Crystalline Silicon Solar Cells**
Cheolwook Kwon[1] , Yong-Jin Kim[1] , Minsoo Jeong[3] , SangHee Lee[1] , Yunae Cho[1] , Yuntak Han[1] , Kyuhyeon Im[1] , Munse Kim[1] , Soohyun Bae[1] , Hee-eun Song[1] , Min Gu Kang[1] , Soo Min Kim[4] , Young-Joo Eo[1] , Hae-Seok Lee[2] *
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[3]Department of Cell process, Hanwha Q CELLS Co., Ltd., Republic of Korea
[4]Department of Nano Convergence Materials Center, Korea Institute of Ceramic Engineering & Technology, Republic of Korea

2-1-AP-26 **Saccharin-Controlled Residual Stress in Electroplated Ni for SLIM-Cut Fabrication of Ultra-Thin Silicon**
Eunbin Jo[1] , Seeun Kim[2] , Doowon Lee[1] *
[1]Department of Division of Electrical Electronic and Control Engineering, Kongju National University, Republic of korea
[2]Department of Smart Mobility Engineering, Kongju National University, Republic of korea

2-1-AP-27 **Patterned Ion Implantation for Buried Amorphized Silicon Nanostructures in Crystalline Silicon Photovoltaics**
Lejo J. Koduvelikulathu[1] , Mikaël Hosatte[2] * , Brice Rouffie[2] , Lazhar Rachdi[1] , Frédéric Milési[3] , Andrzej Miszczuk[4]
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[3]Department of CEA-Leti, Grenoble, France
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Area 2-2. Innovative Silicon PV Cell Architectures and Interfaces

2-2-AP-01 **Surface Modification of Silicon Heterojunction Solar Cells via Acid-Assisted Wet Etching Process**
Hyungwoo Kim[1] , Yongjin Kim[1] , Unsoo Kim[1] , Yunae Cho[1] , Sang Hee Lee[1] , Jinsu Yoo[1] , Kyung Taek Jeong[1] , Hee-eun Song[1] *
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2-2-AP-02 **A Novel Hybrid FFE/FSF Front Surface Architecture for Efficient Exciton Separation in Singlet Fission Sensitized Solar Cells**
Zhiyuan Chen[1] * , Shaoyang Liu[1] , Shona McNab[1] , Michael Nielsen[1] , Murad Tayebjee[1] , Sanchuan Wang[1] , Hamid Mehrvarz[1] , Ned Ekins-Daukes[1]
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2-2-AP-03 **Bi-poly TOPCon bottom cells for tandem applications**
Anitta Rose Varghese[1] * , Rabin Basnet[1] , Kean Chern Fong[1] , Daniel Macdonald[1]
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2-2-AP-04 **Enhancement of Passivation Performance of TOPCon Structures by Hydrogen Radicals Generated in a Cat-CVD chamber**
Duanyi Yin[1] * , Keisuke Ohdaira[2] , Kensaku Maeda[2]
[1]Department of Materials Science, Japan Advanced Institute of Science and Technology, China
[2]Department of Materials Science, Japan Advanced Institute of Science and Technology, Japan

2-2-AP-05 **Investigation of Hydrogen and Boron Incorporation in Hall Contacts Using a Silicon Nano-crystals/Silicon Oxide Composite Layer**
Hiroto Yamaguchi[1] , Yasuyoshi Kurokawa[2] , Noritaka Usami[1] *
[1]Department of Engineering, Nagoya University, Japan
[2]Department of Science and Engineering, Kansai University, Japan

2-2-AP-06 **Feasibility of Ag Consumption Reduction in HJT Solar Cells Using Ag-Coated Cu Paste**
Myounghyun Lee[1] , Sang Hee Lee[1] , Young-Joo Eo[1] *
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea

2-2-AP-07 **Dopant-Type Effects on Interfacial Electronic States at Ag/c-Si Contacts**
Hyeonsu Son[1] , Tae Kyung Lee[1] *
[1]Department of Organic and Nano Engineering, Hanyang University, Republic of korea

2-2-AP-08 **Microvoid-Mediated Hydrogen Redistribution in a-Si:H Passivating Contacts under Dark Annealing and Light Soaking Cycling**
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[1]Department of Energy and Environment, KU-KIST Green School, Energy and Environment, Korea University, Republic of Korea
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[3]Department of Materials Science and Engineering, Korea University, Republic of Korea

2-2-AP-09 **Impact of Oxidation Temperature on Crystallization and Passivation Properties of SiOx Films and Their Evaluation in Solar Cell Performance**
Yuntak Han[1] , Ka-Hyun Kim[2] * , Hee-Eun Song[3] , Sea-Woo Sim[3] , Yong-Jin Kim[3] , Unsoo Kim[3] , Hyungwoo Kim[3] , Sang Hee Lee[3] , Kyung Taek Jeong[3] , Junyong Um[3] , Min Gu Gang[3]
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2-2-AP-10 **Lithography-Free Laser Patterning for Tunnel Oxide Passivated Back Contact Solar Cells**

Liu Chaohua[1] , Chen Sung-Yu[1] * , Chang Han-Chen[1] , Wei Chih-Ming[1] , Lin Chun-Ping[1] , Huang Ying-Yuan[2]
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2-2-AP-11 **High-Efficiency and Stable Perovskite/TOPCon Silicon Tandem Cells via AI-driven Integration**

Yunae Cho[1] * , Sang Hee Lee[1] , Yong Jin Kim[1] , Unsoo Kim[1] , Hyungwoo Kim[1] , Kyung Taek Jeong[1] , Hee-eun Song[1] , Jihye Gwak[1] , Jun-Sik Cho[2]
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2-2-AP-12 **Reflectance Reduction in Encapsulant-Free PERC Si PV Modules Using Moth-Eye-Textured PC Covers**

Koki Komatsu[1] , Yasuaki Ishikawa[1] , Itaru Raifuku[1] * , Taichi Uemura[1]
[1]Department of Electrical and Electronic Engineering, AoyamaGakuin University, Japan

2-2-AP-13 **Development and device integration of p-type and n-type poly-SiOx layers for high-efficiency c-Si solar cells**

Yingwen Zhao[1] * , Paul Procel Moya[1] , Yi Zheng[1] , Liqi Cao[1] , Zhirong Yao[1] , Martijn Tijssen[1] , Daniel Duarte Sánchez[1] , Rudi Santbergen[1] , Engin Özkol[1] , Luana Mazzarella[1] , Miro Zeman[1] , Olindo Isabella[1] , Yifeng Zhao[1]
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2-2-AP-14 **Controlling Ion Flux via Substrate Biasing during ITO deposition: A Key to Preserving Passivation Quality in Silicon Heterojunction Solar Cells**

Shahnawaz Alam[1] , Silajit Manna[1] , Kishan Bajpai[1] , Arnab Jyoti Mandal[1] , Niraj Kumar Yadav[1] , Son Pal Singh[1] , Vamsi Krishna Komarala[1] *
[1]Department of Energy Science and Engineering, Indian Institute of Technology Delhi, India

2-2-AP-15 **Accelerated p-nc-Si:H Growth from 2D to 3D using CO2-plasma Curated Buffer-layer and VHF-PECVD for High Efficiency SHJ Solar Cells**

Silajit Manna[1] , Shahnawaz Alam[1] , Kishan Bajpai[1] , Arnab Jyoti Mandal[1] , Son Pal Singh[1] , Vamsi Krishna Komarala[1] *
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2-2-AP-16 **Fabrication of Polysilicon Diodes and Their Performance Assessment as Bypass Diodes for IBC POLO Solar Cells**

Leon Salomon[1] * , Jannik Bolm[1] , Dennis Bredemeier[3] , Udo Römer[2] , Robby Peibst[4] , Jan Krügener[5]
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2-2-AP-17 **Silicon Heterojunction Solar Cells featuring Boron-doped Amorphous Quantum-Well Contact: A Proof-of-Concept**

Brian Istvan Giam[2] * , Paul Procel-Moya[1] , Eicke Weber[2] , Dietrich Lembke[2] , Olindo Isabella[1] , Yifeng Zhao[1]
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2-2-AP-18 **Fabrication of Tin Oxide Thin Films by Spin Coating for Solar Cell Applications**

Yui Sawayanagi[1] , Atsushi Masuda[1] , Kazuhiro Gotoh[1] *
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2-2-AP-19 **Hybridization of Encapsulated Si Solar Cells and Droplet-based Silicone Triboelectric Nanogenerators**

Haruka Watanabe[1] , Hiroto Oowada[2] , Kazuhiro Gotoh[1] * , Atsushi Masuda[1]
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2-2-AP-20 **Fabrication of TiOx Thin Films by Spin Coating for Solar Cell Applications**

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2-2-AP-21 **Material-Efficient Silicon Heterojunction Solar Cells via Integration of Silver-Lean Paste and Indium-Lean Transparent Conductive Oxide**

Lizhi Sun[1] , Guangtao Yang[3] , Angus Gentle[1] , Yuhao Cheng[1] , Yuchao Zhang[2] , Shuo Deng[1] , Weiqiang Zhan[1] , Hang Su[1] , Xianjie Zhou[4] , Yifeng Chen[3] , Jifan Gao[3] , Martin Green[1] , Ning Song[1] *
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2-2-AP-22 **Development of Nickel Oxide Thin Films Using the Spin-Coating Method**

Yuta Yamamoto[1] , Atsushi Masuda[1] , Kazuhiro Gotoh[1] *
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2-2-AP-23 **Silver-Lean Metallisation for n-Type Contacts Using Silver Dashes and Aluminium Fingers**

Bruno Vicari Stefani[1] * , Li Wang[1] , Zhen Yang[1] , Catherine Chan[1] , Marwan Dhamrin[2] , Kosuke Tsuji[2] , Weiguang Yang[3] , Seunghwan Sim[3] , Genhua Ji[3] , Brett Hallam[1]
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[3]Department of Jolywood Solar Technology Co., China

2-2-AP-24 **Hydrogen Dynamics and Structural Degradation of SiNx:H Passivation Layers in TOPCon Solar Cells**

Kyuhyeon Im[1] , Munse Kim[1] , Yong-Jin Kim[1] , Sang Hee Lee[1] , Hee-eun Song[1] , Hae-Seok Lee[2] , Yunae Cho[1] * , Ka-hyun Kim[3]
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[2]Department of Energy and Environment, Korea University, Republic of Korea
[3]Department of Physics, Chungbuk National University, Republic of Korea

2-2-AP-25 **Optimization of Electrical Properties in Thin Films for High Performance SHJ Solar Cell Performance**

Saewoong Kim[1] , Ki Joon Seong[1] , Min jae Ko[2] , Jun-Sik Cho[1] , Jinsu Yoo[1] *
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[2]Department of Chemical Engineering, Hanyang University, Republic of Korea

2-2-AP-26 **Optimization of Thermal Oxidation Process with Gas Flow Control for Improving Passivation Quality of TOPCon Solar Cells**

Yire Han[1] , Kwanyong Seo[1] *
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2-2-AP-27 **Random Micro-Pyramids for Transparent c-Si Solar Cells: Enabling 16.1% Efficiency with Wavelength-Independent 20% Transmittance**

Yire Han[1] , Myounghyun Lee[1] , Kwanyong Seo[1] *
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2-2-AP-28 **Influence of Structural Properties of nc-Si/SiOx Composite Films on Phosphorus Diffusion and Passivation Characteristics**

Kaori Takagi[1] , Yasuyoshi Kurokawa[2] , Atsushi Masuda[1] , Noritaka Usami[3] , Kazuhiro Gotoh[1] *
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[3]Department of Grad. Sch. Engr., Nagoya University, Japan

2-2-AP-30 **Interfacial Band Engineering for High-Voltage Rear-Emitter Silicon Solar Cells**

Muhammad Khokhar[1] , Hasnain Yousuf[2] , Alamgeer [2] , Mengmeng Chu[2] , Rafi Ur Rahman[1] , Maha Nur Aida[3] , Junsin Yi[1] *
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[3]Department of Future Energy Engineering, Sungkyunkwan University, Republic of Korea

2-2-AP-31 **Exploring the role of LiF in Al-doped ZnO passivating contacts for c-Si solar cells**

Gabriel Bartholazzi[1] * , Piyumi Kodithuwakku[1] , Daniel Macdonald[1] , Lachlan Black[1]
[1]Department of Engineering, Australian National University, Australia

2-2-AP-32 **Influence of Annealing on Copper Iodide Thin Film Formation Using Radio-Frequency Magnetron Sputtering on Crystalline Silicon**

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2-2-AP-33 **TiOxNy interlayers for Al metallisation of thin polycrystalline silicon passivated contacts**

Zhongshu Yang[2] , Di Yan[1] , Jesus Ibarra Michel[1] , Yida Pan[1] , Sieu Pheng Phang[2] , Rabin Basnet[2] , Kean Chern Fong[2] , Yuchao Zhang[3] , Li Wang[3] , Brett Hallam[3] , Peter C. Sherrell[4] , Billy J. Murdoch[5] , Jie Mao[6] , Zhao Wang[6] , Jie Yang[6] , Xinyu Zhang[6] , Daniel Macdonald[2] , Peiting Zheng[6] , James Bullock[1] *
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2-2-AP-34 **Integrating Aluminium-Metallized Solar Cells into Modules**

Henning Schulte-Huxel[1] * , Malte Brinkmann[1] , Thomas Daschinger[1] , Till Brendemühl[1] , Christina Hollemann[1] , Byungsul Min[1] , Sebastian Junge[1] , Rolf Brendel[1]
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2-2-AP-35 **Engineering Thermally Evaporated MoO_x Hole-Selective Contacts through Thickness Control for Efficient Silicon Heterojunction Solar Cells**

Keerthana B K[1] , Tulsiram Madkami[1] , Pratima Agarwal[1] *
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2-2-AP-36 **Silver Reduction Strategies in Metallization Pastes**

Yiyu Zeng[1] * , Wen Yu[1] , Martin Green[1] , Jessica Yajie Jiang[1]
[1]Department of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

2-2-AP-37 **Optimizing Electrical and Optical Properties of ITO Thin Films for High-Efficiency Silicon Heterojunction Solar Cells**

Ki Joon Seong[1] , Saewoong Kim[3] , Sang Hee Lee[3] , Hee-eun Song[3] , Ka-Hyun Kim[2] *
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2-2-AP-38 **Harnessing Exciton Fission for Next-Generation High-Efficiency Silicon Solar Cells**

Kangmin Lee[1] *
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2-2-AP-39 **Thermal-Window-Limited Ag/Al Contact Formation on Boron Emitters in Industrial TOPCon Solar Cells**

Munse Kim[1] , Hee-eun Song[1] , Yong-Jin Kim[1] , Unsoo Kim[1] , Hyungwoo Kim[1] , Kyung Taek Jeong[1] , Hae-Seok Lee[1] , Sang Hee Lee[1] , Yunae Cho[1] *
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2-2-AP-40 **Towards High-Efficiency Silicon Solar Cells Using an External Phosphor-in-Glass Spectral Conversion Layer**

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Area 3-1. Perovskite Solar Cells with Wide, Mid and Narrow Bandgaps

3-1-AP-01 **Boosting Perovskite Solar Cells by Isomeric Halide Engineering, Surface Passivation, and Self-Assembled Interface Design**

Chih-Ping Chen[1] *
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3-1-AP-02 **Coordination Dynamics of Green Solvents Tailor Solubility and Crystallization in Wide-Bandgap Perovskite Solar Cells**

Kun-Mu Lee[3] * , Yean-San Long[2] , Chih-Hung Lin[2] , Wei-Hao Chiu[3] , Shih-Hsuan Chen[1] , Yu-Sheng Lin[1] , Min-An Tsai[2]
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[2]Department of Center for Measurement Standards, Industrial Technology Research Institute, China
[3]Department of Center for Sustainability and Energy Technologies, Chang Gung University, China

3-1-AP-03 **Developing Perovskite Quantum Dots with High Stability via Core-Shell Architecture and Appplication on Solar Cell**

Dian-Ting Tsai[1] , Chia-Ching Wu[1] *
[1]Department of Applied Science, National Taitung University, China

3-1-AP-04 **Mixed-Phase Formamidinium Lead Iodide Powder and Silicon Quantum Dots for Improved Light-Soaking Stability of Perovskite Solar Cells**

Vladimir Svrcek[1] * , Calum J. McDonald[1] , Ankur Kambley[1] , Abduhabir Mirza[1] , Takurou N. Murakami[1] , Takuya Matsui[1] , Davide Mariotti[2]
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3-1-AP-05 **Durability Test and Degradation Mechanism of Wide Bandgap Metal Halide Perovskite Solar Cells**
Masatoshi Yanagida[1] *
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3-1-AP-06 **SnF_2 Is Unnecessary in DMSO-Free Tin Halide Perovskite Solar Cells: A Solvent-Dependent Reassessment**
Takeshi Kitamura[1] , Shinpei Sasahara[2] , Satoru Kani[2] , Shuzi Hayase[1] *
[1]Department of info-Powered Energy System Research Center, The University of Electro-Communications, Japan
[2]Department of New Business Development Group, Origin Co., Ltd., Japan

3-1-AP-07 **Modulating Binding Strength and Acidity of Benzene-Derivative Ligands Enables Efficient and Hysteresis-Free Perovskite/Silicon Tandem Solar Cells**
Liu Yang[1] , Shibo Wang[1] , Ninggui Ma[2] , Xinbo Yang[1] *
[1]Department of College of Energy, Soochow University, China
[2]Department of Xiamen Key Laboratory ofOptoelectronic Materials and Advanced Manufacturing, Huaqiao University, China

3-1-AP-08 **Vapor-Phase Compositional Engineering of Phase-Stable All-Inorganic CsPbI3 Perovskites**
Jinju Jeong[1] , Jaehun Kim[1] , Seungjin Lee[1] *
[1]Department of Energy engineering, Korea institute of energy technology, Republic of korea

3-1-AP-09 **Self-powered Perovskite Photodetector with Chocolate-chip-cookie Structure**
Ko Ko Shin Thant[1] , Pimsuda Pangsa-Ngat[1] , Patawee Sakata[1] , Ladda Srathongsian[1] , Chaowaphat Seriwattanachai[1] , Myo Zin Tun[1] , Phyo Thuta Tun[1] , Thanawat Kanlayapattamapong[2] , Worawut Rueangsawang[1] , Kanokwan Choodam[1] , Pipat Ruankham[2] , Nattaporn Chattham[3] , Ratchadaporn Supruangnet[4] , Hideki Nakajima[4] , Pongsakorn Kanjanaboos[1] *
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[2]Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Thailand
[3]Department of Physics, Faculty of Science, Kasetsart University, Thailand
[4]Department of Synchrotron Light Research Institute, Ministry of Higher Education, Science, Research and Innovation, Thailand

3-1-AP-10 **Near-Infrared Light-Harvesting Molecular Dye Additive for Enhanced Performance and Stability of Perovskite Solar Cells**
Ashique Kotta[1] , Abdullah [1] , Hyung-Kee Seo[1] *
[1]Department of Chemical Engineering, Jeonbuk National University, Republic of korea

3-1-AP-11 **The Central Role of Bromine in Reversible Photovoltaic Evolution of Mixed-Halide Perovskite Solar Cells Revealed by Time-Dependent XAS**
Mitsuoki Hishida[1] * , Itaru Raifuku[2] , Hiroaki Ono[1] , Ryosuke Katagiri[1] , Yuki Okabe[1] , Yasuaki Ishikawa[2]
[1]Department of Electronic Solution Development Dept., Toyoda Gosei Co., Ltd., Japan
[2]Department of College of Science and Engineering, Aoyama Gakuin University, Japan

3-1-AP-12 **Passivation Gone Too Far: The Influence of Halide-Containing Passivation Chemicals on the Bandgap of Perovskite Solar Cells**
Samantha Stanton[1] * , Heena Khotekar[1] , Robby Peibst[1]
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[2]Department of Institute of Electronic Materials and Devices, Leibniz University Hannover, Germany

3-1-AP-13 **Iodine-Driven Modulation of Metallic Bismuth Defects in AgBiI4-Based Lead-Free Solar Cells**
Shanas Fatima[1,2] , Dhruba B. Khadka[1] * , Shirai Yasuhiro[1] , Yanagida Masatoshi[1] , Sunil K. Singh[2]
[1]Department of Research Center for Energy and Environmental Materials, National Institute for Material Science, Japan
[2]Department of Physics, Indian Institute of Technology, Banaras Hindu University, India

3-1-AP-14 **Bandgap-Dependent Design Rules for Self-Assembled Monolayer Hole-Selective Contacts in p-i-n Perovskite Solar Cells**
Van Hung Tran[1] , Heesuk Jung[1] *
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3-1-AP-16 **Performance Analysis of Perovskite Solar Cells Using DFT-Extracted Parameters**
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3-1-AP-17 **Ultrathin Al2O3 Interface Engineering for Enhanced Efficiency and Stability of Inverted Perovskite Solar Cells**
Masauko Utila[1] , Hsu I-Sheng[1] , Pokala Yugandhar[1] , Chih-Hung Tsai[1] , Wang-Chi Vincent Yeh[1] , Chu-Hsuan Lin[1] *
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3-1-AP-18 **Optimization of Annealing Temperature for PEDOT:PSS Hole Transport Layer in Perovskite Solar Cells**
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3-1-AP-19 **Achieving High Voltage-sweep Tolerance in Metal Halide Perovskite Rectifier Diodes through Interface and Additive Engineering**
Ryan Iman[1] , Neng Handayani[2] , Md. Shahiduzzaman[3] , Tetsuya Taima[3] , Makoto Karakawa[3] , Masahiro Nakano[1] *
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3-1-AP-20 **Flow-Reactor Engineering Ligand-Assisted Synthesis of PEAI-Modified $Cs_3Bi_2I_9$ Perovskites with Enhanced Photovoltaic Performance**
Gufran Umar Alam Shaikh Shaikh[1] , Erra Natasha Rasul Rasul[1] , Fatin Farisha Alia Azmi Azmi[1] , uvaneswaran Chelvanathan Chelvanathan[1] , Akrajas Ali Umar Umar[1] , Norasikin Ahmad Ludin Ahmad Ludin[1] , Mohd Sukor Su'ait Su'ait[1] *
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3-1-AP-21 **Computational Insights into Controlled p-Type Doping and Sn2+ Protection in Tin–Lead Perovskites by PPJ-PF6**
Sang Wook Park[1] , ChaeEun Lee[1] , Jong Chan Shin[1] , Dohun Baek[1] , Minjae Lee[1] , Min Kim[1] , Tae Kyung Lee[1] *
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3-1-AP-22 **Molecularly Engineered Bathocuproine Buffer Layers to Improve Charge Transport and Stability in Perovskite Solar Cells**
Myeong In Kim[1] , Doyeong Yeo[1] , Sumin Lee[1] , Ji-Youn Seo[2] , In Hwan Jung[1] *
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3-1-AP-23 **Molybdenum Foil-Supplied Growth of Monolayer MoS_2 for Scalable Electron Transport Layers in Perovskite Solar Cells**
Taichi Tsutsui[1] , Kosei Aoki[1] , Naochika Masuda[1] , Ryousuke Ishikawa[1] *
[1]Department of Electrical Engineering and Chemistry, Tokyo City University, Japan

3-1-AP-24 **Cesium Iodide Seed Layer Engineering for Vacuum Co-Evaporated Wide-Bandgap Perovskite Solar Cells**
Minseok Chin[1] , Hae-Seok Lee[1] * , Seok-Hyun Jeong[2]
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3-1-AP-25 **Kinetics of X-ray-induced metallic lead (Pb0) formation in halide perovskite solar cells**
Heli Mondaca Felix[1] * , Raphaël Ramos[1] , Damien Aureau[2] , Philip Schulz[3] , Anass Benayad[4]
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3-1-AP-26 **Additive Engineering for Enhanced Uniformity and Thermal Stability in Wide-Bandgap Inverted Perovskite Solar Cells**
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[1]Department of Physics, Ewha Womans University, Republic of Korea
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3-1-AP-27 **Low-Damage Deposition of ITO Transparent Electrodes by Facing Target Sputtering for Semitransparent Inverted Perovskite Solar Cells**
Assanali Sultanov[1] * , Dina Akhmetova[1] , Madiyar Issenov[1] , Ilya Zhirkov[1] , Nurzhan Beisenkhanov[1]
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3-1-AP-28 **Stabilizing FAPbI3 Single Crystals through Open-Environment Storage for Efficient Perovskite Solar Cells**
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3-1-AP-29 **Application of CVD-Grown MoS_2 as an Electron Transport Layer for Inverted Perovskite Solar Cells**
Kosei Aoki[1] , Taichi Tsutsui[1] , Naochika Masuda[1] , Ryousuke Ishikawa[1] *
[1]Department of Electrical Engineering and Chemistry, Tokyo City University, Japan

3-1-AP-30 **Development of Semi-Transparent Perovskite Solar Cells with Spin-Coated Silver Nanowire Electrodes for 4-Terminal Tandem Solar Cells**
Tomoki Sonoda[1] , Itaru Raifuku[1] * , Yasuaki Ishikawa[1]
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3-1-AP-31 **Stable Alfa-Phase CsPbI3 Layer Formation by Room-Temperature RF Magnetron Sputtering Deposition**
Toranosuke Takematsu[1], Itaru Raifuku[1], Yoshihiro Ueoka[2], Masami Mesuda[2], Yasuaki Ishikawa[1]*
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3-1-AP-32 **Kinetically Controlled Interfacial Phase Conversion for Perovskite Solar Cells**
Somin Yun[1], Hanul Min[1]*
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3-1-AP-33 **Effects of the Concentration of Iodine Solution on the Morphology of Copper Iodide Hole Transport Layers for Inverted Planar Perovskite Solar Cells**
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3-1-AP-34 **Direct Sputter Deposition of SnO2 Electron Transport Layers for Inverted Perovskite Solar Cells**
Michihiro Tokunaga[1], Takahito Nishimura[1]*
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3-1-AP-35 **Hybrid Metal-Organochalcogenide as a Hole-Transport Material for Inverted Perovskite Solar Cells**
Chanisara Chooseng[1], Pimpan Leangtanom[1], Chanoknan Pirommai[1], Watcharaphol Paritmongkol[1]*
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3-1-AP-36 **Bisphosphonate-Anchored Self-assembled Molecule with Halogen Functionalization for Wide-Bandgap Perovskite Solar Cells and Tandems**
He Zhu[1], Zonghao Liu[1], Wei Chen[1]*
[1]Department of Optical Engineering, Huazhong University of Science and Technology, School of Optical and Electronic Information, China

3-1-AP-37 **Closed form Analytical Model of Perovskite Solar Cells accounting for recombination phenomena**
Ilaria Matacena[1]*, Pierluigi Guerriero[1], Gerardo Saggese[1], Laura Lancellotti[2], Paola Delli Veneri[2]
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3-1-AP-38 **Effect of FLA on the stability of Inorganic Perovskite Films**
Yuji Okuhara[1]*, Peng Liu[2], Neng Hani Handayani[2], Kensaku Maeda[1], Md. Shahiduzzaman[2], Tetsuya Taima[2], Keisuke Ohdaira[1]
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3-1-AP-39 **Investigation of Bio-Based N-Propyl-Tris(3-Lauroylamidopropyl) Ammonium Iodide Salt (TAS) As Tin Based Perovskite Precursor for Perovskite Solar Cell Application**
Afifah Muhamad Sidik[1], Mohd Sukor Su'ait[1]*, Yuko Takeoka[2], Nur Maizura Mustafa[1], Nur Hasyareeda Hassan[4], Ubaidah Syafiq[1], Norasikin Ahmad Ludin[1], Akrajas Ali Umar[3]
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3-1-AP-40 **Boosting Efficiency and Stability of Perovskite Solar Cells via CsPbCl3:Mn2+ Quantum Dot Passivation**

Seokhyun Jeong[1], Dongjin Choi[1], Sujin Cho[2], Dowon Pyun[1], Hyunju Lee[3], Hae-Seok Lee[4]*
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3-1-AP-41 **Empirical Extraction of Exciton Binding Energy and Halide Interaction Parameters in Mixed-Halide Perovskites via Modified Elliott Model Fitting**

Maryam Khan[1], Siwon Yun[1], Wonjong Lee[1], Hyeji Han[1], Minkyu Kim[1], Jongchul Lim[1]*
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3-1-AP-42 **Understanding the deconvolution of PL spectra in mixed halide Perovskites via Complex Fitting Models**

Asawar Batool[1], Jongchul Lim[1]*, Muhammad Adnan[1], Zobia Irshad[1], Wonjong Lee[1], Siwon Yun[1], Hyeji Han[1], Minkyu Kim[1], Maryam Khan[1]
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3-1-AP-43 **Tin-Rich Lead–Tin Perovskite Solar Cells with Sn-Friendly Blended Hole Transport Layers for High Efficiency and Stability N-I-P Structured**

Andi Muhammad Risqi[1], Sang Il Seok[1]*
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3-1-AP-44 **Hybrid Evaporation-Solution Deposition for Efficient Perovskite Solar Cells by Regulating the PbI2 Scaffold via Additive Post-Treatment**

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3-1-AP-45 **Mitigation of Current–Voltage Hysteresis in Air-Processed $FAPbI_3$ Perovskite Solar Cells via a Nano-Engineered Buried Interface**

Taehwan Kim[1], William Jo[1]*
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3-1-AP-46 **PEI-Crown Ether Complex Suppressing Li+ Migration for Long-Term Stable Perovskite Solar Cells**

Dongwook Lee[1]*
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3-1-AP-47 **Thiol Additive Engineering Enables Chemically Stable $CsSnI_3$ Perovskites via Continuous Flow Synthesis**

Erra Natasha Rasul[1] , Gufran Umar Alam Shaikh[1] , Fatin Farisha Alia Azmi[1] , Jegadesan Subbiah[3] , Puvaneswaran Chelvanathan[1] , Akrajas Ali Umar[2] , Norasikin Ahamad Ludin[1] , Mohd Sukor Su'ait[1] *
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3-1-AP-48 **Optimization of Peak-to-Peak Voltage and Duty Ratio for Non-Destructive Electroluminescence Imaging of Perovskite Solar Cells**

Itaru Raifuku[1]*, Moeka Kishi[1], Yasuaki Ishikawa[1]
[1]Department of Electrical Engineering and Electronics, Aoyama Gakuin University, Japan

3-1-AP-49 **Controlled Modulation of PTAA for Efficient and Stable Perovskite Photovoltaics**

Subin Jeon[1], Hanul Min[1]*
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3-1-AP-50 **Improving the Moisture Resistance of $CsPbI_2Br$ Perovskite Thin Films**

Kaisei Ito[1], Shohei Kodera[1], Shunsuke Kobayashi[1], Kimihiko Saito[1], Ryousuke Ishikawa[1]*
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3-1-AP-51 **Effect of Precursor Design on Wide-Bandgap FA/Cs Mixed-Halide Perovskite Films Fabricated by Close-Spaced Sublimation**

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[3]Department of Institute for Energy Technology, Korea University, Republic of korea

3-1-AP-52 **Urbach Energy-Guided Control of Infiltration Uniformity in 1.59 eV Hybrid Two-Step Perovskites for High-Efficiency Solar Cells**

Jin Ho Yang[1], Yeonwoo Park[1], Jae Ho Yun[1]*
[1]Department of Energy Materials and Devices, Korea Institute of Energy Technology, Republic of Korea

3-1-AP-53 **Nano-Silica/IZO Front Electrodes for Enhanced Light Trapping and Chemical Stability in Perovskite Solar Cells**

Daehyun Kim[1], Changsoon Cho[1]*
[1]Department of Materials Science and Engineering, Pohang University of Science and Technology, Republic of Korea

3-1-AP-54 **Enhanced Performance of $CsPbI_3$/$FAPbI_3$ Bilayer Quantum Dot Solar Cells through Passivation with MPA–CPA-Based Materials**

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3-1-AP-55 **Rapid Assessment of Intrinsic Stability in Perovskite Solar Cells Using Combined Stress Factors**

Anh Bui[1], Daniel Walter[1], Jinzhi Si[1], Kelvin Prasetia[1], Klaus Weber[1], The Duong[1]*
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3-1-AP-56 **Engineering Functional Moiety of PTAA for Efficient Trap Passivation in Inverted-type Perovskite Solar Cells**

Jaewoo Jeong[1], Chanhyeok Kim[2], Junwoo Lee[3], Jong.H Kim[3]*
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3-1-AP-57 **Dipole-Induced Surface Passivation in Wide-Bandgap Perovskite Solar Cells**

Rukesh Kumar Selvaprakash[1], Aishwarya Shailendra Nikam[1], Sungjin Jo[1]*
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3-1-AP-58 **Interfacial Layering of Organic Halide Salts: A Strategy for Enhancing the Quality of Perovskite Films, Enabling High Efficiencies in Single-Junction and Tandem Device Architectures**

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3-1-AP-59 **Additives Mixing Strategy in Vacuum-Flash Process of Perovskite Films: Simple and Effective Crystallization Control Method for Improving Efficiency of Perovskite Solar Cells**

Min Jun Choi[1], Sun-Ju Kim[2], In Hwa Cho[3], Gyeong G. Jeon[1], Tanzeela Yousafe[4], Jun-Ho Yum[5], Siyeon Seo[6], Geun-young Yoon[6], Dong Hyun Lee[1], Jan Seidel[4], Hyo Jung Kim[6], Kevin Sivula[5], Jincheol Kim[7], Ji-Youn Seo[2], Jong H. Kim[1]*

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3-1-AP-60 **Hot Pressing Transfer for Constructing 3D/2D Interfaces in Wide-Bandgap Perovskite Solar Cells**

Akshaiya Padmalatha Muthukrishnan[1], Hanyi Cho[1], Sungjin Jo[1]*

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3-1-AP-61 **Interfacial Passivation of Dry-Processed NiOx with Self-Assembled Monolayer for Highly Efficient p-i-n Perovskite Solar Cells**

Inhong Min[1], Sujin Cho[2], Jiyoon Lee[3], Seok-Hyun Jeong[1], Dowon Pyun[1], Jiyeon Nam[1], Sang Wook Park[4], Hae-Seok Lee[5]*

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[5]*Department of Energy Environment Policy and Technology, Korea University, Graduate School of Energy and Environment (KU-KIST Green School), Republic of Korea*

3-1-AP-62 **Nanoscale Carrier Dynamics across Grain Boundaries in Perovskite Solar Cells**

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3-1-AP-63 **Interface character, not crystallinity, governs RF-sputtered SnO2 Electron-transport Layers in perovskite solar cells**

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3-1-AP-64 **Laser-Based Vacuum Processing of Halide Perovskite Thin Films for Photovoltaics: Process Windows and Growth Mechanisms**

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3-1-AP-65 **High-Efficiency 1.61 eV Hybrid-Processed Perovskite Solar Cells Employing H_2O_2 Surface-Modified pH 8.5 NiOx Nanoparticle Hole Transport Layers**

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3-1-AP-66 **Importance of Oxygen-Controlled NiOx Surface for Stable SAM-Based Inverted Perovskite Solar Cells**

Hanseul Lee[1], Yejin Kim[1], Pravin Pawar[1], Hochan Hyun[1], Bo Gyung Park[1], Jaewon Seo[1], Sang Hoon Kim[2], Han Seul Kim[3], Donghwan Kim[4], Gee Yeong Kim[1]*

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3-1-AP-67 **Bandgap Engineering of Wide, Mid, and Narrow-Bandgap Perovskites for Tandem and Multijunction Photovoltaics**

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3-1-AP-68 **Surface Interaction Mechanisms of Fluorinated Ammonium Passivation in $FAPbI_3$-Based Perovskite Thin Films**

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3-1-AP-69 **Improvement of CsPb(Br0.42Cl0.58)3 film Quality Using PEABr Treatment**

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3-1-AP-70 **Light-Intensity Dependent Carrier Diffusion Length of CsPbBr3 Deposited by close-spaced sublimation (CSS)**

Hiroka Abe[1], Yuejie Tan[1], Shinsuke Miyajima[1]*

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3-1-AP-71 **Influence of n-Type Oxide Semiconductor Electrodes on the Degradation of Perovskite Solar Cells**

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3-1-AP-72 **Achieving high-fill factor through dual-interface contact selectivity in efficient 1.68 eV p-i-n perovskite solar cells**

Enkhjargal Enkhbayar[1], June Suh Hong[1], Kyungsik Kim[2], Md. Matiur Rahman[1], Jinho lee[1], JunHo Kim[1]*

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3-1-AP-73 **Selective Grain-Boundary Functionalization with Barium Stearate for Efficient and Stable Perovskite Solar Cells**

Bisol Kim[1], Taehee Kim[1]*, Donghoe Kim[2], Phillip Lee[1], Muhammad Haris[1], Minho Kang[1], Yejin Hong[1]

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3-1-AP-74 **Interfacial Engineering Using DPTPO-TRZ for Efficient and Stable Inverted Perovskite Solar Cells**
Yejin Whang[1], Min Kim[1]*
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3-1-AP-76 **Hybrid Self-Assembled Molecular Architecture Enabling Robust Interfacial Adhesion and Enhanced Performance in Inverted Perovskite Solar Cells**
Minho Kang[1], Taehee Kim[1]*, Bisol Kim[2], Muhammad Haris[2], Yejin Hong[2], Phillip Lee[2], Donghoe Kim[1]
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3-1-AP-77 **Theoretical Insights into Interfacial Charge Transport Layers Using Halogen-Substituted SAMs for Perovskite Solar Cells**
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3-1-AP-78 **Tuning the Work Function of Hole-Selective Contacts via Strategically Functionalized Triphenylamine Self-Assembled Monolayers for Inverted Perovskite Photovoltaics**
Hyo Jeong Jo[1], Eun Kyung Jo[1], Dae-Ho Son[1], Jae-Hong Kim[2], Dae-Hwan Kim[1]*
[1]Department of Energy Environmental Research Division, Daegu Gyeongbuk Institute of Science and Technology, Energy and Environment Research Division, Republic of Korea
[2]Department of Chemical Engineering, Yeungnam University, Republic of Korea

3-1-AP-79 **Co-optimization of NiOx Hole Transport Layers and Self-Assembled Monolayers for High-Efficiency Inverted Perovskite Solar Cells**
Pravin Pawar[1], Hanseul Lee[1], Hochan Hyun[1], Bogyeong Park[1], Yejin Kim[1], Gee Yeong Kim[1]*
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3-1-AP-80 **Hybrid Thermal Evaporation Processing of Mid-Bandgap Perovskites for High-Performance Perovskite/CIGS Tandem Solar Cells toward Triple-Junction Photovoltaics**
Syed Fawad Ali Shah[1], Kihwan Kim[2], Jae HO Yun[1]*, Awet Mana Amare[2], Rehan Muhammad[2], Donghyeop Shin[2]
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3-1-AP-81 **Perylene Diimide-Derived Molecule as Electron Transport Layer in Wide-Bandgap Perovskite Solar Cells**
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3-1-AP-82 **Balancing Optical, Electrical, and Surface Properties of Sputtered NiOx Thin Films for Efficient Hole Transport Layers in Perovskite Solar Cells**
Ivan Dmitriev[1]*, Anna Tsareva[1], Mikhail Dunaevskiy[2], Evgenii Terukov[1], Dmitriy Orekhov[1]
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3-1-AP-83 **Spatial Ionic Engineering Enables Depth-independent Homogeneity and Strain Relaxation in Efficient Inverted Perovskite Solar Cells**
Minseong Kim[1], Dong Suk Kim[1]*
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3-1-AP-84 **Engineering the Perovskite/Electron Transport Layer Interface for Wide-Bandgap Perovskite Solar Cells**
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3-1-AP-85 **Synergistic Interfacial Defect Passivation for Efficient Perovskite Solar Cells**
Hyungsu Jang[1] , Dong Suk Kim[1] *
[1]Department of Carbon Neutrality, Ulsan National Institute of Science and Technology, Republic of Korea

3-1-AP-86 **Ethanol purification enables high-quality α-phase FAPbI3 perovskite microcrystals for commercial photovoltaic applications**
Hanna Park[1] , Hyun Seo Kim[1] , Bong Joo Kang[2] , Nam Joong Jeon[2] , Eui Hyuk Jung[1] *
[1]Department of Energy Engineering, Korea Institute of Energy Technology, Republic of Korea
[2]Department of Materials Research Center, Korea Research Institute of Chemical Technology, Republic of Korea

3-1-AP-87 **Stable Lead Acetate-Mediated CsPbI2Br Inorganic Perovskite Solar Cells Achieving 1.323 V Open-Circuit Voltage**
Pavan Kodam[1] , Sawanta Mali[1] , Jyoti Patil[1] , Ajit Mali[1] , Gopal Kulkarni[1] , Chang Kook Hong[1] *
[1]Department of Chemical Engineering, Chonnam National University, Republic of Korea

3-1-AP-88 **Enhanced Efficiency of Triple-Cation Wide-Bandgap Perovskite Solar Cells via B-site Manganese Chloride Doping**
Ajit Mali[1] , Jyoti Patil[1] , Pavan Kodam[1] , Gopal Kulkarni[1] , Chang Kook Hong[1] * , Sawanta Mali[1]
[1]Department of Chemical Engineering, Polymer Energy Materials Laboratory, Chonnam National University, Republic of Korea

3-1-AP-89 **Lamination-Compatible SnO_2/Reactive-Sputtered ITO/Ag Rear Contacts for Stable Perovskite Solar Cells**
Oh Sehun[1] , Seo Jiyoun[2] *
[1]Department of Nanofusion Technology, Pusan National University, Republic of Korea
[2]Department of Nanoenergy Engineering, Pusan National University, Republic of Korea

3-1-AP-90 **Tailoring Thick Film Crystallization and Facet Orientation via Potassium Acetate for Efficient Bifacial Perovskite Solar Cells**
Xianggang Chen[1] , Molang Cai[1] *
[1]Department of new energy, North China Electric Power University, China

3-1-AP-91 **Performance Enhancement of All-Evaporated Perovskite Solar Cells via Tailored Self-Assembled Monolayers**
Sangheon Lee[1] , Sungnam Kwon[1] , Seokin Na[1] *
[1]Department of Flexible Printable Electronics, Jeonbuk National University, Republic of Korea

3-1-AP-92 **Efficient n–i–p All-Perovskite Tandem Solar Cells Enabled by Tailored Interconnection Layers**
Dong Hyun Kim[1] , Jun Hong Noh[1] *
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3-1-AP-93 **Constructing Orderly Crystal Orientation with Bidirectional Coordinator for High-Efficiency and Stable Perovskite Solar Cells**
Jaehwi Lee[1] , Yun Seop Shin[1] , Elham Oleiki[1] , Geunsik Lee[1] , Dong Suk Kim[1] , Jin Young Kim[1] *
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3-1-AP-95 **Sequential Passivation Using Ammonium Salts for Efficient and Stable Vacuum-Deposited Perovskite Solar Cells**
Mohammadhossein Kohan[1] , Sang-Heon Lee[1] , Jaswinder Singh[1] , Sung-Nam Kwon[1] , Seok-In Na[1] *
[1]Department of Flexible and Printable Electronics, Jeonbuk National University, Republic of Korea

3-1-AP-96 **Solvent Engineering with Hexafluorobenzene for Reproducible 2D/3D Perovskite Heterojunction Solar Cells**
Imil Fadli Imran[1] , Rakesh Rosan Pradhan[1] , Drajad Satrio Utomo[1] , Stefaan De Wolf[1] *
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3-1-AP-97 **Performance Enhancement of Transparent Wide-Bandgap Perovskite Solar Cells through Al_2O_3 Interfacial Engineering**
MinJae Jang[1] , DongWon Kang[1] *
[1]Department of Energy Systems Engineering, Chung Ang University, Republic of Korea

3-1-AP-98 **Sustainable Self-Healing of Perovskite Solar Cells Using Dendrimers as Volatile Reservoirs**
Yehyung Kim[1] , Wooyeon Kim[1] , Jaeyeon Kim[1] , Min Jae Ko[1] *
[1]Department of Chemical engineering, Hanyang University, Republic of Korea

3-1-AP-99 **NiOx HTL Engineering with a Multifunctional Organic Molecular Dopant for Efficient MA-free Tin-Lead Perovskite Solar Cells**
Taegyeong Lee[1] , Seojun Lee[1] , Dongwon Kang[1] *
[1]Department of Energy Systems Engineering, Chung-Ang University, Republic of Korea

3-1-AP-100 **Sequential Two-Step Solution Processing of Wide-Bandgap Perovskite Solar Cells for Tandem Applications**
Abduhabir Mirza[1] * , Masatoshi Yanagida[1] , Dhruba B. Khadka[1] , Kenjiro Miyano[1] , Yasuhiro Shirai[1]
[1]Department of Photovoltaic Materials Group, GREEN Research On Energy And Environmental Materials, National Institute for Materials Science, Japan

3-1-AP-101 **Surface Modification of Tin–Lead Perovskite Solar Cells Using Perovskite Quantum Dots for Enhanced Efficiency and Stability**
Dohun Baek[1] , ChaeEun Lee[2] , Min Kim[1] *
[1]Department of Chemical Engineering, University of Seoul, Republic of Korea
[2]Department of Chemical Engineering, Jeonbuk National University, Republic of Korea

3-1-AP-102 **Charge-State-Controlled Surface Modifiers for High-Voltage and Stable Wide-Bandgap Perovskite Solar Cells**
Sanghyun Lee[1] , Subin Yu[1] , Min Jae Ko[1] *
[1]Department of Chemical Engineering, Hanyang University, Republic of korea

3-1-AP-103 **Green-Solvent Processed 2.0 eV Wide-Bandgap Perovskite Solar Cells Yielding an Unprecedented VOC of 1.325 V**
Yehyung Kim[1] , Min Jae Ko[1] *
[1]Department of Chemical Engineering, Hanyang University, Republic of korea

3-1-AP-104 **Solid-State Dry-Contact Trimming for Homogenized Sn–Pb Perovskites in Efficient All-Perovskite Tandem Solar Cells**
Woocheol Han[1] , Hyojin Hong[1] , Chan Young Kim[1] , Jun Hong Noh[1] *
[1]Department of Civil Environmental and Architectural Engineering, Korea University, Republic of Korea

3-1-AP-105 **Co-Self-Assembled Monolayer-Mediated Buried Interface Engineering for Suppressing Interfacial Losses in Wide-Bandgap Tin Perovskite Solar Cells**
Won Choi[1] , SungWon Cho[2] , Chang Eun Song[3] , Jong-Woon Ha[4] , Dong-Won Kang[1] *
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[3]Department of Photoenergy Research Center, Korea Research Institute of Chemical Technology, Republic of Korea
[4]Department of Materials Engineering and Convergence Technology, Gyeongsang National University, Republic of Korea

3-1-AP-106 **Linker-Engineered Polymerized Small-Molecule Acceptors with High Electron Mobility and Passivation Capability for High-Performance and Stable Inverted Perovskite Solar Cells**
MinAh Park[1] , Seungjun Lee[2] , Hye Seung Kim[1] , Myoung Hoon Song[1] * , Bumjoon Joon Kim[2]
[1]Department of Materials Science and Engineering, Ulsan National Institute of Science and Technology, Republic of korea
[2]Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology, Republic of korea

3-1-AP-107 **Homogeneous Low-dimensional Phase Engineering via Solvent-Driven Surface Reconstruction for Efficient and Stable 2D/3D Perovskite Solar Cells**
Min Jung Sung[1] , Dong Suk Kim[1] *
[1]Department of Carbon Neutrality, Ulsan National Institute of Science and Technology, Republic of korea

3-1-AP-108 **Odd-Numbered Alkyl Chains Enables Chemical Control of Interfacial Ordering for Efficient Perovskite Solar Cells**
Changhyeon Yoon[1] , Dongsuk Kim[1] *
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3-1-AP-109 **Photo-Induced Interfacial Dipole Engineering via ESIPT-Active Organic Interlayers for Efficient Wide-Bandgap Perovskite Solar Cells**
Seoyeon Park[1] , Hui Joon Park[1] * , Sanghyuk Park[2] , Vachan B. S.[2]
[1]Department of Semiconductor Engineering, Hanyang University, Republic of Korea
[2]Department of Chemistry, Kongju National University, Republic of Korea

3-1-AP-110 **Crystallization and Interface Engineering for Efficient 2.0 eV Wide-Bandgap Inorganic Perovskite Solar Cells**
Kwon Pyo Lee[1] , Jun Hong Noh[1] *
[1]Department of Civil Environmental and Architectural Engineering, Korea University, Republic of korea

3-1-AP-111 **Terminal-Group-Dependent Voltage and Charge-Transport Regulation in Wide-Bandgap Perovskite Solar Cells**
Jiwon Ha[1] , Dong Suk Kim[1] *
[1]Department of Carbon Neutrality, Ulsan National Institute of Science and Technology, Republic of korea

3-1-AP-112 **Improvement of Perovskite Solar Cells Using SnO_2 Dispersion with added Ammonia Water**
Tatsuya Yamamoto[1] , Hiroki Oka[1] , Kyosuke Sato[1] , Takeharu Aoki[1] , Atsushi Kogo[2] , Shiro Uchida[1] *
[1]Department of Advanced Materials Science and Engineering, Chiba Institute of Technology, Japan
[2]Department of Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology, Japan

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3-1-AP-113 **Investigation of MoO_3 /ITO layers deposition for perovskite/Si tandem solar cells**
Hiroki Oka[1] , Takeharu Aoki[1] , Kyosuke Sato[1] , Tatsuya Yamamoto[1] , Kousuke Suzuki[1] , Tomoki Miki[1] , Naoki Narukawa[1] , Atsushi Kogo[2] , Shiro Uchida[1] *
[1]Department of Advanced Materials Science and Engineering, Chiba Institute of Technology, Japan
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3-1-AP-114 **Comparative performance simulation study of Germanium-based perovskite solar cells**
Neha Bisht[1] , Jaeyeong Heo[1] *
[1]Department of Materials Science and Engineering, Chonnam National University, Republic of korea

3-1-AP-115 **Controllable Growth of Micron-Thick α-FAPbI3 Films for High-Performance Bifacial Perovskite Solar Cells**
Molang Cai[1] * , Xiaoxu Sun[1]
[1]Department of New Energy, North China Electric Power University, China

3-1-AP-116 **Bio-Inspired Interface Enables Heat-Resistant Perovskite Solar Cells**
Zhijie Tang[1] , Jianyu Yuan[1] *
[1]Department of Institute of Functional Nano and Soft Materials, Soochow University, China

3-1-AP-117 **Ionic liquid-driven surface reconstruction for thermally stable n–i–p Sn–Pb perovskite solar cells**
Jongdeuk Seo[1] , Heunjeong Lee[2] , Shinuk Cho[2] , Jin Young Kim[1] * , Taehee Song[1] , Yeonjeong Lee[1] , Jaehyeong Kim[1] , Ha-eun Koo[1]
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of Korea
[2]Department of Physics and Energy Harvest Storage Research Center, University of Ulsan, Republic of Korea

3-1-AP-118 **Antimony-Doped Tin Oxide as a Stable Hole Transport Layer for Inverted Perovskite Solar Cells**
Jaeyong Park[1] , Jaeki Jeong[1] *
[1]Department of Energy Science, Sungkyunkwan University, Republic of Korea

3-1-AP-119 **Surface-Confined Modification of Inverted CsPbI3 Perovskite Solar Cells using Formamidinium Salt**
Seungmin Ha[1] , Jinyoung Kim[1] , Chaewon Park[2] , Siyeon Kim[2] , Ikjae Park[2] *
[1]Department of Material Sience and Engineering, Seoul National University, Republic of korea
[2]Department of Materials Physics, Sookmyung Women's University, Republic of korea

3-1-AP-120 **Green Solvent Strategy for High-Performance Perovskite Solar Cells**
Soo Bin Yoo[1] , Hyun-Sung Yun[1] , Bong Joo Kang[1] , Nam Joong Jeon[1] *
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3-1-AP-121 **Oxide Nanoparticle Engineering at the Buried Interface of Middle-Bandgap Perovskite Solar Cells**
Seungmin Lee[1] , Byungha Shin[1] *
[1]Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Republic of Korea

3-1-AP-122 **Ligand-Engineered Ultra-Wide Bandgap Perovskites for Triple-Junction Tandem Solar Cells**
Jigeon Kim[1] , Seungmin Lee[1] , Byungha Shin[1] *
[1]Department of Materials Science and Technology, Korea Advanced Institute of Science and Technology, Republic of Korea

3-1-AP-123 **Synergistic Enhancement of Charge Extraction and Heat Dissipation in Inverted Perovskite Solar Cells via n-Doped Top Interlayers**
Sang Young Jeong[1] , Han Young Woo[2] , Myoung Hoon Song[3] , Nam Joong Jeon[1] *
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[2]Department of Chemistry, Korea University, Republic of Korea
[3]Department of Materials Science and Engineering, Ulsan National Institute of Science and Technology, Republic of Korea

3-1-AP-124 **Annealing Temperature-Dependent Phase Evolution and Crystallinity of Inorganic $CsPbI_3$ Perovskite Thin Films**
Su-Ho Ahn[1] , EQ Han[1] , Jung-Ho Yun[1] *
[1]Department of Environmental Science and Engineering, Kyung Hee University, Air and Environment Energy Nexus Lab, Republic of Korea

3-1-AP-125 **Conformal CVD-Deposited Parylene-D Passivation for High-Performance and Stable Perovskite Solar Cells**
Eungyeol Lim[1] , Seulki Song[1] *
[1]Department of Chemical Engineering, Chungnam National University, Republic of Korea

3-1-AP-126 **Enhancing Interfacial Adhesion between PTAA and Metal Electrodes in Perovskite Solar Cells Using DMAP**
Yeji Kim[1] , Seulki Song[1] *
[1]Department of Applied Chemical Engineering, Chungnam National University, Republic of Korea

3-1-AP-127 **Process Engineering for Defect Suppression in All-Inorganic Narrow-Bandgap Perovskite Solar Cells**
Younghye Lee[1] , Seulki Song[1] *
[1]Department of Chemical Engineering And Applied Chemistry, Chungnam National University, Republic of korea

3-1-AP-128 **Work-Function-Tuned MXene with Enhanced Interfacial Binding for Highly Stable Hole Transport Layers**
Seohyeon Park[1] , Seulki Song[1] *
[1]Department of Chemical Engineering, Chungnam National University, Republic of Korea

3-1-AP-129 **Decoupling Bulk Crystallization and Surface Passivation in Low Temperature Wide Bandgap Perovskites for High Performance Flexible Solar Cells**
Joo Woong Yoon[1] , Min Hyeok Park[1] , Dae Hyeok Seo[1] , Dong Hoe Kim[1] *
[1]Department of Material Science and Engineering, Korea University, Republic of korea

3-1-AP-130 **Hole-Transporting Materials and Self-Assembled Hole-Selective Contacts for Perovskite Solar Cells and Tandem Devices**
Yan Duo Lin[1] *
[1]Department of Chemistry, Soochow University, Chinese taipei

3-1-AP-131 **Redox-Buffering PEAI-CeOx Passivation Suppresses Thermo-Mechanical Degradation in Perovskite Solar Cells Under Rapid Thermal Cycling**
George Kwesi Asare[1] , Minwoo Lee[2] , Joshua Sraku Adu[1] , Chang Eun Song[1] , Jae Sung Yun[3] , Helen Hejin Park[4] *
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[4]Department of Chemical and Biological Engineering, Hanbat National University, Republic of Korea

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3-1-AP-132 **Tuning the Surface Electronic Landscape of Ultrathin (Al,Sn)Ox Electron Extraction Layers in Perovskite Solar Cells**
Joshua Adu[1] , Helen Park[1] *
[1]Department of Energy Materials Research Centre, Korea Research Institute of Chemical Technology, University of Science and Technology, Republic of korea

3-1-AP-133 **Theophylline-Mediated Defect Passivation in Mixed-Cation Mixed-Halide Perovskite Solar Cells for Enhanced One-Sun and Indoor Photovoltaic Performance**
Jae Jin Song[1] , Hana Kang[2] , Mijoung Kim[2] , Moonhoe Kim[2] , JungYup Yang[2] *
[1]Department of Energy, Kunsan National University, Republic of Korea
[2]Department of Physics, Kunsan National University, Republic of Korea

3-1-AP-134 **Impact of Surface Energy of SAM-blends on Photophysical Properties of Perovskite Thin Films**
Biswajit Pal[1] , Sofiia Kosar[2] , Oleksandr Matiash[2] , Hannu Pasanen[2] , José P Jurado[2] , Vladyslav Hnapovskyi[2] , Napan Phuphathanaphong[2] , Luis Victor Torres Merino[2] , Asmat Ullah[2] , Giovanni Pica[2] , Anil Reddy Pininti[2] , Subhashri Mannar[2] , Stefaan De Wolf[2] , Vijay K Singh[1] , Ambesh Dixit[1] , Frédéric Laquai[3] , Christopher E Petoukhoff[3] *
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[3]Department of Chemistry, Faculty of Chemistry and Pharmacy, Ludwig-Maximilians-Universität München, Germany

3-1-AP-135 **Charge Separation and Transport in Perovskite Solar Cells with a Sulfonate-Functionalized Covalent Organic Framework**
Haicheng Xia[1] , Changjie Tang[1] , Fengwu Liu[1] , Sung Heum Park[1] *
[1]Department of Physics, Pukyong National University, Busan, Republic of Korea

3-1-AP-136 **Dynamic Lattice Stabilization in Perovskite Solar Cells via Multifunctional Polymeric Interfacial Engineering**
Dongmin Lee[1] , Dong Suk Kim[1] *
[1]Department of Carbon Neutrality, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

3-1-AP-137 **Data-Driven Optimization of HTL-Free Graded Heterojunction Solar Cells through Numerical Simulations and Machine Learning**
Savita Kashyap[1] * , Chinmaya Kumar Sahoo[2] , Sanjeev Kumar[3] , Arun Kumar Singh[1]
[1]Department of Electronics and Communication Engineering, Semiconductor Research Centre, Punjab Engineering College, Chandigarh, India
[2]Department of Centre for Sophisticated Instruments and Facilities, Indian Institute of Technology Bombay, Mumbai, India
[3]Department of Physics, Punjab Engineering College, Chandigarh, India

3-1-AP-138 **Improving Hole-Selective Contacts in Wide-Bandgap Inverted Perovskite Solar Cells via Solvent and Concentration Optimization of Self-Assembled Monolayers**
Yejin Lee[1]
[1]Department of Korea Institute of Science and Technology, Republic of Korea

3-1-AP-139 **Synergetic Effect of Self-Assembled Monolayer and Passivation Layer in P-I-N Perovskite Solar Cells**
Jonabelle G. Delda , SeJin Ahn[1] *
[1]Department of Korea Institute of Science and Technology, Republic of Korea

3-1-AP-140 **Performance improvement of Lead-Based Ultra-Wide-Bandgap Perovskite Solar Cells with Formate Salt as an Additive: Attaining ~ 15% Efficiency**
Anfal Iftikhar[1] , Dong-Won Kang[1] *
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Area 5-2. Reliability and Performance of PV Modules and Systems

5-2-AP-01 **Beyond IEC 61215: Failure-Threshold Testing of Commercial PV Modules Under Practical Hail-Stow Conditions**
Roopmati Meena[1] *
[1]Department of Quality Assurance and Quality Control, DESRI India LLC, India

5-2-AP-02 **Quantitative Model of Modulating Light Irradiation Method to Estimate Generating Photovoltaic Cell Condition**
Yasuyuki Kobayashi[1] *
[1]Department of Faculty of Science and Engineering, Teikyo University, Japan

5-2-AP-03 **Process Analysis of Cell-to-Module (CTM) Losses and Power Output Improvement in Semi-Transparent Photovoltaic Modules**
Rock Heo[1] , Jin-Hui Han[1] , Dong-Wook Shon[1] , Jin-Seob Lee[1] *
[1]Department of Research Institute, SG Energy Co., Ltd., Republic of Korea

5-2-AP-04 **Field-Feasible Improvement of the Single-Diode Model from Standard Test Conditions to Diverse Environmental Conditions**
Jing-Wu Dong[1] * , Jyun-Guei Huang[2] , En Pan[1] , Yue-Ling Jiang[1] , Juan-You Yu[1] , Tz-Hau Su[1]
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[2]Department of Green Communication Laboratory, Telecom Technology Center, Chinese taipei

5-2-AP-05 **Impact of Encapsulant–Backsheet Material Selection on Damp-Heat Reliability of TOPCon Glass-Backsheet PV Modules**
Sraisth Sraisth[1] , Mehul Raval[1] * , Marius Luedemann[2] , Michael Wendt[2] , Jishnu Ramachandran Nair[2] , Anton Mordvinkin[2] , Robert Heidrich[2] , Oliver Voigt[1] , Xinyang Li[3] , Hardik Gohil[4] , Markus Beck[1] , Wolfgang Jooss[1]
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[3]Department of Technology, Wuhan RCT PV Technology Co. Ltd., China
[4]Department of Technology, RCT Solutions India Pvt Ltd, India

5-2-AP-06 **Impact of Natural Dust Accumulation on the Performance of High-Efficiency PERC, TOPCon, and HJT Modules in a Tropical Coastal Environment**
Tanokkorn Chenvidhya[1] , Manit Seapan[1] * , Panusorn Polchai[1] , Kittipob Wiriyavorawet[1] , Watcharee Phojan[1] , Nattakarn Sakarapunthip[1] , Yaowanee Sangpongsanont[1] , Chamnan Limsakul[1] , Usman Yahaya[1] , Dhirayut Chenvidhya[1] , Krissanapong Kirtikara[1]
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5-2-AP-07 **Integrated Thermal, Electrical, and Economic Assessment of Photovoltaic Systems with Phase-Change Materials**
Edgardo González[2] , Patricio Lefort[1] * , Luis Valenzuelz[3]
[1]Department of Electrical Engineering, University of Santiago of Chile, Chile
[2]Department of Mechanical Engineering, University of Santiago of Chile, Chile
[3]Department of O&M PV, ENEL CHILE, Chile

5-2-AP-08 **Behavior of Flexible MAPbI3 Perovskite Solar Cell Under Partial Shading**
Tomohiko Hara[1] * , Navapat Krobkrong[1] , Abdurashid Mavlonov[1] , Jeganathan Chellamuthu[1] , Yoshihiro Hishikawa[1] , Takayuki Negami[1] , Takashi Minemoto[1]
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5-2-AP-09 **Weather-Free Fault Labelling for Distributed PV Performance Assessment Using Inverter Monitoring Data**

Yang Tang[1] * , Shukla Poddar[1] , Merlinde Kay[1] , Earl Duran[2] , Chris Martell[2] , Fiacre Rougieux[1]
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[2]Department of Diagno Energy Pty Ltd, Diagno Energy Pty Ltd, Australia

5-2-AP-10 **Analysis of Degradation Behavior in Photovoltaic Modules with Various Encapsulant Combinations through Sequential Accelerated Lifetime Testing**

Yeonbae Shin[1] * , Kibaek Hong[1] , Woojun Nam[1] , Yonghyun Cho[1] , Gyugwang Kim[1] , Youngho Cho[1] , Jinho Choi[1] , Jaehyeok Hur[1]
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5-2-AP-11 **PV Performance Loss Rate Calculation Using an Ensemble Method in High Latitudes**

Lauri Karttunen[1] * , Ida Fagerli[2] , Sami Jouttijärvi[1] , Kati Miettunen[1]
[1]Department of Mechanical and Materials Engineering, University of Turku, Finland
[2]Department of Electric Energy, Norwegian University of Science and Technology, Norway

5-2-AP-12 **Combined Automotive Mechanical Loading Tests on Polymer-Based Submodules for Vehicle-Integrated Photovoltaics**

Daisuke Sato[1] * , Noboru Yamada[2] , Kensuke Nishioka[1]
[1]Department of Faculty of Engineering, University of Miyazaki, Japan
[2]Department of Mechanical Engineering, Nagaoka University of Technology, Japan

5-2-AP-13 **Diurnal and Seasonal Investigation of the Spectral Mismatch Factor Between CIGS and c-Si Solar Cells Using Two Year Outdoor Spectral Data**

Elias Perarticos[3] , Sumeet Mujumdar[1] * , Nuno Rodrigues[2] , Vasiliki Paraskeva[3] , Matthew Norton[3] , Sascha Sadewasser[2] , Pedro Anacleto[2] , Andreas Kyprianou[1] , George Georghiou[3] , Maria Hadjipanayi[3]
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5-2-AP-14 **Exploring the Thermal and Electrical Response to Partial Shading of Emergent Cell Connection Topologies**

Robinson Cavieres[1] * , Phillip Hammer[1] , Bram Hoex[1]
[1]Department of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australia

5-2-AP-15 **Hot Spot Suppression in Cell-Level TCT-Interconnected Modules and Verification by Circuit Simulation**

Nyoman Budiawan[1] * , Yasuyuki Ota[1] , Tatsuya Takamoto[1] , Kensuke Nishioka[1]
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5-2-AP-16 **Quantitative Evaluation of Soiling Level of PV using Photographic Image Analysis**

Ryo Mawatari[1] * , Tatsuya Takamoto[1] , Kensuke Nishioka[1]
[1]Department of Engineering, University of Miyazaki, Japan

5-2-AP-17 **First-Year Outdoor Stabilization and Performance of Bifacial TOPCon, PERC, and HJT Modules under Tropical Climatic Conditions**

Manit Seapan[1] , Tanokkorn Chenvidhya[1] * , Panusorn Polchai[1] , Kittipob Wiriyavorawet[1] , Nattakarn Sakarapunthip[1] , Yaowanee Sangpongsanont[1] , Chamnan Limsakul[1] , Usman Yahaya[1] , Watcharee Phojan[1] , Dhirayut Chenvidhya[1] , Krissanapong Kirtikara[1]
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5-2-AP-18 **Toward Reliable Perovskite Modules: Stability under ISOS-L1/L3, Damp Heat, and Real Outdoor Conditions Exceeding 5000 Hours with Performance-Enhancing Preconditioning**

Cynthia Farha[1] , Yves Abou Khalil[1] * , Liam Gollino[1] , Marion Provost[1] , Van Son Nguyen[1] , Thomas Guillemot[1] , Jean Rousset[1] , Karim Medjoubi[1]
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5-2-AP-19 **Advanced Multifunctional Coatings and Functional Encapsulants for Enhanced TOPCon PV Module Reliability**

Donya Ramimoghadam[1] * , Rowena Yew[1]
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5-2-AP-20 **The Accelerated Damp-Heat Test Method for Sodium-Contaminated Silicon-Based Heterojunction Solar Cells**

Yiming Qin[1] * , Yunren Luo[2] , Wenjie Zhao[3] , Qiang Shi[3] , Kazuhiro Gotoh[4] , Atsukshi Masuda[4] , Fanying Meng[2] , Zhengxin Liu[2]
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5-2-AP-21 **A study regarding heat dissipation performance improvement through substrate and cell surface coating in c-Si solar cell modules without encapsulant**

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5-2-AP-22 **Comparative Study of Electrical Characteristics in PERC, TOPCon, and HJT Silicon Solar Cells**

Thao Nguyen[1] , Jaehyeong Lee[1] *
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5-2-AP-23 **Investigating UV-Induced Degradation and Recovery Dynamics in p-type PERC Solar Cells**

Aeron Johns[1] * , Muhammad Umair Khan[1] , Alison Ciesla[1] , Lahiruni Ranasinghe[1] , Chandany Sen[1] , Bram Hoex[1]
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5-2-AP-24 **Solar cell interconnection with SphericaTM particle based ECA**

Junjie Zhu[1] * , Helge Malmbekk[1] , Helge Kristiansen[2] , Daniel Buckland[3] , Giuseppe Galbiati[3]
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[3]Department of R&D, Henkel AG & Co, Germany

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5-2-AP-25 **Reliability-Enhancing and Pre-laminates Interlayers for Photovoltaic Modules in Harsh Environments**

Matthieu Despeisse[1] , Lison Marthey[1] , Olatz Arriaga Arruti[1] * , Dhanup S. Pillai[2] , Mohammad Hossain[2] , Loann Baume[1] , Ludovic Vuithier[1] , Hengyu Li[1] , Sertac Bayhan[2] , Brahim Aissa[2] , Tonio Buonassisi[1] , Christophe Ballif[1]

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[2]Department of Qatar Environment and Energy Research Institute, Hamad bin Khalifa University, Qatar

5-2-AP-26 **Transparent Radiative Cooling Films for Photovoltaic Panels: Physics-Driven Optimization of Functionalized PDMS/SiO_2 Nanocomposites**

Andrea Minin[1] *

[1]Department of Chemical and Pharmaceutical Sciences, University of Trieste, Italy

5-2-AP-27 **Study of Fire Safety regulation for BIPV system in korea**

Kyu Jin Kim[1] , Seung Joon Lee[1] *

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5-2-AP-28 **Evaluation of Photovoltaic Module Reliability Using an Indoor Accelerated Complex Test**

YoungHo Cho[1] , Donggun Lim[2] * , Kibaek Hong[1] , Woojun Nam[1] , Yonghyun Cho[1]

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[2]Department of Electronic Engineering, Korea National University of Transportation, Republic of Korea

5-2-AP-29 **TOPCon module current gains by profiled cell interconnectors**

Lara Bakker[1] * , Christina Hollemann[2] , Malte Brinkmann[1] , Sonja Bräunig[2] , Henning Schulte-Huxel[2] , Rolf Brendel[1]

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5-2-AP-30 **Photovoltaic Modules with Wooden Frames – Proof-of-Concept**

Christian Reichel[1] * , Tanyew Singer[1] , Daria Raine[1] , Max Mittag[1] , Martin Heinrich[1] , Holger Neuhaus[1]

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5-2-AP-31 **Comparative Analysis of Data Analytics and Machine Learning Approaches for String-Level Photovoltaic Power Plant Degradation Monitoring**

Nattakarn Sakarapunthip[1] * , Yaowanee Sangpongsanont[1] , Dhirayut Chenvidhya[1] , Chamnan Limsakul[1] , Tanokkorn Chenvidhya[1] , Usman Yahaya[1] , Manit Seapan[1]

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5-2-AP-32 **Multi-Scale Impedance Spectroscopy of c-Si Photovoltaic Modules: From Single-Cell Defect Signatures to Module-Level Diagnostics**

Emiliano Leghissa[1] , Luca Trivillin[1] *

[1]Department of Information Engineering Electrical Engineering and Applied Mathematics, University Of Salerno, Italy

5-2-AP-33 **Manufacturing and Durability Evaluation of HJT Solar Cell Module Using Silver Paste**

Kyungsoo Kim[1] * , Young-Joo Eo[1] , DoHyun An[1]

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5-2-AP-34 **Techno-Economic Analysis of an n-TOPCon PV Platform Integrating GERP Frames and 1-Step Edge Sealants with Next-Generation 2000V DC SiC String Inverters**

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5-2-AP-35 **Corrosion sensitivity of industrial SHJ and TOPCon solar cells under acidic and ionic contamination**

Jiexi Fu[1] , Bram Hoex[1] * , Xinyuan Wu[1] , Xutao Wang[1] , Wenjie Lin[1]

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5-2-AP-36 **Electrical and image-based combined strategy for machine learning fault detection in PV modules**

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5-2-AP-37 **Operational Responses of Reused and Newly Installed Photovoltaic Arrays to Short-Term and Cumulative Particulate-Matter Exposure**

Jeong-Eun Jeon[1] * , Jae-Hyeok Hur[2] , Ji-Hyun Yoo[1] , Yun-Sung Lee[1] , Seok-Jae Lee[1] , Su-Mi Yang[1]

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5-2-AP-38 **Initial Operational Assessment of a Photovoltaic Power System with Module-Level Power Electronics at Far East University**

Jihyun Yoo[1] * , Jeong-Eun Jeon[1] , Yoon-Sung Lee[1] , Jae-Hyeok Hur[2] , Kil-Su Shin[1] , Gyeong-Jun Min [1] , Su-Mi Yang[1]

[1]Department of Energy IT Engineering, Far East University, Republic of Korea

5-2-AP-39 **Electrical Response of Monocrystalline Silicon Solar Cells under Outdoor, Thermal, and Combined Stress Conditions**

Jihyun Yoo[1] * , Jae-YeongJang[1] , Sung-ChulYang[1] , Byeong-Hyeok Jeon[1] , Jae-Woo Shim[1] , Yoon-Sung Lee[1] , Su-Mi Yang[1]

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5-2-AP-40 **Performance Evaluation of Low-Temperature Electrode Sheet Interconnection Technology for Cell-to-Module Integrated PV Modules**

Donggun Lim[1] * , Mingyu Kwak[1] , Yong Joon Kwon[1] , Sungjun Cho[1] , Sung Deok Seo[1] , Sunwoo Yun[1]

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5-2-AP-41 **Preliminary Electrical and Electroluminescence Assessment of Reused Photovoltaic Modules from Different Manufacturers**

Yunsung Lee[1] * , Jeongeun Jeon[1] , Jihyun Yoo[1] , Jaehyeok Hur[1] , Junhyuck Choi[1] , Sungjae Min[1] , Sumi Yang[1]

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5-2-AP-42 **Risk-Screening Potential of Cumulative Particulate-Matter Exposure and Operational History for Low-Performance Events in Reused Photovoltaic Arrays**

Jeong-eun Jeon[1] * , Kil-Su Shin[1] , Byeong-Hyeok Jeon[1] , Sung-Chul Yang[1] , Sung-Jae Min[1] , Ji-Sun Lee[1] , Su-Mi Yang[1]

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5-2-AP-43 **A Study on the Reliability Characteristics of Photovoltaic Modules Integrated with RFID Tags**
jongrok Lim[1] , TaeHee Jung[1] , Sungmin Han[1] , pilkyu Kim[1] , Seong-won Kim[1] *
[1]Department of Renewable Energy Technology Center System Energy Division, Korea Testing Laboratory, Republic of Korea

5-2-AP-44 **Numerical Analysis of Cell Degradation on Offshore PV Modules**
Sungmin Youn[1] , Chil-Hyoung Lee[1] , Min-Joon Park[1] *
[1]Department of Energy Nano Technology Group, Korea Institute of Industrial Technology, Republic of Korea

5-2-AP-45 **Process Design and Long-Term Reliability Assessment of RFID-Embedded Large-Area Photovoltaic Modules for Lifecycle Traceability**
Yongki Min[1] * , Tai-hyeong Kim[1] , Chung-hyun Kim[1]
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5-2-AP-46 **Stability of Water Vapor Barrier Performance of Cat-CVD Silicon Nitride Films under Damp Heat Exposure**
Keisuke Ohdaira[1] * , Masayuki Fukuda[2]
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5-2-AP-47 **A Device to Nanoscale Failure Analysis Workflow for Encapsulated Perovskite Mini-Modules under Damp-Heat Stress**
Yeonwoo Park[1] , Jae Ho Yun[1] *
[1]Department of Energy Engineering, KENTECH, Republic of Korea

5-2-AP-48 **Quality Assurance of Solar Simulators Using a Long-Term Working Reference Module for Photovoltaic Module Testing**
Manit Seapan[1] * , Kittipob Wiriyavorawet[1] , Dhirayut Chenvidhya[1] , Panusorn Polchai[1] , Chamnan Limsakul[1] , Yaowanee Sangpongsanont[1] , Tanokkorn Chenvidhya[1]
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5-2-AP-49 **Condition Assessment of a Monocrystalline PV Module after Long Term Field Operation in a Humid Tropical Coastal Environment**
Yaowanee Sangpongsanont[1] , Chamnan Limsakul[1] * , Manit Seapan[1] , Dhirayut Chenvidhya[1] , Tanokkorn Chenvidhya[1] , Nattakarn Sakarapunthip[1] , Chaiyawut Kanjanajongkon[1]
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5-2-AP-50 **Low-Temperature Rapid Lamination for Stable Perovskite Photovoltaic Modules**
Moonhoe Kim[1] , Gisung Kim[1] , Hana Kang[1] , Jaejin Song[2] , Mijoung Kim[1] , JungYup Yang[1] *
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5-2-AP-51 **Power Generation Performance Analysis of East–West Bifacial PV Systems Installed on Gabled Roofs Based on Outdoor Experiments and Simulation**
Hayoung Kim[1] , Junwon Jang[1] , Jinhee Kim[2] , Juntae Kim[3] *
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[3]Department of Green Smart Architectural Engineering/Energy Systems Engineering(Graduate School), Kongju National University, Republic of Korea

5-2-AP-52 **Design and Preliminary Evaluation of a Threshold-Normalized Multivariable Fire-Risk Screening Algorithm for East–West Gable-Roof PV Systems**
Dakyung Lee[1] , Gunwoo Kim[1] , Chang Sik Son[1] , Donghyun Hwang[1] *
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5-2-AP-53 **Uncertainty in IEC 61853 Energy-Yield Predictions Induced by PAN-File Generation Methods**
Ahmad Hashem[1] * , Hugo Sanchez[1] , Frank Xu[3] , Leila Mortazavifar[1] , Christos Monokroussos[3] , Ralph Gottschalg[1]
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[3]Department of -, TueV Rheinland Co., China

5-2-AP-54 **Standardization Trends and Advanced Testing Methodologies from Material to Module Levels for Long-Term PV Module Reliability**
Sang Woo Park[1] , Soohyun Hwang[1] , Mu Yi Jeon[1] *
[1]Department of New and Renewable Energy Business Center, Korea Testing Certification institute, Republic of Korea

5-2-AP-55 **Structural Design and Mechanical Load Validation of a Lightweight Frameless Photovoltaic Module Using Bio-Based Epoxy Composites**
Yohan Noh[1] , Chanyong Lee[1] , Seohee Hwang[2] , Hangoo Cho[1] , Jaehyeong Lee[1] *
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[2]Department of Semiconductor Convergence Engineering, Sungkyunkwan University, Republic of Korea

5-2-AP-56 **Thermomechanical Failure Modes of Lightweight Flexible PV Modules under Automotive Thermal Shock: Effects of Cover Materials and Laminate Configurations**
Riku Yoshii[1] * , Daisuke Sato[2] , Masaaki Baba[1] , Noboru Yamada[3] * ,
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5-2-AP-57 **Mechanical Response to Impact Loading of Lightweight Photovoltaic Modules with Polymer Covers**
Katsuhiko Hino[1] , Daisuke Sato[2], Masaaki Baba[3] , Noboru Yamada[4] *
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[2]Department of Mechanical Engineering, Miyazaki University, Japan
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5-2-AP-58 **Fluorine-Free Hydrophobic Anti-Soiling Alumina-Based Coating for Photovoltaic Cover Glass**
Gulnaaz[1] * , Sudhanshu Mallick[1]
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5-2-AP-59 **Uncertainty in I–V Measurements of IBC Photovoltaic Modules Using Spire and Pasan Sun Simulators**
Nishant Kumar[1] * , K. L. Narasimhan[1] , B. M. Arora[1] , Narendra Shiradkar[1]
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5-2-AP-60 **Sensitivity of Thermomechanical Cell Stress to Mounting Conditions in Full-Size Semi-Flexible PV Modules**
Takehiro Hasegawa[1] , Daisuke Sato[2] , Masaaki Baba[3] , Noboru Yamada[4] *
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Area 5-4. PV Deployment in Diverse Environments (Agri-PV and Floating PV)

5-4-AP-01 **Technical and economic feasibility for connecting a floating photovoltaic project to a reservoir power plant of the Chilean national electrical system**

Fernanda Flores[1] , Patricio Lefort[1] * , Luis Valenzuela[2]
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[2]Department of O&M PV, ENEL CHILE, Chile

5-4-AP-02 **Dust-to-Energy Recovery in Coastal Photovoltaics: Comparative FPV–GPV Performance, Soiling Mechanisms, and Sustainable Cleaning Strategies**

Asim Ahmad[1] * , Kashif Irshad[1] , Shafiqur Rehman[1] , Mohamed E. Zayed[1]
[1]Department of Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals, Saudi arabia

5-4-AP-03 **A Standardization and Modularization Strategy for Offshore Floating Photovoltaic Platforms toward Global Deployment**

Kyusuk Lee[1] , Moonok Kim[1] * , Beomsik Kim[1] , Yong-il Jung[1]
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5-4-AP-04 **Framed for the Future: Rethinking PV Module Mounting for Durability and Sustainability in Diverse Environments**

Nikoleta Kyranaki[1] * , Philippe Nivelle[1] , Arvid van der Heide[1] , Jens Moschner[2] , Arnaud Morlier[1] , Michaël Daenen[1]
[1]Department of IUMAT, Hasselt University, imec, Belgium
[2]Department of ESAT-ELECTA, KU Leuven, Belgium

5-4-AP-06 **Spectrum-Sharing Transparent and Semitransparent Photovoltaics for Agrivoltaic Sunroofs and Building Windows**

Nobuyuki Matsuki[1] * , Tomomasa Sato[1] , Rie Nakagawa[2] , Shintaro Negishi[1] , Hiromasa Sekiguchi[3]
[1]Department of Electrical and Electronics Engineering, Faculty of Engineering, Kanagawa University, Japan
[2]Department of Biofunctions course, Faculty of Chemistry and Biochemistry, Kanagawa University, Japan
[3]Department of International Business and Management, Faculty of Business Administration, Kanagawa University, Japan

5-4-AP-07 **Desert Agrivoltaics under Arid Gulf Conditions: Lessons from Field Operation**

Sagarika Kumar[1] * , Min Hsian Saw[2] , Mohamed AlRemeithi[1] , Mauro Pravettoni[1]
[1]Department of Renewable and Sustainable Energy Center, Technology Innovation Institute, Abu Dhabi, UAE
[2]Department of Solar, REC Solar Pte Ltd, Singapore

5-4-AP-08 **Demonstration Study of Establishing Floating Substation Standards for Floating PV**

Hyunsik Jo[1] * , Jieun Lee[1] , Sunghyun Lee[1] , Donggeon Yang[1]
[1]Department of Kwater Research Institute, Korea Water Resources Corporation, Kwater Research Institute, Water Energy Research Center, Republic of Korea

5-4-AP-10 **Comparison of Power Generation System Characteristics of Vertical Agrivoltaic Systems at 60- and 90-Degree Installed Angles**

SeungJoon Park[1] , YongKyu Park[1] * , SeonHeui Kang[1]
[1]Department of Technical Research Center, WP CoLtd, Republic of Korea

5-4-AP-11 **A Physics-Based 3D Resistive Thermal Model for Floating Photovoltaic Systems**

Sri Sathya Sai Shanka Vasuki[1] * , Ioannis Patokas[1] , Aryeshah Akbar[1] , Teddy Simanjuntak[2] , Olindo Isabella[1] , Rudi Santbergen[1]
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[2]Department of Shell Global Solutions International B.V, Shell Global Solutions International B.V, Netherlands

5-4-AP-12 **Power-Generation and Cabbage Cultivation Performance of a 180° Rotatable Vertical Agrivoltaic System**

Cheolhyun Lim[1] * , Juyoup Shin[1] , Gayoon Yoon[1] , Heegwan Chae[1] , Gunho Gim[1]
[1]Department of Energy Engineering Department, KENTECH, Republic of Korea

5-4-AP-13 **Development and Demonstration of a 50 kW Vertical Photovoltaic System for Greenhouse Sidewalls at the Goheung Smart Farm Innovation Valley**

Seonheui Kang[1] , Sangro Lee[1] , Geonmin Kang[1] , Chungyoub Kim[2] *
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[2]Department of Mechanical Systems Engineering, Chonnam National University, Republic of Korea

5-4-AP-14 **Data-Driven Optimal Control and Fault Diagnosis of a Hybrid Variable-Angle Vertical Photovoltaic System**

SeJun Pyo[1] *
[1]Department of Research and development, SeJin Eng, Republic of Korea

5-4-AP-15 **Application of Colored PV Modules on Wolffia Cultivation in an Agrivoltaic System**

Sasiwimon Songtrai[1] * , Perawut Chinnavornrungsee[2] , Supoj Sodarat[2] , Supanit Porntheeraphat[1] , Bunpot Saekow[1] , Kobsak Sriprapha[1]
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5-4-AP-16 **Research on Developing Design Guidelines for Floating Substations in Floating Photovoltaic systems**

Sodam Choi[1] , Myeongwi Choi[1] , Hyunsik Jo[1] , Sunghyun Lee[1] , Donggeon Yang[1] , Jieun Lee[1] *
[1]Department of Water Energy Research Center, Kwater Resources Corporation, Republic of Korea

5-4-AP-17 **Development and Field Application of an Environmental Monitoring Framework for Ensuring Environmental Safety of Floating Substations in Floating Photovoltaic**

Myeongwi Choi[1] , Jieun Lee[1] , Sunghyun Lee[1] , Donggeon Yang[1] , Sodam Choi[1] , Hyunsik Jo[1] *
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5-4-AP-18 **Field Observation of Photovoltaic Module Degradation Characteristics under Coastal Exposure**

Yongki Min[1] * , Tae hyung Kim[1] , Chunghyun Kim[1] , Ji sun Kim[1] , Sanggil Lee[2] , Sehwan Ju[2]
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[2]Department of R&D, S-Energy, Republic of Korea

5-4-AP-19 **Predicting Solar Insolation Under Various Agrivoltaic Installations for Informed Crop Selection and System Optimization**

Suryansh Goel[2] , Narendra Shiradkar[1] *
[1]Department of Electrical Engineering, Indian Institute of Technology Bombay, India
[2]Department of Eton College, IIT Bombay, UK

5-4-AP-20 **Experimental investigation on solar cell cooled by inorganic phase change material, activated biochar and multiwalled carbon nanoparticles: A techno-enviro-economic assessment**

Jagan Sivamani[1] *, Ahmed Mohsen Abd El Fattah[2] , Mohammed Al-Osta[3] , Ravikumar Kottala[1]
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[3]Department of Civil and Environmental Engineering & Interdisciplinary Research Center for Construction and Building Materials, King Fahd University of Petroleum & Minerals, Saudi Arabia

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Area 2-3. Manufacturing and Process Integration of Silicon Photovoltaics

2-3-BP-01 **Fabrication of Self-Aligned Front Electrode for High-Efficiency Silicon Microwire Solar Cells**

Jihwan Jeong[1] , Soohyeok Park[1] , Yejin Han[1] , Seongmin Lee[1] , Taewan Kim[1] , Gayeong Lee[1] , Sehwan An[1] , Handon Um[1]
[1]Department of Chemical Engineering, Kangwon National University, Republic of korea

2-3-BP-02 **Residual Gas Analyzer-Based Process Monitoring of Industrial-Scale LPCVD for Crystalline Silicon Photovoltaic Manufacturing**

Munse Kim[1] , Hee-eun Song[1] , Yunae Cho[1] , Yong-Jin Kim[1] , Kyung Taek Jeong[1] , Sang Hee Lee[1] , Ka-Hyun Kim[2] *
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[2]Department of Physics, Chungbuk National University, Republic of Korea

2-3-BP-03 **Electrode Design for High-Performance and Low-Ag-Consumption Zero-Busbar (ZBB) Photovoltaic Modules**

Unsoo Kim[1] *
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2-3-BP-04 **Loss Analysis and Improvements for Industrial TOPCon cell production**

Haitce Duman[1] , Furkan Kaya[2] , Hümeyra Betül ŞAHİN[1] , Çağatay EZEN[1] , Berfin Yağmur ÇAKMAK[2] , Mert KAHRAMAN[2] , Elif Toker[2] , Mehul Raval[3] * , Meriç ÇALIŞKAN ARSLAN[1]
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[3]Department of Technology, RCT Solutions GmbH, Germany

2-3-BP-05 **Improvements in Ag metallization for Industrial TOPCon cell production**

Mert Kahraman[1] , Halil ELDEMİR[1] , Furkan Kaya[1] , Berfin Yağmur ÇAKMAK[1] , Hatice Duman[2] , Elif Toker[1] , Mehul Raval[3] * , Meriç ÇALIŞKAN ARSLAN[2]
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2-3-BP-06 **Optimal Solar Cell Sorting Method For High Module Production Reliability**

Minseo Kim[1] , Minseo Kim[2] , Yunae Cho[1] , Yong-Jin Kim[1] * , Sang Hee Lee[1] , Hee-eun Song[1] , Yoon Mook Kang[2]
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2-3-BP-07 **Data-Efficient Optimization of Ex-situ BBr_3 Diffusion via Gaussian Process Regression**

Minseo Kim[1] , Minseo Kim[2] , Yunae Cho[1] , Yong Jin Kim[1] , Sang Hee Lee[1] , Yoon Mook Kang[2] , Hee-eun Song[1] *
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Area 2-4. Characterization, Modeling, and Analysis

2-4-BP-01 **A Case Study of Developing SEMI / IEC Standards for Solar Cell/emerging PV**

Yung-Jen Shyong[2] , Yean-San Long[1] * , Yung-Tsung Liu[1] , Min-An Tsai[1] , Cho-Fan Hsieh[1]
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2-4-BP-02 **Study of Accelerated Degradation in Photovoltaic Components of Photovoltaic Plants in Chile**

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2-4-BP-03 **Development of a Segmented Cooling Jacket for Uniform Thermal Distribution in Photovoltaic Silicon Crystal Manufacturing**

Beenaben Sadasivan Santhi[1] , Srinivasan Manickam[4] * , Xin Liu[2] , Noritaka Usami[3] , Radha Sankararajan[1]
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2-4-BP-04 **PV Multiscale Modelling of Novel Silicon Devices: from Simulation of Innovative Cell Performance to Energy Yield Prediction**

Miroslav Zeman[2] * , P. Procel Moya[1] , Y. Zhou[2] , M. Verkou[2] , M. Leonardi[3] , D. Di Girolamo[3] , G. Giuliano[3] , F. Rametta[3] , M. Foti[3] , C. Gerardi[3] , K. Bittkau[4] , A. Eberst[4] , K. Ding[4] , Y. Blom[1] , M. Vogt[1] , R. Santbergen[1] , O. Isabella[1]
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2-4-BP-05 **Assessment of Optical Bandgap Extraction in Ultra-thin a-Si:H: Linking Thickness-dependent Reliability to Microstructural Evolution**

Si Hyeong Lee[1], Seung Min Park[1], Ki Joon Seong[1], Jeong-Ho An[3], Joon-Ho Oh[3], Hee-eun Song[2], Kyoung-Ho Kim[4], Ka-Hyun Kim[1]*
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2-4-BP-06 **Down-Shift Conversion by Measuring the External Quantum Efficiency in the Silicon Solar Cell with a Europium Complex Incorporated in the Antireflective Layer**

Yasuhiro Matsumoto[1]*, Gloria Lesly Jimenez[2], Ciro Falcony[2], Rogelio Mendoza[3], Anisleidy Borche[1], Aditya Nandi[1]
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[3]Department of College of Science and Technology, Mexico City Authonomous University, Mexico

2-4-BP-08 **Accurate Reflectance Reconstruction from Sparse Wavelength Sampling for Rapid Inline Silicon Solar Cell Characterisation**

Qingru Liu[1]*, Brendan Wright[1], Ziv Hameiri[1]
[1]Department of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

2-4-BP-09 **In-Line Compatible IDCL Fitting Method for Decomposing Recombination Current Densities in Industrial Silicon Solar Cells**

Kyung Taek Jeong[1], Hee-eun Song[1], Sang Hee Lee[1]*
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2-4-BP-10 **Influence of Cat-CVD Silicon Nitride Films on Potential-Induced Degradation in Silicon Heterojunction Solar Cells**
Lin Guo[1]*, Keisuke Ohdaira[2], Kensaku Maeda[2]
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[2]Department of materials science, Japan Advanced Institute of Science and Technology, Japan

2-4-BP-11 **Flash Lamp Annealing for Efficient Recovery of Potential-Induced Degradation in Crystalline Silicon Solar Cells**
Muhammad Adeel[1], Keisuke Ohdaira[1]*, Kensaku Maeda[1]
[1]Department of Material Science, Japan Advanced Institute of Science and Technology, Ohdaira lab, Japan

2-4-BP-12 **Early-stage detection of potential induced degradation of crystalline Si solar cells by outdoor electroluminescence method**
Arata Matsukawa[1], Itaru Raifuku[1]*, Yasuaki Ishikawa[1]
[1]Department of Electrical and Electronic Engineering, AoyamaGakuin University, Japan

2-4-BP-13 **Revealing the Mechanism of Wavelength-dependent Reversible UVID in TOPCon Solar Cells using a non-destructive Raman characterisation**
Ziheng Liu[1]*, Pengfei Zhang[1], Caixia Li[1], Jialiang Huang[1], Jialin Cong[1], Jingwen Cao[1], Martin Green[1], Xiaojing Hao[1]
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2-4-BP-14 **Performance Evaluation of Vehicle-Integrated Photovoltaics with Different Solar Cell Configurations Based on Measured Driving Shading Patterns**
Takumi Okamoto[1], Tatsuya Takamoto[2], Kensuke Nishioka[3], Yasuyuki Ota[3] *
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[2]Department of Professor, University of Miyazaki, GX Research Center, Japan
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2-4-BP-15 **Quantifying Interface Evolution during UV-Induced Degradation and Recovery of TOPCon Devices**
Xinya Niu[2], Emma Lee[1], Yao Xiao[3], Yanzhe Li[1], Dong Zhang[1], Yutong Song[1], Kei Kuwahara[1], Yuelin Xiong[1], Juan Gutierrez[1], Xiajie Meng[3], Sebastian Bonilla[1]*
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[2]Department of Solar Energy, Oxford Suzhou Centre for Advanced Research, China
[3]Department of Solar Energy, Tongwei Solar (Chengdu) Co. Ltd, China

2-4-BP-16 **Enhanced Efficiency and Reliability of Silicon Heterojunction Solar Cells via Nafion-Based Edge Passivation**
Hyejeong Jin[1], Junsin Yi[1]*
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2-4-BP-17 **Embedded Low-Breakdown Junctions in IBC Cells: Efficiency and Energy-Yield Trade-Offs**
Paul Procel[1] *, Youri Blom[1], Malte Vogt[1], Rudi Santbergen[1], Rene van Swaaij[1], Yifeng Zhao[1], Olindo Isabella[1]
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2-4-BP-18 **Daylight Photoluminescence Imaging of TOPCon Cells using a Silicon CCD Camera**
Chinmaya Kumar Sahoo[1] *, Riya Sharma[2], Shashwata Chattopadhyay[3], K.L. Narasimhan[2], B.M. Arora[2], Narendra Shiradkar[2], Dinesh Kabra[4], Anil Kottantharayil[2]
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[3]Department of Research & Development Department, Rayzon Solar Limited, India
[4]Department of Physics, Indian Institute of Technology Bombay, India

2-4-BP-19 **One-Time Suns-Voc-Based Lifetime Analysis of Contact-Induced Recombination in Silicon Heterojunction Solar Cells**
Cheolwook Kwon[1], Sang Hee Lee[1], Yong-Jin Kim[1], Yunae Cho[1], Soohyun Bae[1], Hee-eun Song[1], Soo Min Kim[3], Young-Joo Eo[1], Hae-Seok Lee[2]*
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2-4-BP-21 **Accurate Power Rating of High-Capacitance Modules Via Combined Transient-Corrected I-V and Suns-VOC Measurements**
Riya Sharma[1], Nishant Kumar[2], K. L. Narasimhan[3], B. M. Arora[4], Anil Kottantharayil[5], Narendra Shiradkar[6]*
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2-4-BP-22 **Experimental Assessment of an Optical-Electrical-Thermal Model for a Bifacial Photovoltaic Module Under Nordic Ground Conditions**
Zineb Gherdaoui[1] *
[1]Department of electrical engineering, The National Institute of Applied Sciences of Lyon, Institut des nanotechnologies de Lyon, France

2-4-BP-23 **Performance Modeling and Experimental Assessment of Bifacial PV Technologies across Different Tilt Angles**
Khadija El Ainaoui[1] *, Said Elhamaoui[1], Mhammed Zaimi[3], Abdellatif Ghennioui[2], Hachem Saadaoui[2], Ibtihal Ait Abdelmoula[1], El Mahdi Assaid[3]
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[3]Department of Physics Departement, Chouaib Doukkali University, Morocco

2-4-BP-24 **Probing Buried Amorphized Silicon Nanolayers in Textured Silicon Wafers by Reflectance Spectroscopy and Transfer-Matrix Modelling**
Lejo J. Koduvelikulathu[1] , Mikaël Hosatte[2] * , Brice Rouffie[2] , Lazhar Rachdi[1] , Frédéric Milési[3] , Andrzej Miszczuk[4]
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[2]Department of Segton Advanced Technology, Versailles, France
[3]Department of CEA-Leti, Grenoble, France
[4]Department of Roltec, Poznan, Poland

2-4-BP-25 **Quantitative Cell-Resolved Shunt Resistance Mapping in Photovoltaic Modules Using Electroluminescence Imaging**
Riya Sharma[1] * , K. L. Narasimhan[1] , B. M. Arora[1] , Anil Kottantharayil[1] , Narendra Shiradkar[1]
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Area 3-2. Perovskite Solar Cells & Modules: Advances in Scalability and Reliability

3-2-BP-01 **From Lab to Field: Mapping Degradation in Perovskite Modules via Spatially Resolved Characterization and Simulation**
Jonathan Parion[1]*, Arthur Julien[3], Elias Peraticos[4], Vasiliki Paraskeva[4], Maria Hadjipanayi[4], Aranzazu Aguirre[2], Filip Duerinckx[2], Ziv Hameiri[3], Hariharsudan Sivaramakrishnan Radhakrishnan[2], Jef Poortmans[2], Johan Lauwaert[5], Bart Vermang[1]
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[5]Department of Electronics and Information Systems, Ghent University, Belgium

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3-2-BP-02 **Performance and Stability of PVDF-HFP-Modified Perovskite Solar Cells under Space-Relevant Coupled Vacuum, Illumination, and Thermal Stress**

Wei-Hao Chiu[1], Harini Srikanth Rao[2], Seoungjun Ahn[2], Min-An Tsai[3], Yean-San Long[3], Chih-Hung Lin[3], Kun-Mu Lee[1]*

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3-2-BP-03 **Coring Technique Development and Failure Analysis of Perovskite Solar Modules**

yujian Han[1], Xiting Lang[2], Chuanxiao Xiao[2]*, Minghui Li[2], Hao Tian[2], Hong Lu[4], Xirui Liu[2], Xingxing Wang[2], Lang Wen[2], Jiang Sheng[3], Jichun Ye[2], Chongwen Li[5]

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[5]Department of Electronic Science and Engineering, Southeast University, China

3-2-BP-04 **Synergistic Interface Engineering and Hybrid Encapsulation Strategies for Stability Enhancement of Inverted Perovskite Solar Cells**

Iqra Shaheen[1], Kun-Mu Lee[1]*

[1]Department of Chemical and material Engineering, Chang gung University, China

3-2-BP-05 **A Simulation Framework for Evaluating the Annual Output Power of Outdoor Perovskite Solar Cell Under Realistic Conditions via Temperature Coefficient Engineering**

Aditya Anugrah[1], Itaru Raifuku[1], Tatsuro Kawamura[2], Tamotsu Horiuchi[2], Yasuaki Ishikawa[1]*

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[2]Department of Production Engineering, EneCoat Technologies Co., Ltd., Japan

3-2-BP-06 **Scalable Mold-Replicated Light-Trapping Films for High-Performance Perovskite Solar Cells**

Mitsuoki Hishida[1]*, Ryosuke Katagiri[1], Yuki Okabe[1], Itaru Raifuku[2], Yasuaki Ishikawa[2]

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3-2-BP-07 **Comparative Impact of Pinhole and Film Thickness Distributions on Large-Area Perovskite PV Module Performance**

Takayuki Negami[1]*, Azusa Shimotsuma[2], Takashi Minemoto[2]

[1]Department of Research Organization of Science and Technology, Ritsumeikan University, Japan

[2]Department of Electrical and Electronic Engineering, Ritsumeikan University, Japan

3-2-BP-09 **Investigating Temperature and Irradiance-Induced Metastability in Perovskite Mini-Modules Through Indoor and Outdoor Aging**

Mirella Al Katrib[1]*, Vasiliki Paraskeva[2], Aranzazu Aguirre[3], Tamara Merckx[3], Sumeet Mujumdar[2], Elias Peraticos[2], Maria Hadjipanayi[2], Karim Medjoubi[1]

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[3]Department of Imec, IUMAT, Belgium

3-2-BP-10 **Light-Soaking Stability of Flexible Perovskite Solar Cell Mini-Modules: Influence of Heat and Light Intensity under Acceleration Test**

Abdurashid Mavlonov[1], Navapat Krobkrong[1], Tomohiko Hara[1], Jeganathan Chellamuthu[1], Yoshihiro Hishikawa[1], Takayuki Negami[1], Takashi Minemoto[2]*

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[2]Department of Electrical and Electronic Engineering, Ritsumeikan University, Japan

3-2-BP-12 **Comparative Study of Flexible Perovskite Solar Cell Mini-Module under Electrical Bias and Light Stress Over 1000 H**

Navapat Krobkrong[1], Abdurashid Mavlonov[1], Tomohiko Hara[1], Jeganathan Chellamuthu[1], Yoshihiro Hishikawa[1], Takayuki Negami[1], Takashi Minemoto[1]*

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3-2-BP-13 **Addressing Practical Light Stability Challenges in All-Evaporated Perovskite Solar Modules toward Commercialization**

Haram Lee[1], Kunsoo Jung[1], Gabseok Seo[1]*

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3-2-BP-14 **Study of Deposition Processes for Perovskite Layers Using the Two-Step Blade Coating Method**

Seima Ishii[1], Kohei Yamamoto[2], Hiroyuki Yaguchi[1], Takurou N. Murakami[2]*

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3-2-BP-15 **High-Throughput, Fully Vacuum-Free Roll-to-Roll Fabrication and In-line Characterization for Scalable Manufacturing of Perovskite Photovoltaics**

Juengeun Kim[1], Luke Sutherland[1], Dechan Angmo[1], Doojin Vak[1], Mei Gao[1]*

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3-2-BP-16 **Thermal Stability of Amorphous Transparent Conductive Oxides and Their Impact on Degradation in Perovskite Solar Cells**

Kohei Yamamoto[1], Takurou N. Murakami[1]*

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3-2-BP-17 **Outdoor Performance of Stable ~800 cm2 Perovskite Solar Modules across Multiple Climates**

Ismail Kaaya[1]*, Jonathan Parion[1], Tamara Merckx[1], Yinghuan Kuang[1], Anurag Krishna[1], Tom Aernouts[1], Aranzazu Aguirre[1]

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3-2-BP-18 **PbCl2-Assisted Dual-Layer Fully Sequential Evaporation Deposition for Scalable Perovskite Solar Cells and Modules**

Namatullah Nizamani[1], Sunil Suresh[1], Tamara Merckx[1], Tim Oris[1], Aranzazu Aguirre[1], Tom Aernouts[1], Yinghuan Kuang[1]*, Bart Vermang[1]

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3-2-BP-19 **Understanding Co-Determinants of Charge Extraction in Perovskite Thin Films**

Siwon Yun[1], Jongchul Lim[1]*

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3-2-BP-20 **Evaluation of Potential-Induced Degradation Behavior in Large-Area Encapsulant-Free Crystalline Silicon Photovoltaic Modules**

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3-2-BP-21 **Homogeneous Large-Area Film Formation for Scalable Perovskite Photovoltaics**
Qinggui Li[1], Rui Wang[1]*
[1]Department of Engineering, Westlake University, China

3-2-BP-22 **Atmospheric Vapor-Deposited Silane SAMs for Interface Passivation in Perovskite Solar Cells**
Hrishitha Sree Sivakumar[1], Ashique Kotta[1], Abdullah[1], Hyung Kee Seo[1]*
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3-2-BP-23 **Hierarchically Porous Carbon Electrodes Synthesized by Solution Plasma for Efficient and Stable Mesoscopic Perovskite Solar Cells**
Chanatip Sungprasit[1,2] Hiroaki Benten[1], Masakazu Nakamura[1], Pongthep Prajongtat[3], Pongthep Prajongtat[4], Gasidit Panomsuwan[2]*, Gasidit Panomsuwan[5]
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3-2-BP-24 **Highly Reporducible Wide-Gap Perovskite Solar Cells through Automated Gas Quenching**
Timothy Jones[1]*, Matthew Richardson[1], Lars Flauger[1], Bruno Vicari-Stafani[1], Adrian Element[1], Benjamin Duck[1], Callum Carroll[1], Sahan Kuruneru[1], Gregory Wilson[1]
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3-2-BP-25 **Solvent-Retained Crystallization Regulator via Dynamic Spin Casting for High-Quality Large-Area Perovskite Solar Modules**
Dongshin Kim[1], Tae Joo Shin[1]*
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3-2-BP-26 **Outdoor Energy Yield Analysis of Perovskite PV Modules Under South-Facing Vertical Installation for BIPV Applications**
Jiyeon Nam[1], Hae-Seok Lee[2]*, Beom-Soo Kim[3], Young Yun Kim[3]
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[3]Department of Division of Advanced Energy Materials Research, Korea Research Institute of Chemical Technology, Republic of Korea

3-2-BP-27 **Temporal Evolution of Hysteresis and Resistance Parameters in Outdoor-Exposed Perovskite Mini-Modules**
Ismail Kaaya[1]*, Vasiliki Paraskeva[2], Jonathan Parion[1], Sumeet S. Mujumdar[2], Maria Hadjipanayi[2], Elias Peraticos[2], George E. Georghiou[2], Tom Aernouts[1], Tamara Merckx[1], Arnaud Morlier[1], Aranzazu Aguirre[1]
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3-2-BP-28 **High-performance Perovskite Solar Cells with Low-Resistance Enabled by Metal Substrates**
Yihui Hou[1], Klaus Weber[1], Heping Shen[1]*
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3-2-BP-29 **Lateral Light Management at Interconnection Dead Areas for Efficient Perovskite Solar Modules**
Jeongheon Park[1], Changsoon Cho[1]*
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3-2-BP-30 **Defect Engineering and Crystallization Kinetics Control via Dual-Functional Mercaptoacetamide for High-Performance, Large-Area Perovskite Solar Modules**
Wenguang Liu[1], Wei Chen[1]*
[1]Department of Optical Engineering, Huazhong University of Science and Technology, Wuhan National Laboratory for Optoelectronics, China

3-2-BP-31 **Luminescence-based detection of local shunts and defects and their impact on performance and aging of upscaled perovskite solar devices**
Alexandra Levtchenko[1]*, Marion Provost[1], Karim Medjoubi[1], Liam Gollino[1], Yves Abou-Khalil[1], Jean Rousset[2], Daniel Ory[2], Thomas Guillemot[1]
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3-2-BP-32 **Amorphous π-Conjugated Passivator Facilitates Widening Process Window for Reliable Perovskite Solar Modules**
Hyun Seo Kim[1], Young Yun Kim[2], Hyejin Na[2], Jaemin Lee[2], Nam Joong Jeon[2], Eui Hyuk Jung[1]*
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3-2-BP-33 **Surface Engineering of Tin Oxide Nanoparticles by pH Modulation Facilitates Homogeneous Film Formation for Efficient Perovskite Solar Modules**
Youyoung Byun[1], Hyun-Sung Yun[2], You-Hyun Seo[2], Chea-Eun Seo[1], BongJoo Kang[2], NamJoong Jeon[2], EuiHyuk Jung[1]*
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3-2-BP-34 **From n–i–p to p–i–n: Transfer and Scale-Up of Laser-Scribing Strategies for Perovskite Solar Modules**
Yejin Kim[1], Yujin Jeong[2], Yiting Zheng[3], Hanseul Lee[1], Hochan Hyun[1], Pravin Pawar[1], Bogyeong Park[1], Jaewon Seo[1], Kisslinger Kim[4], Chang-Yong Nam[4], Eunseo Choi[1], Jeung-hyun Jeong[1], David J. Hwang[3], Gee Yeong Kim[1]*
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3-2-BP-35 **Site-Selective Fluorination of Bathocuproine Derivatives for Enhanced Performance and Stability in Perovskite Solar Cells**
DongGeon Kwun[1], Nhan Tran Hong[1], Ji-Youn Seo[1]*
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3-2-BP-36 **All-Perovskite Tandem Modules Enabled by Sputtered Interfacial Oxide Engineering for Electric-Field Regulation**
Chan Young Kim[1], Jun Hong Noh[1]*
[1]Department of Civil Environmental and Architectural Engineering, Korea University, Republic of Korea

3-2-BP-37 **Low-Temperature ALD for Process-Robust and Stable p-i-n Perovskite Solar Cells via SnO2 Buffer and Al2O3 Encapsulation**
UkJin Choi[1], JiYoun Seo[1]*
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3-2-BP-38 **Halide-Diffusion-Assisted Lamination of Perovskite Films for Efficient and Thermally Stable Semitransparent Solar Cells**
Sanghyun Lee[1], Min Jae Ko[1]*
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3-2-BP-39 **High-Performance Noble-Metal-Free Perovskite Solar Cells Enabled by MoOX/Cr/Al Multilayer Electrodes**
Seoyeong Lee[1], Wooyeon Kim[1], Min Jae Ko[1]*
[1]Department of Chemical engineering, Hanyang university, Republic of Korea

3-2-BP-40 **Ternary Solvent Engineering Enables Highly Efficient and Scalable Slot-Die Coated Perovskite Solar Cells**
Jaswinder Singh[1], Sung-Nam Kwon[1], Seok-In Na[1]*
[1]Department of Flexible and Printable Electronics, Jeonbuk National University, Republic of Korea

3-2-BP-41 **Unravelling Charge Carrier Dynamics at the Perovskite/Carbon Interface Using Time-Resolved Photoluminescence Mapping**
Appiagyei Mensah[1], Rodrigo Garcia-Rodriguez[1], Mathew L Davies[1]*
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3-2-BP-42 **Designing a Slot-Die Compatible Green Solvent Perovskite Ink through Wettability and Volatility Engineering**
Myung Ji Kim[1], Jun Hong Noh[2]*
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3-2-BP-43 **The Road to Affordable Perovskite Solar Cells**
Pongsakorn Kanjanaboos[1]*
[1]Department of Materials Science and Innovation, Faculty of Science, Mahidol University, Thailand

3-2-BP-44 **Dithiocarbamate as a Multifunctional Unit for Lead Leakage Management in Perovskite Solar Cells**
Nan Song[1], Cheng Chen[1], Francis Kwaku Asiam[1], Appiagyei Ewusi Mensah[1], Jae-Joon Lee[1]*
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3-2-BP-45 **Fabrication Perovskite Solar Cells/Modules with Environmental Friendly Materials/Methods**
ChunGuey Wu[1]*
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3-2-BP-46 **ALD/CVD Perovskite Approach for Large-Area Productivity and Improved Stability**
Yeongeun Kim[1]*
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3-2-BP-47 **Seed- and Vacuum-Assisted, Anti-Solvent-Free Crystallization for Uniform Perovskite Mini-Modules**
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3-2-BP-48 **Solvent-Orthogonal NiOx Nanoparticle Inks Enable Stable n-i-p Perovskite Solar Cells with All-inorganic Charge-Transport Layers**
Jihye Park[1], Chanhyeok Kim[2], Sang Wook Park[3], Tae Kyung Lee[3], Hanul Min[2], Seungjin Lee[1]*
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[3]Department of Organic and Nano Engineering, Hanyang University, Republic of Korea

3-2-BP-49 **Effects of Stoichiometric Control on the Long-Term Durability of Perovskite Solar Cells**
Yuko Matsushige[1], Hiroshi Matsuda[1], Megumi Haramatsu[1], Richard Murdey[1], Atsushi Wakamiya[1]*
[1]Department of Institute for Chemical Research, Kyoto University, Japan

3-2-BP-50 **Output Characteristics of Perovskite PV Modules under Different Light-Soaking Conditions**
Hyeongjin Kim[1], jongrok Lim[1]*, sungmin Han[1], Pilkyu Kim[1], TaeHee Jung[1], seong-won Kim[1]
[1]Department of Renewable Energy Technology Center, Korea Testing Laboratory, Republic of korea

3-2-BP-51 **Development of Advanced Polymer-based Passivation Strategy for High-performance Large-area Perovskite Solar Modules**
Sinyoung Cho[1], Yeonkyeong Ju[1], Mi Sun Bae[1], So Jung Moon[1], Young Yun Kim[1]*, Nam Joong Jeon[1]
[1]Department of Photoenergy Research Center, Korea Research Institute of Chemical Technology, Republic of Korea

3-2-BP-52 **Improving Quality of Blade-coated Perovskite Films with Cyclic Amide Additives for High-performance, Large-area Perovskite Solar Modules**
Su Min Park[1], Young Yun Kim[1]*
[1]Department of Photo Energy Research Center, Korea Research Institute of Chemical Technology, Republic of Korea

3-2-BP-53 **Protective Interlayer Engineering to Suppress Ion Migration and Improve the Stability of Perovskite Solar Cells**
Thi Ha Giang Tran[1], Seulki Song[1]*
[1]Department of Chemical Engineering and Applied Chemistry, Chungnam National University, Republic of Korea

3-2-BP-54 **Multifunctional Interfacial Passivation for High-Efficiency Perovskite Solar Modules**
Seri Lee[1], Sojung Mun[1], Yeonkyeong Ju[1], Young Yun Kim[1]*, Nam Joong Jeon[1]
[1]Department of Photoenergy Research Center, Korea Research Institute of Chemical Technology, Republic of Korea

3-2-BP-55 **Molecular Engineering of Sulfonimide-Based Dopants via Methyl Substitution for Efficient and Stable Large-Area Perovskite Solar Modules**
Chanhong Min[1], Bogeum Kim[2], Dong Hwan Wang[2], Nam Joong Jeon[1], Young Yun Kim[1]*
[1]Department of Photoenergy Research Center, Korea Research Institute of Chemical Technology, Republic of Korea
[2]Department of Integrative Engineering, Chung-Ang University, Republic of Korea

3-2-BP-56 **Exploring the Role of Methylammonium Halide Additives on Carbon-Based Perovskite Solar Cells**
Benjamin K. Korir[1], Mensah Appiagyei[2], Rodrigo Garcia-Rodriguez[2], Mathew Davies[2], Vincent Nyamori[3], Joshua K. Kibet[1]*
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[5]Department of Chemistry, University of KwaZulu Natal, Westville Campus, South Africa
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3-2-BP-57 **Intact-film Orthogonal 2D X-ray Diffraction Mapping in Comparison with Sectioned Analysis for Evaluating Crystallographic Homogeneity in Perovskite Solar Modules**
YuJin Shin[1], dongsuk Kim[1]*
[1]Department of Carbon Neutrality, Ulsan National Institute of Science and Technology, Republic of Korea

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3-2-BP-58 **Defect Engineering at the Interface of Perovskite Solar Cells Utilizing Polymeric Ionic Liquids**

Hana Kang[1], Moonhoe Kim[1], Gisung Kim[1], Jaejin Song[1], Mijoung Kim[1], Jungyup Yang[1]*
[1]Department of Physics, Kunsan national university, Republic of Korea

3-2-BP-59 **High-Density Ag Electrodes in Perovskite Solar Cells via Plasma-Assisted Vapor Deposition**

Gisung Kim[1], Mijoung Kim[3], Moonhoe Kim[1], Hana Kang[1], Kang-Il Lee[2], Yongsup Choi[2], JungYup Yang[1]*
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[3]Department of The Institute of Basic Science, Kunsan National University, Republic of Korea
[4]Department of Energy Science and Engineering, Kunsan National University, Republic of Korea

3-2-BP-60 **Observation of Time-Dependent Recovery of Mechanically Induced Performance Loss in a Perovskite PV Module**

Haruto Watanabe[1] , Noboru Yamada[1] *
[1]Department of Mechanical Engineering, Nagaoka University of Technology, Nagaoka, Japan

3-2-BP-61 **Rethinking Ionic Salt Evaporation in Vacuum Deposition of Metal Halide Perovskites**

Eui Dae Jung[1] , Bo Ram Lee[1] *
[1]Department of Advanced Materials Science & Engineering, Sungkyunkwan University, Suwon, Republic of Korea

Area 3-3. Perovskite Solar Cells & Modules: Advances in Application Versatility

3-3-BP-01 **Toward Energy-Autonomous Androids: High-Speed Differential-Geometry Modeling of Wearable Perovskite PV Skins**

Kenji Araki[1]*, Nobuteru Takeshita[2], Yasuyuki Ota[1], Kensuke Nishioka[1]
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[2]Department of Faculty of engineerging, University of Miyazaki, Japan

3-3-BP-02 **Mapping the Proton Energy-Fluence Landscape for Perovskite-Based Solar Cells: From Fundamental Material Physics to Space Mission Qualification**

Da Seul Lee[1], Jae Sung Yun[4], Jongsung Park[2]*, Suseong Jang[2], Suwhan Kim[3], Hyeong Won Seo[2], Sang Won Kang[2], Dong-Seok Kim[3]
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[4]Department of Korea Multi-purpose Accelerator Complex, Korea Atomic Energy Research Institute, Republic of Korea
[5]Department of Electrical and Electronic Engineering, University of Surrey, UK

3-3-BP-03 **“Energy Anywhere”: The Commercialization of High Efficiency and Long-term Durability Perovskite Solar Modules**

Ryuji Kaneko[1], Tomoko Teranishi[2], Shuhei Yamamoto[1], Tamotsu Horiuchi[3]*
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[3]Department of Chief Technology Officer, EneCoat Technologies Co.,Ltd., Japan

3-3-BP-04 **Computational Study on the Balance between Radiation Tolerance and Self-Healing in Perovskite Solar Cells**

Jun Hyeok Choi[1], Minwoo Lee[2], Youngmin Kim[3], Dong Gyu Lee[1], Xiaojing Hao[2], Hanul Min[3], Jae Sung Yun[2], Tae Kyung Lee[1]*
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3-3-BP-05 **Development of Lightweight Perovskite Solar Cells for Space Applications**

Noboru Ohashi[1], Kazuhiro Hikida[1], Junichi Nishitani[1], Natsuki Onuma[1], Shuhei Yamamoto[1], Tamotsu Horiuchi[1]*, Minh Anh Truong[2], Richard Murdey[2], Tomoya Nakamura[2], Atsushi Wakamiya[2], Yu Miyazawa[3], Yoshiyuki Murakami[3], Shusaku Kanaya[3], Hiroyuki Toyota[3], Hiroaki Jinno[3], Osamu Mori[3]
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[3]Department of Space Exploration Innovation Hub Center, Japan Aerospace Exploration Agency, Japan

3-3-BP-06 **Perovskite Solar Cells with Free-Standing Carbon Electrodes for Integrated Energy Devices**

Yeseo Lim[1], Taewoong Son[1]*, Jangwon Seo[1]
[1]Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology, Republic of Korea

3-3-BP-07 **Double-Layer Transparent Indium Tin Oxide Rear Electrode for Flexible Bifacial Perovskite Solar Cells toward Indoor-Outdoor Low-Power Electronic Applications**

Taweewat Krajangsang[1]*, Wassana Lekkla[2], Thanawan Wongsrirak[1], Nontawat Sricharoen[1], Surawut Chuangchote[2], Amornrat Limmanee[1]
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[2]Department of Tool and Materials Engineering, Faculty of Engineering, King Mongkut's University of Technology Thonburi, Thailand

3-3-BP-08 **Slot-Die Interface Passivation for Scalable Semi-Transparent Wide-Bandgap Perovskite Solar Modules**

Yassine Raoui[1]*, Anna Capitaine[1], Alexandra Levtchenko[1], Estelle Cariou[1], Kamil Baba Ali Turqui[1], Pauline Dufour[1], Damien Coutancier[1], Muhammed Salim Kunnummal Mangott[1], Iwan Zimmerman[1], Jean Rousset[1]
[1]Department of IPVF, The Photovoltaic Institute of ile de France, France

3-3-BP-09 **Interfacial Stability of Organic Hole-Transport Layers in Perovskite Solar Cells under Space-Relevant Thermal Stress**

Donghwan Yun[1], Gi-Hwan Kim[1], Seyoeng Song[2] *
[1]Department of Materials Engineering and Convergence Technology, Gyeongsang National University, Republic of Korea
[2]Department of Research Institute of Molecular Alchemy, Gyeongsang National University, Republic of Korea

3-3-BP-10 **Modularization of Perovskite Solar Cells Using Room-Temperature Polymerized Encapsulants and Their Effects on Photovoltaic Performance.**

Sotaro Yamada[1]*, Yasushi Sobajima[1], Masataka Taya[1], Yasuha Yamamoto[2]
[1]Department of Science and Technology, Gifu University, Japan
[2]Department of Engineering department, Gifu University, Japan

3-3-BP-11 **Suppression of Recombination at SnO2/Perovskite Interface through Sequential Cs2CO3 Treatment for Achieving High Efficiency Perovskite Solar Cells under Indoor Illumination Environment**

Hye W. Chun[1], So Jeong Shin[1], Sang Eun Yoon[1], Gyeong G. Jeon[1], Jae Sung Yun[2], Jong H. Kim[1]*
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3-3-BP-12 **Buried Interface Engineering of Self-Assembled Monolayers for Space Perovskite Solar Cells**

Harin Kim[1], Gi-Hwan Kim[1]*
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3-3-BP-13 **Stability Assessment of Hybrid and All-Inorganic Perovskite Thin Films and Solar Cells for Space Photovoltaics**

Chaewon Lee[1], Dong-Young Jeong[2], Hyo-Young Lee[3], Seong-Oh Park[3], Hae-Seong Shin[3], In-Gyo Jeong[3], So-Eun Ahn[3], Hyeon-Chang Noh[3], Yo-Han Jeon[4], Jae-Hwan Kim[4], Joo-Hong Lee[5], Keonwoo Park[6], Jin-Wook Lee[6]*

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3-3-BP-14 **In-situ Synthesis of 2D [PbI2(4,4′-bipyridine)]n and [PbI2(4,4′-vinylenedipyridine)]n Metal-Organic Frameworks for Efficient Surface Passivation of Perovskite Solar Cells**

June-Hung yang[1], Chun-Ting Li[1]*, Shun-Min Chen[1], Pei-Hsuan Lo[2], Yu-Chiang Chao[2]

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3-3-BP-16 **Comparative Evaluation of MPPT Algorithms for Accurate Power Conversion Efficiency Measurement of Perovskite Solar Cells at Elevated Temperature**

Jeganathan Chellamuthu[1]*, Yoshihiro Hishikawa[1], Abdurasid Mavlonov[1], Tomohiko Hara[1], Navapat Krobkrong[1], Takayuki Negami[1], Takahashi Minemoto[1]

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3-3-BP-17 **Li-Free Dopant Design for Space-Grade Perovskite Solar Cells via Multi-Scale Simulations**

Dong Gyu Lee[1], Sangjin Yang[2], Chanhyeok Kim[3], Tommy Richards[4], Jae Sung Yun[4], Hanul Min[3], Changduk Yang[2], Tae Kyung Lee[1]*

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3-3-BP-19 **Radiation-Induced Dose-Dependent Transition in Wide-Bandgap Sn-Based Perovskite Solar Cells**

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3-3-BP-20 **Fabry–Perot Resonance-Mediated RGB Spectral Engineering in Semitransparent Tin Perovskite Solar Cells**

Subin Heo[1], Hui Joon Park[1]*

[1]Department of Semiconductor Engineering, Hanyang University, Republic of Korea

3-3-BP-21 **Digital Twin-based Spatiotemporal Irradiance Simulation Platform for Optimizing Interconnection Configurations of Flexible Solar Cell Modules**

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[2]Department of GX Research, University of Miyazaki, Japan
[3]Department of Engineering, GX Research, University of Miyazaki, Japan

3-3-BP-22 **Enhanced Thermal-Cycling Stability of Perovskite Solar Cells through Interface Engineering for Low-Earth-Orbit Applications**

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[1]Department of Chemical Engineering, Gyeongsang National University, Jinju, Republic of Korea

Area 4-1. Recent Advances in Chalcogenide Thin Film PV Technology

4-1-BP-01 **Solution Route for Efficient Chalcopyrite Thin Film Solar Cells**

Hao Xin[1]*, Chengfeng Ma[1], Kang Wu[1], Chuanan Ding[1], Weibo Yan[1], Shaoying Wang[1]

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4-1-BP-02 **Substrate temperature dependence in CdZnS buffer layers by open-air chemical vapor deposition method**

Tamotsu Okamoto[1]*, Takumi Shimada[1], Yuji Kurimoto[1], Ayaka Kanai[2], Kunihiko Tanaka[2]

[1]Department of Electrical and Electronic Engineering, National Institute of Technology, Kisarazu College, Japan
[2]Department of Electrical, Electronics and Information Engineering, Nagaoka University of Technology, Japan

4-1-BP-03 **Achieving Over 390mV Open-Circuit Voltage in Co-sputtered AgBiS2 Thin-Film Solar cells via Substrate heating**

Na Nuri[1], Kim Suwhan[1], Park Jongsung[1]*

[1]Department of Energy System Engineering, Gyeongsang National University, Republic of Korea

4-1-BP-04 **Precursor Sequence Engineering of Molecular Inks for Enhanced Cation Disorder in AgBiS2 Solar Cells**

Hyeongwon Seo[1], Daseul Lee[2], Suhwan Kim[2], Jongsung Park[3]*

[1]Department of Energy Systems Engineering, Gyeongsang National University, Republic of Korea
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4-1-BP-05 **$CuInSe_2$ Thin Films: A Versatile Platform for Solar Cells and Near-Infrared Photodetectors**

Temujin Enkhbat[1], Jieun Park[1], Sang Hun Lee[1], Seong Ju Park[1], Jae Hyung Jang[1]*

[1]Department of Energy Engineering, Korea Institute of Energy Technology, Republic of Korea

4-1-BP-06 **High-Efficiency CdTe Thin-Film Photovoltaics: Combined role of CdSe window layer and TiO2/Cu2O electron-hole transport layers**

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4-1-BP-07 **Performance Enhancement of Bifacial CIGS Solar Cells Using Transition Metal-Based Back Surface Field Materials**

Udai Singh[1]*, Dipak Jena[2], Rajendra Prasad[1], Titirsha Biswas[1], Raj Saha[1]

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4-1-BP-08 **Hydrogen-Assisted RF sputtering process for Plasma Damage Mitigation during Zn(O,S) Buffer Layer Deposition**

Tae Ei Hong[1], Dae-Hyung Cho[2], Woo-Jung Lee[2], Won Seok Han[3], Yong-Duck Chung[2]*

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[3]Department of Photonic/Wireless Devices Research Division, Electronics and Telecommunications Research Institute, Republic of Korea

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4-1-BP-09 **Effects of Sulfurization Conditions on the Structural and Photovoltaic Properties of Wide-Bandgap Cu(In,Ga)(S,Se)$_2$ Thin-Film Solar Cells**
Wook Hyun Kim[1] , Dae-Ho Son[1] , Kee-Jeong Yang[1] , Dae-Hwan Kim[1] *
[1]Department of Division of Energy and Environmental Technology, Daegu Gyeongbuk Institute of Science and Technology, Republic of Korea

4-1-BP-10 **Study of CsF post-deposition treatment for silver alloyed Cu(In,Ga)S2 solar cells**
Yuta Yoshino[1] , Takahito Nishimura[1] *
[1]Department of Electrical and Electronic Engineering, Institute of Science Tokyo, Japan

4-1-BP-11 **Analysis of relation between performance of CdTe solar cell using CdZnS buffer layer formed by Open-Air CVD method and deposition condition of the buffer layer**
Yuji Kurimoto[1] * , Takayuki Inaba[1] , Koki Watanabe[1] , Tamotsu Okamoto[1]
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4-1-BP-12 **UHV-Assisted Three-stage Co-Evaporation for High-Quality CIGS Absorber Formation**
Juchan Choi[1] , Hyeong jin Kim[1] , Jae ho Yun[1] *
[1]Department of Materials Science and Engineering, Korea Institute of Energy Technology, Republic of Korea

4-1-BP-13 **Modelling the indoor light field relaxes the cell bandgap constraint and opens indoor PV to inorganic thin films**
Sergio Giraldo[1] , Zacharie Jehl LiKao[1] * , Marcel Placidi[1] , Harris Goniotakis[1] , Oriol Segura Blanch[1] , Edgardo Saucedo[1]
[1]Department of Electronic Engineering, Polytechnic University of Catalonia, Spain

4-1-BP-14 **A Collection-Probability Extension of Detailed-Balance Photovoltaics**
Alex Jimenez Arguijo[1] , Zacharie Jehl LiKao[1] * , Outman El Khouja[1] , Marcel Placidi[1] , Sergio Giraldo[1]
[1]Department of Electronic Engineering, Polytechnic University of Catalonia, Spain

4-1-BP-15 **Minimize Cu(In, Ga)Se$_2$ absorption layer bulk defects through 2step optimization of 3stage coevaporation process**
Hyoung Jin Kim[1] , Ju Chan Choi[1] , Jae Ho Yun[1] *
[1]Department of Energy Engineering, Korea Institute of Energy Technology, Republic of Korea

4-1-BP-16 **Organic Silicon Salt and Alkali Incorporation in Solution-Processed CZTS Thin Films for Indoor Photovoltaics**
Achmad Nasyori[1] * , Valdek Mikli[1] , Mati Danilson[1] , Maarja Grossberg-Kuusk[1] , Marit Kauk-Kuusik[1]
[1]Department of Materials and Environmental Technology, Tallinn University of Technology, Estonia

4-1-BP-17 **Cs-Mediated Surface Protection and Ag-Enhanced Bulk Defect Healing on Radiation Tolerance CIGS Solar Cells**
Cheng Hung Hsieh[1] , Tzu-Ying Lin[1] *
[1]Department of Materials Science and Engineering, National Tsing Hua University, Chinese taipei

4-1-BP-18 **Development of P-Type SnO Hole Transport Layer for High-Efficient Semitransparent CIGSe Solar Cells**
Masaki Hashimoto[1] , Yosuke Abe[1] * , Takahito Nishimura[1]
[1]Department of Engineering, Electrical And Electronic Engineering Energy And Information Cou, Institute Of ScienceTokyo, Japan

4-1-BP-19 **Suppressing Defect-Induced Band Tailing in Wide-Bandgap Kesterite Solar Cells via Cation Substitution: A Study on Cu2CdSnS4(CCTS) Absorbers**
Haehoon Jeong[1] , Namuundari Otgontamir[1] , MD. Matiur Rahman[1] , Jiheon Lee[2] , JunHo Kim[1] *
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4-1-BP-20 **Synergistic Defect Passivation in Solution-Processed Cu(In, Ga)(S,Se)2 Solar Cells via RbF Pre-deposition and K-Alloying**
Jiheon Lee[1] , Tae Ei Hong[3] , MD. Matiur Rahman[2] , Haehoon Jeong[2] , JunHo Kim[1] *
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[2]Department of Physics, Incheon National University, Republic of Korea
[3]Department of Topological Insulator Creative Research Section, Electronics and Telecommunications Research Institute, Republic of Korea

4-1-BP-21 **Band-Gap Tuning of Cu(In,Ga)(S,Se)2 Solar Cells via Spray Deposition and Post Sulfo-Selenization**
Md Matiur Rahman[1] , Orgil Unursaikhan[1] , HaeHoon Jeong[1] , JiHeon Lee[2] , JunHo Kim[3] *
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4-1-BP-22 **Over 17% Efficient, Molecular-Ink based (Ag, Cu)(In,Ga)(S,Se)2 Solar Cells and Fully Ink-Based Monolithic Chalcogenide-Perovskite Tandem Solar Cells**
Sunil Suresh[1] * , Raju Pusapati[1] , Jessica De Wild[1] , Tom Aernouts[1] , Joost Caeyers[1] , Bart Vermang[1]
[1]Department of Thin Film PV Technology, Imec, Institute for Materials Research, Hasselt University, Belgium

4-1-BP-23 **The Role of Cadmium Sulfide Stoichiometry on Inkjet Printed Buffer Layers for Cu(In,Ga)(S,Se)$_2$ Thin-Film Solar Cells**
Paul Phipps[1] * , Joanna Maciejewska[2] , Nina Kochel[2] , Dominika Wieczorek[2] , Katarzyna Zubek[2] , Nuno Rodrigues[3] , José Fonseca[3] , Michele Melchiorre[1] , Marcin Morawski[2] , Sascha Sadewasser[3] , Phillip Dale[1]
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[2]Department of Roltec, Roltec, Poland
[3]Department of Laboratory for Nanostructured Solar Cells, International Iberian Nanotechnology Laboratory, Portugal

4-1-BP-24 **The Impact of Different Spin Coating Speeds on the Properties of Cu2ZnSnS4 Nanocrystal Thin Films**
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[2]Department of Physics, Durham University, Centre for Materials Physics, South Road, UK

4-1-BP-25 **Toward Cu(In,Ga)Se2 solar cells on textile substrates**
Sascha Sadewasser[1] * , André Silva[1] , Neslihan Akçay[2] , João Rodrigues[1] , Jorge Padrão[3] , José Abreu[3] , Ana Moura[1] , Neha Kumari[1] , Inês Alves[4] , José Gouveia[4] , Juliana P.S. Sousa[1] , Ana Maria Rocha[3] , Pedro Anacleto[1]
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[3]Department of Textile Engineering, University of Minho, Portugal
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4-1-BP-26 **Reaction kinetics of Sb2Se3 and solar cell fabrication**
Youngho Yeon[1] , Sreedevi Gedi[1] , Vasudeva Reddy Minnam Reddy[1] , Gyeongmin Lee[1] , Yeji Jang[1] , Woo Kyoung Kim[1] *
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4-1-BP-27 **Preparation of Ag8GeS6 Thin Films for Photovoltaic Applications**
Yoji Akaki[1] * , Toya Shibahara[1] , Hideaki Araki[2]
[1]Department of Electrical and Computer Engineering, National Institute of Technology Miyakonojo College, Japan
[2]Department of Materials Engineering, National Institute of Technology Nagaoka College, Japan

4-1-BP-28 **Effects of Na-Rb Co-incorporation on Cu2SnS3 Thin-Film Solar Cells**
Hideaki Araki[1] * , Kazuki Hasegawa[1]
[1]Department of Materials Engineering, National Institute of Technology Nagaoka College, Japan

4-1-BP-29 **MoSe2 Back-contact engineering and Voc deficit of substrate Sb2Se3 thin-film solar cells**
Donghwan Jeon[1] , Bashiru Kadiri-English[1] , Ali Amanat[1] , Jae-Back Lee[1] , Vo Pham Huy Hoang[1] , Kee-Jeong Yang[1] , Dae-Kue Hwang[1] , Shi-Joon Sung[1] , Eun-Kyung Cho[1] , Dae-Hwan Kim[1] *
[1]Department of Division of Energy Environmental Technology, Daegu Gyeongbuk Institute of Science and Technology, Republic of Korea

4-1-BP-30 **Surface Planarization of CIGS absorbers by HBr/H2O2 Treatment for Monolithic Perovskite/CIGS Tandem Solar Cells**
Won-Joon Kim[2] , Dae-Ho Son[1] , Wook Hyun Kim[1] , Muhammad Jahankhan[2] , Hyo Jeong Jo[1] , Sushil Shivaji Sangale[2] , Seyeong Lim[1] , Dae-Kue Hwang[1] , Kee-Jeong Yang[1] , Jin-Kyu Kang[1] , Shi-Joon Sung[1] * , Dae-Hwan Kim[1]
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4-1-BP-31 **Influence of Deposition Rate-Time Conditions on UHV-Grown CIGS Thin Films**
Juchan Choi[1] , Hyeong jin Kim[1] , Jae ho Yun[1] *
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4-1-BP-32 **Interface Engineering of Co-Evaporated Sb_2Se_3 Thin-Film Solar Cells by an Ultrathin Atomic Layer Deposition Surface Treatment**
Jaebaek Lee[1] , Van-Quy Hoang[1] , Bashiru Kadiri-English[2] , Huy Vo Pham Hoang[1] , Ali Amanat[2] , Shi-Joon Sung[1] , Kee-Jeong Yang[1] , Dae-Kue Hwang[1] , Jin-Kyu Kang[1] , Dae-Hwan Kim[1] *
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4-1-BP-33 **Cs-treatments in Kesterite Thin-Film Solar Cells for Efficient Perovskite Tandems**
Jooho Yoon[1] , Jinyoung Kim[1] *
[1]Department of Materials Science and Engineering, Seoul National University, Republic of Korea

4-1-BP-34 **Low-Cost Thin-Film Solar Cells Based on Single-Source Vapor-Transport-Deposited SnSx,Se1−x Absorber Layers**
Yong Tae Kim[1] , Jaeyeong Heo[1] *
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4-1-BP-35 **Effect of buffer layer formation through intentionally dominant heterogeneous reactions on CIGS absorbers**
Ara Cho[1] *
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4-1-BP-36 **Compositional Optimization of SnSxSe1-x Thin-Film Solar Cells via Vapor Transport Deposition for Enhanced Power Conversion Efficiency**
Junseong Song[1] , Jaeyeong Heo[1] *
[1]Department of Materials Science and Engineering, Chonnam National University, Republic of Korea

4-1-BP-37 **Two-Step Strategy for Enhancing VTD-SnS Solar Cell Efficiency via Point-Contact Junctions and NaF-Assisted Selenium Diffusion**
Gaeun Kim[1] , Jaeyeong Heo[1] *
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4-1-BP-38 **Enhancing the Efficiency of VTD-SnS Solar Cells through KF-Induced Passivation**
Hyeon Woo Park[1] , Jaeyeong Heo[1] *
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4-1-BP-39 **Advances in Vapor-Transport-Deposited SnS Thin-Film Solar Cells through Surface Morphology Control and SnS Source Engineering**
Rahul Yadav[1] , Jaeyeong Heo[1] *
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4-1-BP-40 **Boosting the Efficiency of SnS Thin-Film Solar Cells Using Controlled GeOx Back-Interface Passivation**
Aparna Girigosavi[1] , Rahul Yadav[1] , Jaeyeong Heo[1] *
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4-1-BP-41 **Enhancing Sb2Se3 Thin Film Solar Cell Performance Through Optimization of TiO2/CdS Double Buffer Layer**
Parag Patil[1] , Yong Tae Kim[1] , Jaeyeong Heo[1] *
[1]Department of Materials Science and Engineering, Chonnam National University, Republic of korea

4-1-BP-42 **Enhancing the Performance of SnS Thin-Film Solar Cell via ALD-Grown ZnSnO Buffer Layer and Interface Engineering**
Vishesh Manjunath[1] , Yong Tae Kim[1] , Rahul Kumar Yadav[1] , Jaeyeong Heo[1] *
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4-1-BP-43 **Surface Modification of Solution-Processed $Cu(In,Ga)(S,Se)_2$ Solar Cells through In_2S_3 Sputtering for Reduced Roughness and Enhanced Device Performance**
Jiheon Lee[1] , Enkhjargal Enkhbayar[2] , Md. Matiur Rahman[2] , SeongWook Yoon[2] , HaeHoon Jeong[2] , JunHo Kim[2] *
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4-1-BP-44 **High-Mobility Ce-Doped In2O3 Transparent Back Contacts for Bifacial Cu(In,Ga)Se2 Solar Cells: Stable Interface and Optical Properties under CIGS processing**
Jonghyun Lee[1] , Seonghoon Jeong[1] , Eunpyung Choi[1] , Wonmok Kim[3] , Donghoe Kim[2] , Jeung-hyun Jeong[1] *
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[4]Department of Electrical Engineering, Korea University, Republic of Korea

4-1-BP-45 **Impact of Mo Film Properties on the Laser Removal Mechanism for Damage-Free P1 Scribing of CIGS Modules**
Minjae Lee[1] , Eunseo Choi[1] , Eunpyeong Choi[1] , Yiting Zheng[3] , Insoo Kim[3] , Byeongkwon Ju[2] , David Hwang[3] , Jeung-hyun Jeong[1] *
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4-1-BP-46 **Suppressing Interfacial GaOx Formation and Parasitic Absorption Loss in Bifacial CIGS Solar Cells through ITO Back-Contact Deposition Control**
Eunypyung Choi[1] , Seonghoon Jeong[1] , Byeongkwon Ju[2] , Jeung-hyun Jeong[1] *
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4-1-BP-47 **Urbach Energy as a Quantitative Indicator of Open-Circuit Voltage Deficit in RbF Post-Deposition-Treated Cu(In,Ga)Se_2 Solar Cells**
Chia Hua Huang[1] * , Yu-Chen Lin[1]
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Area 4-2. Innovations in Solution-processed Solar PV: Organic and Quantum Dot Photovoltaics

4-2-BP-01 **Robust Charge Transport through Optimized Stress Distribution in Intrinsically Stretchable Organic Solar Cells**
Yunsu Lim[1] , Jung-Yong Lee[1] *
[1]Department of Semiconductor Technology, Korea Advanced Institute of Science and Technology, Republic of Korea

4-2-BP-02 **Computational Study of Small Molecule Dopants on ZnO Electron Transport Layers in Non-Fullerene Inverted Organic Solar Cells**
Hyeonsu Son[1] , Tae Kyung Lee[1] *
[1]Department of Organic and Nano Engineering, Hanyang University, Republic of Korea

4-2-BP-03 **Near-Infrared Absorption Enhancement in Thin-Film Type-II GaSb/GaAs Quantum Ring Intermediate-Band Solar Cells Using a Backside Light-Scattering Structure**
Yusuke Oteki[1] * , Nina Leroux[2] , Julie Royer[2] , Maïa Pécastaings[2] , Yoshitaka Okada[1]
[1]Department of Research Center for Advanced Science and Technology, The University of Tokyo, Japan
[2]Department of Institut Polytechnique de Paris, Ecole Polytechnique, France

4-2-BP-04 **Photovoltaic Performances of Reduced Graphene Oxides and Hydroxy Minerals for Dye-Sensitized Solar Cells**
Jun hyeong Im[1] , Mira Kim[1] *
[1]Depatment of Polymer Nano Engineering, Dong-Eui University, Republic of Korea

4-2-BP-05 **Enhancement of Electroluminescent Properties and Process Optimization of Copper-based Lead-Free Perovskite LEDs**
Suyeong Jo[1] , Min Kim[1] , Haedam Jin[1] *
[1]Department of Intelligent Semiconductor Engineering, University of Seoul, Republic of Korea

4-2-BP-06 **Perovskite Quantum Dots as Hole-Extraction Interlayers for Enhanced Efficiency and Stability in Perovskite Solar Cells**
Hong-Yi Lin[1] , Ka-Chi Hsiao[2] , Ting-Han Lin[3] , Jia-Mao Chang[1] , Kun-Mu Lee[4] , Ming-Chung Wu[5] *
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4-2-BP-07 **Ultrasonication-Induced Ambient Synthesis of Perovskite Nanowires with Block Copolymer for Photodetector Applications**
Doyun Kim[1] , Min Kim[1] *
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4-2-BP-08 **High-Efficiency Large-Area Polymer Solar Cell Submodules Enabled by Nonhalogenated-Solvent-Processable 1D/2A Terpolymers**
Youngjun Hwang[1] , Hyeonwoo Jung[1] , Chang Eun Song[2] , Youngu Lee[1] *
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4-2-BP-09 **Conjugated Polyelectrolytes with Tunable Ionic Side Chains for Iodide-Mediated Pt Reduction in Photoelectrochemical H2 Generation**
Jaehyeong Kim[1] , Jin Young Kim[1] *
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of Korea

4-2-BP-10 **Bulk Heterojunction-like Triplet Recombination Pathways in Layer-by-Layer Organic Solar Cells**
Jeongmin Son[1] , Jin Young Kim[1] *
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of Korea

4-2-BP-11 **Hydrogen-Bonding Interactions in Random Terpolymer Blends for Highly Efficient and Stable Non-Halogenated Solvent-Processed Polymer Solar Cells**
Abdulla Saidov[2] , Won Suk Shin[2] * , Fiza Arshad[2] , Chang Eun Song[1]
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4-2-BP-12 **Doping Manipulation of Donor/Acceptor by Perovskite Quantum Dots Enables >20.5% Organic Nonfullerene Solar Cells**
Bin Li[1] , Jianyu Yuan[1] *
[1]Department of Institure of Functional and Soft Materials, Soochow University, China

4-2-BP-13 **Dual-Phase Ligand Engineering Enables 18.21% FAPbI3 Quantum Dot Solar Cells**
Du Li[1] , Jianyu Yuan[1] *
[1]Department of Institute of Functional Nano and Soft Materials, Soochow University, China

4-2-BP-14 **Molecular Design of Phosphonic Acid Self-Assembled Monolayers for Interfacial Engineering of lead-free Perovskite Solar Cells**
Mohammad Shabpiray[1] , Abdilaziz Umirov[1] , Sang Kyu Lee[1] *
[1]Department of Photonic Energy Research Center, Korea Research Institute of Chemical Technology, Korea National University of Science and Technol, Republic of Korea

4-2-BP-15 **Ruthenium Chloride as a Hole Transport Layer for Organic Optoelectronic Devices**
Dohun Yuk[1] , Woojin Lee[1] , Jin Young Kim[1] *
[1]Department of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Republic of Korea

4-2-BP-16 **Photomultiplication Type Perovskite Photodetectors Enabled by Dopant Controlled Bulk Heterojunction**
Teageon Lee[1] , Min Kim[1] *
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4-2-BP-17 **Self-Assembled Monolayer for Surface Passivation and Buried Interface Engineering in $Cs_{1-x}FA_xPbI_3$ Perovskite Quantum Dot Solar Cells**

Yeongju Chun[1] , Min Kim[1] *
[1]Department of Intelligent Semiconductor Engineering, University of Seoul, Republic of Korea

4-2-BP-18 **Low-Cost Self-Assembled Monolayer Materials for High-Efficiency Organic Solar Cells**

Sung Jae Jeon[1] , Nam Gyu Yang[1] , Ye Chan Kim[1] , Doo Kyung Moon[1] *
[1]Department of Chemical Engineering, Konkuk University, Republic of Korea

4-2-BP-19 **Aromatic Group-Substituted Hole-Selective Molecules with Twisted Backbones for Efficient Hole Extraction in Organic Photovoltaics**

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Area 4-3. Emerging Materials for Next-generation Thin Film PV Technology

4-3-BP-01 **Cation-Exchange-Enabled Low-Temperature $AgBiS_2$ PIN Photovoltaics through In-Situ Sulfur Deposition**

Minho Choi[1] , Jongsung Park[1] * , Suwhan kim[2] , Daseul Lee[3] , Sangwon Kang[1] , Nayoung Kwon[1] , Nuri Na[1] , Hyeongwon Seo[1]
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4-3-BP-02 **Composition Control and Device Characterization of $AgBiS_2$ Thin-Film Solar Cells Fabricated by Sequential Sputtering**

Nayeong Kwon[1] , Suhwan Kim[1] , Jongsung Park[1] *
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4-3-BP-03 **Efficiency Enhancement of Cu_2O Solar Cells via Back Surface Field-Induced Recombination Suppression**

Takashi Yamamoto[1] * , Yuya Honishi[1] , Motohiro Toyota[1] , Soichiro Shibasaki[1] , Kanta Sugimoto[1] , Yukitami Mizuno[1] , Naoyuki Nakagawa[1] , Atsushi Wada[1] , Sara Yoshio[1] , Yasutaka Nishida[1] , Junji Sano[1] , Naoki Takeda[1] , Kazushige Yamamoto[1]
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4-3-BP-04 **Phase-Dependent Resistive Switching and Synaptic Behavior in Crystalline GeSe Thin-Film Devices**

Girish Kamble[1] , Jin Hyeok Kim[1] *
[1]Department of Materials Science and Engineering, Optoelectronics Convergence Research Center, Materials Science and Engineering, Chonnam National University, Republic of Korea

4-3-BP-05 **Uniform $BaZrS_3$ Thin Films from Ligand-Exchanged Nanoparticle Dispersions for Solar Cell Absorber**

Kota Ogura[1] , Yoshinori Kimoto[2] , Takuya Kato[2] , Yu Kawano[3] * , Takashi Minemoto[1]
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[2]Department of Next Generation Technology Research Institute, Idemitsu Kosan Co., Ltd., Japan
[3]Department of Science and Engineering, Kindai University, Japan

4-3-BP-06 **Performance Enhancement of Antimony Selenide Thin-film Solar Cells through the Introduction of a ZnO Interlayer**

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4-3-BP-07 **Influence of Deposition Conditions on the Structural and Electrical Properties of SPD Processed $AgBiS_2$ Thick Films**

Haruki Onuma[1] , Itaru Raifuku[1] * , Yasuaki Ishikawa[1]
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4-3-BP-08 **Strategic Control of Crystal Orientation in Sb_2Se_3 Thin Film Solar Cells: A Comparative Study of Single- and Dual-Source Evaporation**

Vo Pham Hoang Huy [1] , Jaebaek Lee[1] , Kaidiri-English Bashiru[2] , Eunkyung Cho[1] , Dae-Kue Hwang[1] , Kee-Jeong Yang[1] , Jin-Kyu Kang Kang[1] , Shi-Joon Sung[1] , Dae-Hwan Kim[1] *
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4-3-BP-09 **Enhanced Open-Circuit Voltage in Superstrate Sb_2Se_3 Solar Cells via Sb_2S_3-Assisted Co-Evaporation Engineering**

Pham Hoang Huy Vo[1] , Jaebaek Lee[1] , Kadiri-Enghish Bashiru[2] , Eunkyung Cho[1] , Dae-Kue Hwang[1] , Kee-Jeong Yang[1] , Jin-Kyu Kang[1] , Shi-Joon Sung[1] , Dae-Hwan Kim[1] *
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4-3-BP-10 **Impact of Inkjet-Printed Indium Sulfide Buffer Layers on Voltage and Recombination Losses in CZTSe Solar Cells**

Alessandro Magon[1] * , Francesco Lodola[1] , Jacob Andrade-Arvizu[2] , Pedro Pedro Vidal-Fuentes[2] , Victor Izquierdo-Roca[2] , Phillip Dale[1]
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4-3-BP-11 **Impact of different charge transport layers on BiI_3 solar cells**

Kosuke Hara[1] * , Hiroto Shiomi[1] , Itaru Raifuku[2] , Hidenori Kawanishi[1] , Kenji Okumoto[3] , Yukiharu Uraoka[1]
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4-3-BP-12 **Direct growth of InP films on MoO_x/Si substrates via the perfect wetting phenomenon of molten In**

Matsunaga Taiyo[1] , Usami Noritaka[1] , Katsube Ryoji[1] *
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4-3-BP-13 **Characterization of Carrier Generation Processes in ZnTeO Intermediate-Band Solar Cells Using Light-Excitation-Power-Density-Dependent Evaluation**

Yuta Suetugu[1] , Katsuhiko Saito[1] , Qixin Guo[1] , Tooru Tanaka[1] *
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4-3-BP-14 **Toward High-Performance $BaSi_2$ Solar Cells ($\eta > 21\%$) via Controlled Zn Decapping**

Md. Ariful Islam[1] , Mizuki Hirai[1] , Yuji Ishiguro[1] , M.E. Castillo-Giron[1] , Hikaru Takeshima[2] , Yoichiro Koda[2] , Masami Mesuda[2] , Kaoru Toko[3] , Takashi Suemasu[3] *
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4-3-BP-15 **4H-SiC as an Electron Transport Layer for $BaSi_2$ Solar Cells aiming for η >21%**

Manuel Castillo Giron[1] , Yuji Ishiguro[1] , Koki Hayashi[1] , Mizuki Hirai[1] , Md. Ariful Islam[1] , Hikaru Takeshima[2] , Yoichiro Koda[2] , Masami Mesuda[2] , Kaoru Toko[3] , Takashi Suemasu[3] *

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4-3-BP-16 **Enhanced NIR/SWIR photoresponse in polycrystalline GeSn thin films toward flexible device applications**

Shintaro Maeda[1] * , Akira Ogawa[1] , Takashi Suemasu[1] , Kaoru Toko[1]

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4-3-BP-17 **Comparison of Intermediate Band Solar Cell and Ratchet Band Solar Cell with drift diffusion model**

Utaikan Suwanbandit[1] * , Thomas Vezin[2] , Myeongok Kim[2] , Yusuke Oteki[2] , Masakazu Sugiyama[2] , Yoshitaka Okada[2]

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4-3-BP-18 **Ligand-Geometry Engineering of $AgBiS_2$ Nanocrystal Solids for Robust Near-Infrared Optoelectronics under Harsh Environments**

Mihyun Kim[1] , Gi-Hwan Kim[1] *

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4-3-BP-19 **Strain-Balanced Multiple Quantum Wells for Low-Bandgap InGaAs Solar Cells grown on InP**

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4-3-BP-20 **Optimization of annealing conditions for Na doped p-type Cu_2O films using Na2CO3**

Kensho Hatakawa[1] , Akio Sekiguchi[1] , Shinsuke Miyajima[1] *

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4-3-BP-21 **Effect of Hydrothermal Carbonization Temperature of Biomass-Waste-Derived Hydrochar on the Interfacial Properties of Perovskite Solar Cells**

Wassana Lekkla[1] , Ryousuke Ishikawa[2] , Phouvnieth Phearum[3] , Taweewat Krajangsang[4] , Surawut Chuangchote[1] *

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4-3-BP-22 **Selective Band-Edge Engineering via Off-Stoichiometry-Induced Antisites in Epitaxial $ZnSnP_2$**

Yoshitaro Nose[1] * , Isshin Sumiyoshi[2]

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[2]*Department of Institute for Materials Research, Tohoku University, Japan*

4-3-BP-23 **Achieving Compact, Non-Stacked Morphology in Solution-Processed Sb_2Se_3 Solar Cells via Thiol-Amine Solvent Engineering**

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4-3-BP-24 **Preparation and Characterization of $BaS/BaSi_2$ Heterostructures for Photovoltaic Applications**

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4-3-BP-25 **Low-Temperature Atomic Layer Deposition of Vanadium-Doped Zinc Oxide Films for Next-Generation Thin-Film Photovoltaics**

Pau Estarlich[1] * , Gustavo Álvarez-Suárez[5] , José Miguel Asensi[3] , Sergi Plana-Ruiz[4] , Juan de Dios Castillo[2] , Cristóbal Voz[1] , Joaquim Puigdollers[1] , Gerard Masmitjà[1]

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4-3-BP-26 **Photovoltaic Structures with Sb-S-Se Thin-Film Absorber Layers Obtained by Sequential Chemical Deposition**

Katarzyna Znajdek[1] * , Yareli Colin Garcia[2] , Priyanka Bamola[2] , Esteban Ojeda Duran[2] , Asiel Neftali Corpus Mendoza[2] , Padmanabhan Karunakaran Nair[2]

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4-3-BP-27 **Template-Driven Kinetic Growth of Sb_2S_3 Absorber Layers: Morphological Control via Chalcogenide Seeding for Next-Generation Photovoltaics**

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4-3-BP-28 **Comparative Study on 3-Junction and 5-Junction InGaAs Power Converters with a PIN Structure for Power-over-Fiber**

Atsushi Kawashima[1] , Ryoga Kakiuchi[1] , Kenta Mutsuzaki[1] , Haruto Sato[1] , Yuto Kaneko[1] , Taisei Murakami[1] , Makoto Takayanagi[2] , Akahane Kouichi[3] , Shiro Uchida[1] *

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4-3-BP-29 **Incident Laser Wavelength Dependence of Green GaInP Solar Cells with a Distributed Bragg Reflector**

Yuto Kaneko[1] , Kenta Mutsuzaki[1] , Haruto Sato[1] , Shion Kosugi[1] , Ryoga Kakiuchi[1] , Atsushi Kawashima[1] , Kakeru Ishida[1] , Takuto Arai[1] , Makoto Takayanagi[2] , Kouichi Akahane[3] , Shiro Uchida[1] *

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4-3-BP-30 **InGaP Solar Cell Modules under Green Laser Light for optical wireless power transmission**

Haruto Sato[1] , Gin Hirano[1] , Kenta Mutuzaki[1] , Yuto Kaneko[1] , Ryoga Kakiuchi[1] , Seki Sonoda[1] , Yuki Miyasaka[1] , Masaki Ayukawa[2] , Masaki Maeda[2] , Kazuyuki Iizuka[2] , Toshihiko Fukamachi[2] , Kouichi Akahane[3] , Shiro Uchida[1] *

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[3]*Department of Corporation Planning, National Institute of Information and Communications Technology, Japan*

4-3-BP-31 **Large-Area $Sb_2(S,Se)_3$ Solar Cells Enabled by Ca-Assisted Uniform Film Formation**

Daseul Kim[1] , Byungha Shin[1] *

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4-3-BP-32 **Characterization of photoconductivity and diffusion length of Cu_2O films deposited by DC sputtering using Cu/CuO mixture target**

Akio Sekiguchi[1] , Atsuto Watanabe[1] , Shinsuke Miyajima[1] *

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4-3-BP-33 **First-principles and nonadiabatic molecular-dynamics framework for Er–O photon-ratchet intermediate-band solar cells**

Tatsuki Kawamura[1] , Tomah Sogabe[1] * , Yusuke Oteki[2] , Myeongok Kim[2] , Takashi Kita[3] , Yoshitaka Okada[2]

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[2]*Department of Research Center for Advanced Science and Technology, The University of Tokyo, Japan*

[3]*Department of Electrical and Electronic Engineering, Kobe University, Japan*

4-3-BP-34 **Effect of Sb Doping and Annealing Conditions on the Optoelectronic Properties of Prototype ATO Films**

Geunpyo Choe[1] , Ilhwan Ryu[2] , Dajung Hong[1] * , Juhong Kang[1] , Min Kim[1] , Hyemin Kwon[1]

[1]*Department of Research Team, Infinity Labs, Republic of Korea*

[2]*Department of Cooperative Center for Research Facilities, Kookmin University, Republic of Korea*

4-3-BP-35 **Development of a Self-Powered IoT Mini-Module using Emerging Thin-Film PV Solar Cells**

Md Rokonuzzaman[2] * , Mahmuda Khatun Mishu[1] , Boon Kar Yap[1] , Asif Islam[2]

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[2]*Department of Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals, Saudi arabia*

4-3-BP-36 **Energy and Thermo-Visual Performance of Adaptive Glazing in Hot Climates**

Khaled Khaled[1] * , Mohammed Alhaji Mohammed[2]

[1]*Department of IRC for Construction and Building Materials, King Fahd University of Petroleum and Minerals, Saudi Arabia*

[2]*Department of Architectural Engineering & Construction Management, King Fahd University of Petroleum and Minerals, Saudi Arabia*

4-3-BP-37 **Phase Formation and Microstructural Evolution of Sb_2Se_3 Thin Films During the Selenization of Sb by H_2Se**

Salh Alhammadi[1] , Gyeongmin Lee[1] , Yeji Jang[1] , William N. Shafarman[2] , Kevin Dobson[2] , Ujjwal K. Das[2] , Margaret Zeile[2] , Noel LoMonaco[2] , Pradipta Roy Dip[2] , Shannon L. Fields[2] , Woo Kyoung Kim[1] *

[1]*Department of Chemical Engineering, Yeungnam University, Republic of Korea*

[2]*Department of Institute of Energy Conversion, University of Delaware, USA*

4-3-BP-38 **Modulating Band Offset through Interface Engineering of Cu_2SnSe_3-Based Heterojunctions for Efficient Charge Separation and Collection**

Durgesh Borkar[1] , Sachin Rondiya[1] *

[1]*Department of Materials Engineering Indian Institute of Science, PhD, India*

Area 5-1. PV System Design, Integration and Resource Assessment

5-1-BP-01 **MPPT control of photovoltaic panels using a mini-inverter power source**

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[2]*Department of Electrical Engineering, University Federico Santa Maria, Chile*

5-1-BP-02 **Development of a Platform for Daily Prediction of Electricity Generation in Photovoltaic Power Plants**

Patricio Lefort[1] * , Antonio Barra[1] , Luis Valenzuela[1]

[1]*Department of Electrical Engineering, University of Santiago of Chile, Chile*

[2]*Department of O&M PV, ENEL CHILE, Chile*

5-1-BP-03 **Comparative Analysis of Hot-Spot Characteristics in PERC, TOPCon, and Back Contact PV Modules under Partial Shading Conditions**

Dong Wook Shon[1] , Sang Yoon Lee[1] * , Jin Hui Han[1] , Jin Seob Lee[1]

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5-1-BP-04 **Assessing the Stability of Solar PV Prediction Models in Data-Scarce Environments: A Comparative Study of Physical, DNN, LSTM, and PINN Models**

Soowon Chae[1] , Sung Ju Tark[1] * , Young-su Kim[1] , A-rong Kim[1]

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5-1-BP-05 **Reducing Module Power Variation Through Optimized Solar Cell Sorting**

Soohyun Bae[1] *

[1]*Department of Photovoltaic Research Department, Korea Institute of Energy Research, Republic of Korea*

5-1-BP-06 **Assessing the Impact of Future Climate Change on PV Module Tilt Optimization across Multiple Climate Zones**

Jordan Ciucea[1] * , Andreea Sabadus[1] , Marius Paulescu[1]

[1]*Department of Physics, Faculty of Physics and Mathematics, West University of Timisoara, Romania*

5-1-BP-07 **Explicit One-Diode PV Modeling for Climate-Adaptive Technology Selection and System Design in Emerging Solar Markets**

Andreea Sabadus[1] * , Jordan Ciucea[1]

[1]*Department of Physics, Faculty of Physics and Mathematics, West University of Timisoara, Romania*

5-1-BP-08 **Field-Validated RPN Framework for Risk-Based O&M and Safety Management of Distributed Photovoltaic Plants**

jinho Choi[1] , Yonghyun Cho[1] , Gyu-gwang Kim[1] , Jaehyeok Heo[1] , Yeon bae Shin[1] *

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5-1-BP-09 **Impact of the L2 Distance between Weather Distributions for Selecting Fine-Tuning Data on the Estimation Accuracy of a CNN-Based Solar Irradiance Estimation Method Using PV Images**

Kento Nakamura[1] , Akiko Takahashi[2] * , Ryuto Shigenobu[3] , Masakazu Ito[3]
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[2]Department of Headquarters for Carbon Neutral Initiatives, Faculty of Basic and Generic Researches, University of Fukui, Japan
[3]Department of Electrical and Electronics Engineering, Faculty of Engineering, University of Fukui, Japan

5-1-BP-10 **Power Generation Assessment of Large-Scale Photovoltaic Systems Under Forest Shading with Optimal String Configuration**

Koshi Matsunaga[1] * , Kenji Araki[1] , Kensuke Nishioka[1]
[1]Department of Engineering, University of Miyazaki, Japan

5-1-BP-11 **Multi-Eye Fisheye Image Synthesis for Spatial Estimations of Solar Irradiance and Power Generation**

Yamato Yamashita[1] * , Kenji Araki[1] , Kensuke Nishioka[1]
[1]Department of Engineering, University of Miyazaki, Japan

5-1-BP-12 **A Techno-Economic and Grid Flexibility Assessment of Solar-BESS Integrated 180-kW V2G Fast Charging Systems**

Nopporn Patcharaprakiti[1] * , Kittinun Srasuay[1] , Jeerawan Patcharaprakiti[2] , Teerasak Somsak[1] , Worrajak Muangjai[1] , Jutturit Thongpron[1] , Anon Namin[1]
[1]Department of Electrical Engineering, Rajamangala University of Technology Lanna, Faculty of Engineering, Thailand
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5-1-BP-13 **Meteonorm Version 9.0 – An worldwide tool for energy modelling and forecasting**

Jan Remund[1] * , Daniel Zbinden[1]
[1]Department of Energy and Climate, Meteotest AG, Switzerland

5-1-BP-14 **A low Irradiance Dead Zone model and threshold based hybrid control for solar water pumping**

Montri Ngaodet[1] , Teerasak Somsak[1] *
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5-1-BP-15 **Architecture-Induced Bias In Behind-The-Meter PV: How Dispatch Curtailment Distorts The Haze–Performance Correlation**

Naris Khampangkaew[1] , Worrajak Muangjai[1] , Montri Ngao-dat[1] , Kan Nakaiam[1] , Nattawat Panlawan[1] , Anon Namin[1] , Nopporn Patcharaprakiti[1] , Jutturit Thongpron[1] , Teerasak Somsak[1] *
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5-1-BP-16 **MAE-Optimized Machine Learning Ensemble for Post-Processing GFS Solar Irradiance Forecasts in East Asia**

Sergiu-Mihai Hategan[1] *
[1]Department of Institute for Advanced Environmental Research, West University of Timisoara, Romania

5-1-BP-17 **A Bias-Aware Dynamical Downscaling Framework for Future Energy Resource Assessment**

Manajit Sengupta[1] , Jaemo Yang[1] * , Yu Xie[1]
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5-1-BP-18 **Quantifying Solar Irradiance Measurement Uncertainty: Application of the SUNI Tool across the Global Radiometric Network**

Manajit Sengupta[1] , Aron Habte[1] * , Sora Ryu[1] , Stephen Wilcox[1] , Thomas Stoffel[1]
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5-1-BP-19 **Thermal-Aware Tracking of Photovoltaics: Decision-Making Under Forecast Uncertainty and Market Signals**

Zeinab Haydous[1] * , Robinson Cavieres Abarca[1] , Phillip Hammer[1] , Nathan Chang[1] , Bram Hoex[1]
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5-1-BP-20 **Experimental Assessment of Storage-Free Bifacial PV-to-EV Charging for Daytime Workplace Applications**

Kittinun Srasuay[1] , Montri Ngao-det[1] , Jutturit Thongpron[1] , Anon Namin[1] , Worrajak Muangjai[1] , Kan Nakaiam[1] , Nattawat Panlawan[1] , Nopporn Patcharaprakiti[1] , Teerasak Somsak[1] *
1Department of Electrical engineering, Rajamangala university of technology lanna, Thailand

5-1-BP-21 **Accurate and Transferable Electricity Price Forecasting with Risk Quantification via State-Conditioned Probabilistic Modeling**

Caixia Li[1] * , Yuanyuan Xu[2] , Ziheng Liu[1] , Pengfei Zhang[1] , Wenjie Zhang[2] , Xiaojing Hao[1]
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5-1-BP-22 **Photovoltaic String Fault Diagnosis Using Data Collected from PV Inverters and Classification Models**

Woogyun Shin[1] , Jinseok Lee[1] , Youngchul Ju[1] , Hyemi Hwang[1] , Sukwhan Ko[1] *
[1]Department of New Renewable Energy System Laboratory, Korea Institute of Energy Research, Republic of Korea

5-1-BP-23 **Loss attribution in a tropical floating PV plant: separating seasonal resource, performance recovery, and holiday-aligned curtailment**

Tanawut Pudnoiy[1] , Teerasak Somsak[1] *
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5-1-BP-24 **Development of a Regional AI Weather Model for High-Resolution Solar Irradiance Forecasting Using Progressive Multi-Scale Training**

Jun Sasaki[1] * , Kenji Utsunomiya[1] , Yuta Kuno[1] , Koji Yamaguchi[1]
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5-1-BP-25 **Development of Advanced Solar Irradiance Forecasting Technologies for Improved Power Generation Prediction in Japan**

Kenji Utsunomiya[1] * , Jun Sasaki[1] , Yuta Kuno[1] , Koji Yamaguchi[1]
[1]Department of Energy Department, Japan Weather Association, Japan

5-1-BP-26 **An Equivalent Circuit Model for Zero busbar Solar Cells According to the Bonding Characteristics Between Finger Electrodes and Ribbons**

Jonggil Baek[1] , EuiYoung Oh[1] , JiWon Song[1] , MinGyu Park[1] , HyungJun Song[1] *
[1]Department of Safety Engineering, Seoul National University of Science And Technology, Republic of Korea

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5-1-BP-27 **New Concept Note on Affordable Efficient Energy Utilization with Right Selection of Reliable Solar Converters for Household Loads**

Richa Parmar[1] * , Anmol R Saxena[2] , Prashant Misra[1] , Jai Prakash[1]
[1]Department of Solar Photovoltaic, National Institute of Solar Energy, India
[2]Department of Electrical Engineering, National Institute of Technology Delhi, India

5-1-BP-28 **AI-Based Spatial Bias Correction of Intraday Solar Irradiance Forecasts Using a U-Net Architecture**

Peh BengAun[1] , Jun Sasaki[1] * , Utsunomiya Kenji[1] , Kanzaki Shinichiro[1] , Yamaguchi Koji[1]
[1]Department of Renewable Energy Section, Japan Weather Association, Japan

5-1-BP-29 **Data Quality Verification and Reliability Analytics for a Utility-Scale PV Plant in a Tropical Climate**

Usman Yahaya[1] * , Chamnan Limsakul[1] , Dhirayut Chenvidhya[1] , Yaowanee Sangpongsanont[1] , Tanokkorn Chenvidhya[1] , Manit Seapan[1] , Nattakarn Sakarapunthip[1]
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5-1-BP-30 **Generation of Initial Perturbations for Large-Ensemble Prediction Using a Generative Adversarial Network**

Shuntaro Nakayama[1] * , Takahiro Takamatsu[2] , Hideaki Ohtake[2] , Takashi Oozeki[2] , Ko Nakajima[3] , Shinji Wakao[4]
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[4]Department of Electrical Engineering and Bioscience, Waseda University, School of Advanced Science and Engineering, Japan

5-1-BP-31 **Design and Control of a Photovoltaic-Fed Wireless EV Charging System Using Variable-Frequency CC/CV Inverter Control**

Wuttikai Tammawan[1] , tatapong Poedee[1] , Thanet Sriprom[1] , Alongkorn Rattanasila[1] , Ekkachai Chaidee[1] , Anon Namin[1] * , Orathai Lueyos[1]
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5-1-BP-32 **Parameter-Level Impact of Non-Uniform Rear Irradiance on Bifacial PV Modules under Low-Clearance Rooftop Conditions**

Phurachaya Wiratsiri[1] , Naris Khampangkaew[1] , Anon Namin[1] , Nopporn Patcharaprakiti[1] , Worrajak Muangjai[1] , Wichet Thipprasert[1] , Jutturit Thongpron[1] , Teerasak Somsak[1] *
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5-1-BP-33 **Techno-Economic Optimization of Battery Storage Technologies in Hybrid Renewable Energy Systems Using HOMER Pro**

Richa Parmar[1] * , P Juhitha Kiran[2] , G. Anil Kumar[2] , Prashant Misra[1] , Jai Prakash[1] , Anmol R. Saxena[3]
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5-1-BP-34 **Probabilistic photovoltaic power forecasting with quantile regression: Added value of ensemble inputs and physical hybridization**

Martin Mayer[1] *
[1]Department of Energy Engineering, Budapest University of Technology and Economics, MTA BME Lendlet Momentum Renewable Energy Systems Research Group, Hungary

5-1-BP-35 **Phase-Guided Frugal Deseasonalization for Enhanced Renewable Energy Forecasting**

AGOUNDEDEMBA Maklewa[1] *
[1]Department of Physics Department, Kenyatta University, Kenya

5-1-BP-36 **Optimal Operation Algorithm of Greem Hydrogen Production Using DC/DC-Coupled PV-Electrolysis System**

Jieun Lee[1] * , Hyunsik Jo[1] , Sung Hyun Lee[1] , Donggeon Yang[1]
[1]Department of Water Energy Research Center, K water Research Institute, Republic of Korea

5-1-BP-37 **Building-Integrated Photovoltaic System Capable of Identifying String Locations and Early Detection**

Jinwoong Park[1] , Ayoung Yoon[1] , Miseon Jeong[1] , Yeonwon Yang[1] *
[1]Department of Research and Development Team, SKS Co Ltd, Republic of Korea

5-1-BP-38 **Local Utilization of PV Surplus Power through Storage Battery Allocation Considering Distribution System Voltage Constraints and PV Forecast Errors**

Sojun Iwashina[1] , Jindan Cui[1] , Yuzuru Ueda[1] *
[1]Department of Electrical Engineering, Tokyo University of Science, Japan

5-1-BP-39 **Quantifying the Impact of Atmospheric Spectral Variability on High-Efficiency Solar Photovoltaic Energy Yield**

Phillip Hammer[1] , Shukla Poddar[1] * , Zihui Zhang[1] , Bram Hoex[1]
[1]Department of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

5-1-BP-40 **Dye-Sensitized Artificial Light Cells for Energy harvesting from LED lighting**

Junyeong Ryu[1] , ChanKi Jeon[1] , Francis Asiam[1] , Jae-Joon Lee[1] *
[1]Department of Energy and Materials Engineering, Dongguk University, Republic of Korea

5-1-BP-41 **Transparent Film Cleaning System for a Floating Photovoltaic Plant**

Hicham Oufettoul[1] * , Saad Motahhir[1] , Ibtihal Ait Abdelmoula[1]
[1]Department of Green Energy Park Research Platform, Mohammed VI Polytechnic University, Morocco

5-1-BP-42 **Machine Learning-Based Prediction of Photovoltaic Power Output under Hot-Desert Conditions Using Day-Wise Validation.**

Mohammed A. Al-Huri[1] * , Mohammed Alhaji Mohammed[1]
[1]Department of IRC for Construction and Building Materials, King Fahd University of Petroleum and Minerals, Saudi Arabia
[2]Department of Architectural Engineering & Construction Management, King Fahd University of Petroleum and Minerals, Saudi Arabia

5-1-BP-43 **Impact of European Climate Conditions on the Energy Feasibility of Solar-Powered UAVs for Predefined Lawnmower-Pattern Missions**

Maciej Sibiński[1] * , Piotr Lichota[2], Pedro Jimenez[2]
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[2]Department of Faculty of Power and Aeronautical Engineering, Warsaw University of Technology, Poland

5-1-BP-44 **Refractive Index Control of Oblique Incidence Liquid Crystal Lenses Concentrator Photovoltaic Using Divided Electrode**

Masakazu Nakatani[1] *
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5-1-BP-45 **Ensuring the Performance and Safety of Aging PV Power Plants: Utilizing Performance and Degradation Trend Lines Based on a Digital Twin Platform**

Seyoung Yoo[1] , Kyungsoo Lee [2] * , Yuncheol Kim[3]
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[3]Department of Shipbuilding and Ocean Engineering Research Center, Kunsan National University, Tech University of Korea, Republic of Korea

Area 5-3. Building-Integrated and Applied PV (BIPV, VIPV, IPPV)

5-3-BP-01 **Numerical computation for performance of complexly curved PV devices - Demonstration on performance calculation for complicated PV such as BIPV, BAPV, VIPV, IIPV, PV system installed in wavy site, and wearable PVs**

Kenji Araki[1] * , Nobuteru Takeshita[1] , Yasuyuki Ota[1] , Kensuke Nishioka[1]
[1]Department of GX Research Center, University of Miyazaki, Japan

5-3-BP-02 **Innovative fire protocol to support the deployment of rooftop photovoltaic solutions (BAPV and BIPV) and aid in decision-making**

Simon Boddaert[1] * , David Lebellac[1] , Brahim Ismael[1] , Laurent Calderon[1]
[1]Department of Energy and Environment, Scientific and Technical Building Center, France

5-3-BP-03 **Integrated PV evolution: from possibilities demonstration to transformative technology for energy sector**

Juras Ulbikas[1] * , Vaidvile Ulbikaite[1]
[1]Department of Photovoltaic technologies, Applied Research Institute for Prospective Technologies, Lithuania

5-3-BP-04 **Comparative Fire Performance of Glass and Steel Back-Layer BIPV Modules Under Full-Scale Conditions**

Sung Ju Tark[1] , A-Rong Kim[1] * , Hoon Ki Hong[1] , Sungyeop Lim[1] , Soo Won Chae[1] , Young-Su Kim[1]
[1]Department of Energy Research Center, Research Institute of Industrial Science Technology, Republic of Korea

5-3-BP-05 **Fluorine-Doped Tin Oxide Darkening Mechanism and Its Contribution to Cell Degradation in Single-Junction Perovskite Solar Cell Modules**

Jin Kim[1] , Jongwon Ko[2] , Junsu Son[3] , MyeongSeob Sim[2] , Tae Kyung Lee[3] , Hae-Seok Lee[4] *
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[4]Department of Integrative Energy Engineering, Korea University, Republic of Korea

5-3-BP-06 **Characterisation of Micro-Striped Semi-Transparent Perovskite Photovoltaics for Building-Integrated Applications**

Elias Peraticos[1] * , Vasiliki Paraskeva[1] , Sumeet S. Mujumdar[2] , Matthew Norton[1] , Omur Burga Gunduz[3] , Ipek Gursel Dino[4] , Francesco De Nicola[5] , Nuno Rodrigues[6] , Sascha Sadewasser[6] , Pedro Anacleto[6] , George E. Georghiou[1] , Maria Hadjipanayi[1]
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[6]Department of International Iberian Nanotechnology Laboratory, Portugal

5-3-BP-07 **Effects of Cusp Magnetic Field Strength on Melt Flow and Thermal Stress in 400 mm Magnetic Czochralski Silicon Crystal Growth for PV Applications**

Thiruvarasu Tamilarasu[1] , Srinivasan Manickam[1] , Chandrasekaran A[1] *
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5-3-BP-08 **Passive Radiative Cooling of Steel-Backsheet BIPV Modules for Enhanced Outdoor Performance under Vertical Installation**

Doyun Lee[2] , SUNG HO Hwang[1] * , Yoonmook. Kang[2] , Woo Young Kim[3] , Won Kyoung Kim[3] , A-Rong Kim[4] , Young-Su Kim[4] , Dongchul Suh[5]
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5-3-BP-09 **Rear-Ventilation Requirements for Thermal Reliability in High-Rise Vertical BIPV Facades across U.S. Climate Zones**

Junyoung Lee[1] , Dongsu Kim[1] * , Jaewon Kim[1] , Ruda Lee[1] , Jongho Yoon[1] , Hansol Lim[2]
[1]Department of Architecture Engineering, Hanbat National University, Republic of Korea
[2]Department of Building Systems Engineering, Hanbat National University, Republic of Korea

5-3-BP-10 **Various antireflection technologies for unencapsulated Si photovoltaic modules**

Atsushi Masuda[1] * , Towa Kameda[1] , Yo Yamakawa[1] , Yasuaki Ishikawa[2] , Keisuke Ohdaira[3] , Kazuhiro Gotoh[1]
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[2]Department of College of Science and Engineering, Aoyama Gakuin University, Japan
[3]Department of Advanced Science and Technology, Japan Advanced Institute of Science and Technology, Japan

5-3-BP-11 **Estimating Solar Irradiance on Building Facades Using 3D Model, Ray-Tracing-Based Shadow Detection, and Sky View Factor**

Taiju Aiko[1] * , Yuzuru Ueda[1] , Jindan Cui[1]
[1]Department of Electrical Engineering, Tokyo University of science, Japan

5-3-BP-12 **Designing an Optimal Smart Energy Building Driven by Concentrated Solar Power System Integrated with Wind Turbine and Battery Energy Storage: Bi-Level Optimization**

Luai Alhems[1] * , Mohamed Zayed[2] , Shafiqur Rehman[2] , Kashif Irshad[2]
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2Department of Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals, Saudi arabia

5-3-BP-13 **Characterization and Correction of Flow-Sensor Artifacts in PWM-Driven PV–PEM Electrolyzer Systems**

Worrajak Muangjai[1] , Kan Nakaiam[1] , Montri Ngao-det[1] , Nattawat Panlawan[1] , Naris Khampangkaew[1] , Anon Namin[1] , Nopporn Patcharaprakiti[1] , Jutturit Thongpron[1] , Teerasak Somsak[1] *
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5-3-BP-14 **Toward Short-Term BIPV Power Output Forecasting for Building and Urban Energy Management: Simulating Solar Irradiance Distributions on Building Facades with Urban Digital Twins**

Kanta Satou[1] , Shuto Tsuchida[1] , Yoshitaka Hayakawa[3] , Noboru Yamada[1] , Masaaki Baba[1] * , Bingying Zheng[2]
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5-3-BP-15 **Evaluation of Vibration-Induced Stress in Vehicle-Integrated Photovoltaic Modules Using Modal Analysis**
Ryota Tsuji[1] , Kenji Araki[2] , Daisuke Sato[2] , Kensuke Nishioka[2] , Yasuyuki Ota[2] *
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[2]Department of Professor, GX Research Center, University of Miyazaki, Japan

5-3-BP-16 **Development of Non-Halogen Flame Retardant Encapsulants and Application for Photovoltaic Modules**
Shiori Shinozaki[1] * , Ken Murasawa[1] , Masahiro Kobayashi[1] , Shigehiro Ueno[1] , Taiki Takayama[1]
[1]Department of High Performance Materials Operations, Dai Nippon Printing Co Ltd, Japan

5-3-BP-17 **GIS-Based Analysis of the Optimal Panel Azimuth and Validity Assessment of the Shading Loss Correction Factor for PV Panels in Urban Parking Lots**
Yuta Araya[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
[1]Department of Electrical Engineering, Tokyo University of Science, Japan

5-3-BP-18 **Bifacial PbS Quantum Dot Solar Cells Utilizing Spray-Coated Silver Nanowire**
DAEHEE cho[1] , Jiwon Ryu[1] , Sangyeon Park[1] , Yejin Park[1] , Kwanghyeon Song[1] , Younghoi Cho[1] , Seokjoon Hwang[1] , phillip Lee[1] *
[1]Department of Advanced Photovoltaics Research Center, Korea institute of Science and technology, Electrical Engineering Korea University, Republic of Korea

5-3-BP-19 **Outdoor Performance Evaluation of Flexible Photovoltaic Modules under Various Installation Configurations**
Yasuyuki Ota[1] * , Kenji Araki[1] , Tatsuya Takamoto[1] , Daisuke Sato[1] , Kensuke Nishioka[1]
[1]Department of GX Research Center, University of Miyazaki, Japan

5-3-BP-20 **Reflection modeling for BIPV yield prediction: Does material-specific and directional reflectance matter?**
Christian Schlaeger[1] * , Dennis Bredemeier[1] , Philip Kühne[1] , Tobias Wietler[1] , Rolf Brendel[1]
[1]Department of Institute of Solid State Physics, Leibniz University Hannover, Germany

5-3-BP-21 **Solar Resource Estimation on Urban Bus Lines for VIPV Applications**
Ricardo Moruno[1] * , Echedey Luis[1] , Maxim Dewaele[1] , Rubén Núñez[1] , Rebeca Herrero[1] , Ignacio Antón[1]
[1]Department of Instituto de Energía Solar, Universidad Politecnica de Madrid, Spain

5-3-BP-22 **Solar Urban e-Mobility Transition (SUNTRANS): Advancing Solar-Powered Urban Electric Mobility in Europe**
Rebeca Herrero[1] , Ignacio Anton[1] , Ruben Nuñez[1] , Aydın BAŞKAYA[2] * , İskender Önem[2] , Tuğba Lekesiz[2] , Parisa Sharif[3] , Batuhan Yildiz[4] , Maite Guede[5] , Tatiana Loureiro[6] , Leonardo Correa[7] , Filipe Serra[8] , Mona Faraji[9] , Onur Küçükali[10] , Adelina Drambarean[11] , Aurore Dudka[12] , Olga Moreno[13]
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[6]Department of -, R2msolution, Spain
[7]Department of -, University of Twente, Netherlands
[8]Department of -, Siemens, Portugal
[9]Department of -, University of Warwick, UK
[10]Department of -, İzmir Metropolitan Municipality, Türkiye
[11]Department of -, Municipality of Alba Iulia, Romania
[12]Department of -, Ambiente Italia, Italy
[13]Department of -, Bizkaigar, Spain

5-3-BP-23 **A Simulation Framework for Evaluating the Performance of an Adaptive Facade System for Existing Buildings: A Preliminary Study**
Gyeong Yun[1] , Dong Su Kim[1] * , Jun Young Lee[1] , Ru Da Lee[1] , Jong Ho Yun[1]
[1]Department of Architectural Engineering, Hanbat National University, Republic of Korea

5-3-BP-24 **A Novel Metal-Panel-Integrated BIPV System Featuring Interlocking Joint Structures for Enhanced Fire Resistance and Construction Efficiency**
Youngsu Kim[1] , A-Rong Kim[1] , Soowon Chae[1] , Hoon-ki Hong[1] , Sungyeop Lim[1] , Sung Ju Tark[1] *
[1]Department of Energy Research Center, Research Institute of Industrial Science and Technology, Republic of Korea

5-3-BP-25 **Evaluation of Encapsulant-Less Vertical Crystalline-Silicon Modules Against Static Vertical Load and Vibration Stress**
Adrian Augusto Sumalde[1] * , Kensaku Maeda[1] , Keisuke Ohdaira[1]
[1]Department of Materials Science, Japan Advanced Institute of Science and Technology, Japan

5-3-BP-26 **Development of film-embedded color BIPV technology to improve durability and secure acceptance of glass color coating modules**
Miseon Jeong[1] , Yeonwon Yang[1] * , Ayoung Yoon[1] , Jin-Woong Park[1]
[1]Department of Research and Development, SKSE Inc, Republic of Korea

5-3-BP-27 **Evaluating the Electrical Reliability and Field Performance of Steel-Plate BIPV Modules**
A-Rong Kim[1] , Sung Ju Tark[1] * , Hoon Ki Hong[1] , Sungyeop Lim[1] , Soo Won Chae[1] , Young-Su Kim[1]
[1]Department of Energy Research Center, Research Institute of Industrial Science and Technology, Republic of Korea

5-3-BP-28 **Annual Power Generation Performance of a Building-Integrated Photovoltaic System at Different Installation Angles in Gyeongsan, south Korea**
Da yeong Jun[1] , Hyunsoo Lim[1] , Sung Hyun Kim[1] *
[1]Department of Renewable Energy Research Center, Korea Electronics Technology Institute, Republic of Korea

5-3-BP-29 **Multi-Physics Simulation for Solar Energy Utilization Yield for Hybrid Transparent Photovoltaic Windows: Electric Power Generation and Daylighting Efficiency**
Seongje Hwang[1] , Seongwoo Lee[1] , Jinwoo Yeo[1] , Minjun Son[1] , Myunghun Shin[1] *
[1]Department of Electronics and Information Engineering and Interdisciplinary Program in Space Systems Engineering, Korea Aerospace University, Republic of Korea

5-3-BP-30 **Identification of Electrical Safety Hazards and Standards Review for Vertical Bifacial Photovoltaic Systems**
Sung-Koo Cho[1] * , Chong-Min Kim[1] , Su-Jeong Oh[1] , Hae-Gweon Kang[1] , Ju-Hee Jang[1]
[1]Department of New Tech Research Center, Korea Electrical Safety Coporation, Electrical Safety Research Institute, Republic of Korea

5-3-BP-31 **System Engineering for Canal-Applied Bifacial PV: Validating Power Generation Accuracy via Rear Reflectance Analysis**
Euihwan Ryu[1] , Deoksung Kim[1] , KyuJin Kim[1] , Sangmoon Lee[1] , Seungjun Lee[1] *
[1]Department of Building Energy Convergence Center, Korea Conformity Laboratories, Republic of Korea

5-3-BP-32 **Cool Solar Helmets? An Exploratory Study in Developing Solar-Powered Safety Helmets for the Tropics**
Yi De Chye[1] , En Rong Stephen Tay[2] *
[1]Department of the Built Environment, National University of Singapore, Singapore
[2]Department of the Built Environment, National University of Singapore, Solar Energy Research Institute of Singapore, Singapore

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5-3-BP-33 **Development of a Construction Standardization and Quality Management Framework for Building-Integrated Photovoltaic Systems**

Jinhee Kim[1] , Juntae Kim[2] *
[1]Department of Green Energy Technology Research Center, Kongju National University, Republic of Korea
[2]Department of Green Smart Architectural Engineering, Kongju National University, Republic of Korea

5-3-BP-34 **Experimental Evaluation of the heating performance of a PVT-Assisted Air Source Heat Pump under Standard Test Conditions**

Sangmyung Kim[1] , Jinhee Kim[1] , Juntae Kim[2] *
[1]Department of Green Energy Technology Research Center, Kongju National University, Republic of Korea
[2]Department of Green Smart Architectural Engineering/Energy System Engineering(Graduated school), Kongju National University, Republic of Korea

5-3-BP-35 **Comparative Analysis of Fire Behavior and Risk of BIPV Systems With and Without Consideration of BIPV Characteristics**

Subin Jeong[1] , Jinhee Kim[1] , Juntae Kim[1] *
[1]Department of Energy Systems Engineering, Kongju National University, Republic of Korea

5-3-BP-36 **Experimental Investigation of Fire Behavior of Building-Integrated Photovoltaic (BIPV) Panels by Panel Type**

Seowon Park[1] *
[1]Department of Risk & Safety Research Center, Fire Insurers Laboratories of Korea, Republic of Korea

5-3-BP-37 **Experimental investigation to enhance the output performance of solar photovoltaic (PV) panels using phase change material (OM-37) with expanded graphite nanoparticle**

Madhan Kuppusamy[1] * , Ravi Kumar Kottala[1] , Vinothkumar Selvaraj[1] , Omar S. Asfour[1] ,
[1]Department of Construction and Building Materials, Interdisciplinary Research Center, King Fahd University of Petroleum and Minerals, Saudi Arabia

5-3-BP-38 **Can Rooftop PV Cool Cities? Cross-Climate Evidence on PV–Urban Heat Island Coupling across Five Köppen-Geiger Zones**

Yingxin Feng[1] , Guang Hu[1] * , Roel Loonen[2] , Angèle Reinders[1]
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[2]Department of the Built Environment, Building Performance Group, Eindhoven University of Technology, Netherlands

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Area 1-1. c-Si Based Tandem Solar Cells and Modules

1-1-DP-01 **Inorganic Perovskite/Silicon Tandem Solar Cells**

Pengyang Wang[1] , Xiaodan Zhang[1] *
[1]Department of Institute of Photoelectronic Thin Film Devices and Technology, Nankai University, China

1-1-DP-02 **Development of a Silicon-Based Optical Multi-Interlayer for High-Efficiency Perovskite/Silicon Tandem Solar Cells**

Ryoga Yotsuya[1] * , Soma Kondo[1] , Xiyuan Yang[1] , Yutaka Matsuo[1] , Ryoji Katsube[1] , Yasuyoshi Kurokawa[2] , Noritaka Usami[1]
[1]Department of Materials Process Engineering, Nagoya University, Japan
[2]Department of Faculty of Engineering Science, Kansai University, Japan

1-1-DP-03 **Selective Electrowinning Recovery of Lead from Perovskite Top Cells of Tandem Solar Cells via Nitric Acid Leaching: Electrode Optimization and Process Scalability**

Suhwan Kim[1] , Seyeon Cho[2] , Jongsung Park[2] *
[1]Department of Future Convergence Technology Research Institute, Gyeongsang National University, Republic of korea
[2]Department of Energy System Engineering, Gyeongsang National University, Republic of korea

1-1-DP-04 **Turning Current Mismatch into Advantage: Suppressing Hysteresis and Improving Operational Stability in Two-Terminal Perovskite/Silicon Tandem Solar Cells**

Kunlin Chen[1] , Anh Dinh Bui[1] , Viqar Ahmad[1] , Heping Shen[1] , Klaus Weber[1] , Daniel Walter[1] *
[1]Department of Engineering, Australian National University, Australia

1-1-DP-05 **Blade-coated perovskite/TOPCon tandem solar cells achieving over 25% efficiency on large-area devices**

Jinzhi Si[1] , Heping Shen[1] , The Duong[1] , Klaus Weber[1] , Daniel Walter[1] , Viqar Ahmad[1] * , Li-chun Chang[1] , Yihui Hou[1]
[1]Department of Engineering, Australian National University, Australia

1-1-DP-06 **Hydrogenated IWO Ultrathin Films as an Interconnecting Layer in Perovskite/Silicon Tandem Solar Cells**

Hyunju Lee[1] * , Genki Sugiura[2] , Yoshio Ohshita[2] , Atsushi Ogura[1], [3]
[1]Department of Meiji Renewable Energy Laboratory, Meiji University, Japan
[2]Department of Electronics and Information Engineering, Toyota Technological Institute, Japan
[3]Department of Science and Technology, Meiji University, Japan

1-1-DP-07 **Low-cost LED-based luminescence imaging (EL, PL) of Large-Area Perovskite Solar Cells on Silicon Wafers**

Jan Haschke[1] * , Elisaveta Ungur[1] , Kwan Bum Choi[1] , Kenta Nakayashiki[2] , Armin G. Aberle[1]
[1]Department of Solar Energy Research Institute of Singapore, National University of Singapore, Singapore
[2]Department of R&D Technology, REC Solar Pte Ltd, Singapore

1-1-DP-08 **A Molecularly Defined Triarylamine Enables Buried-Interface Crystallization Control for Reproducible and Scalable Wide-Bandgap Perovskite Solar Cells**

Youngmin Kim[1] , Hanul Min[1],[2] *
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[2]Department of Integrative Energy Engineering, Korea University, Republic of korea

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1-1-DP-09 **Highly Uniform Large-Area Perovskite Thin Films Fabricated via a Two-Step Hybrid Deposition for Tandem Top Cells**

SunWoo Kwak[1] , Inhwan Oh[1] , Sunkyu Kim[1] , Haram Lee[1] , Gunsoo Jung[1] , JeGeun Shin[1] , Gabseok Seo[1] *
[1]Department of Development Team, UniTest, Republic of korea

1-1-DP-10 **Degradation Study of Industrial-Size Textured Perovskite-Silicon Tandem Solar Cells over 6,000 Hours under ISOS-D1 Conditions**

Krishna Singh[1] * , Biplab Ghosh[1] , Kenta Nakayashiki[2] , Armin G. Aberle[1]
[1]Department of Solar Energy Research Institute of Singapore, National University of Singapore, Singapore
[2]Department of Renewable Energy Corporation Solar Pte. Ltd., Singapore

1-1-DP-11 **DMSO-free Ultra-Wide Bandgap Perovskites for Triple-Junction Applications**

Selin Seyrek[1,2,3] * , Aslihan Babayigit[1,2,3] , Valerie Depauw[1,2,3] , Yinghuan Kuang[1,2,3] , Bart Vermang[1,2,3]
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[2]Department of IUMAT, imec, Belgium
[3]Department of IUMAT, Energyville, Belgium

1-1-DP-12 **Correlating optoelectronics properties with atomic-scale structure in doped ZnO transparent conducting nanolayers for tandem solar cells**

Yuelin Xiong[1] , Sebastian Bonilla[1] * , Emma Lee[1] , Theodore Hobson[1] , Kazuki Koreishi[2]
[1]Department of Materials, University of Oxford, UK
[2]Department of Materials Science, Institute of Science Tokyo, Japan

1-1-DP-13 **Evaluation of Ti-doped SnO2 Thin Film Deposited by RF Magnetron Co-Sputtering**

Tatsumi Nakamura[1] , Yuta Shinohara[1] , Genki Sugiura[2] , Hyunju Lee[2] , Yoshio Ohshita[2] , Atsushi Ogura[3] *
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1-1-DP-14 **Defect-State Engineering and Interface Optimization in Organic Polymer/a-Si:H/n-Si Hybrid Solar Cells: A Comprehensive SCAPS-1D Simulation Study**

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[2]Department of Physics, Sri Sivasubramaniya Nadar College of Engineering, India

1-1-DP-15 **Understanding the Perovskite Crystallization Kinetics through the Optoelectronic analysis**

Hyeji Han[1] , Jongchul Lim[1] * , Siwon Yun[1] , Wonjong Lee[1] , Minkyu Kim[1] , Asawar Batool[1] , Maryam Khan[1] , Adnan Munhammad[1] , Zobia Irshard[1]
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1-1-DP-16 **Templating-Assisted Crystallisation in All-Layer-Vacuum-Processed Inorganic Perovskite Solar Cells**

Wonjong Lee[1] , Minkyu Kim[1] , Muhammad Adnan[1] , Zobia Irshad[1] , Siwon Yun[1] , Hyeji Han[1] , Jongchul Lim[1] *
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1-1-DP-17 **Thermally Formed NiSi/NiOx Bilayers as TCO-Free Interlayers for p–i–n Perovskite/TOPCon Tandem Solar Cells**

Sujin Cho[1] , Dowon Pyun[2] , Seok-Hyun Jeong[2] , Yoonmook Kang[3] *
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[2]Department of Institute of Energy Technology, Korea University, Republic of korea
[3]Department of Energy and Environment (KU-KIST Green School), Korea University, Republic of korea

1-1-DP-18 **Investigation of Al concentration reduction in SiGe layers fabricated by Al–Ge paste printing and annealing process via thermal oxidation treatment**

Kenta Yagi[1] * , Ryoji Katsube[1] , Shota Suzuki[2] , Hideaki Minamiyama[2] , Marwan Dhamrin[2,3] , Yauyoshi Kurokawa[1,5] , Noritaka Usami[1,3,6]
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[5]Department of Science and Engineering, Kansai University, Japan
[6]Department of Center for Integrated Research of Future Electronics, Institute of Materials and Systems for Sustainability, Japan

1-1-DP-19 **Cesium-Halide-Induced Surface Phase Reconstruction for Durable Inorganic Perovskite Solar Cells**

Muhammad Adnan[1] , Zobia Irshad[1] , Wonjong Lee[1] , Siwon Yun[1] , Hyeji Han[1] , Minkyu Kim[1] , Jongchul Lim[1] *
[1]Department of Energy Science and Technology, Graduate School of Energy Science and Technology Chungnam National University, Republic of Korea

1-1-DP-20 **Enhanced Stability of Wide-Bandgap Br less Perovskite Solar Cells**

Suhan Kim[1] , Hanul Min[2] *
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[2]Department of Korea University, KU-KIST Graduate School of Converging Science and Technology, Integrative Energy Engineering, Republic of Korea

1-1-DP-21 **Interfacial Defect Mitigation for Efficient Monolithic Perovskite/Si Tandems**

Mengmeng Chu[1] , Maha Nur Aida[2] , Hyejeong Jin[3] , Hasnain Yousuf[1] , Rafi Ur Rahman[3] , Muhammad Quddamah Khokhar[3] , Junsin Yi[3] *
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[2]Department of Future Energy Engineering, Sungkyunkwan University, Republic of korea
[3]Department of Electrical and Computer Engineering, Sungkyunkwan University, Republic of korea

1-1-DP-22 **Scalable Fabrication of Nanoimprint Master Molds via Dry Colloidal Assembly for Light Trapping in Silicon Tandem Solar Cells**

Yutong Wu[1] , Yasuyoshi Kurokawa[2] , Noritaka Usami[1] *
[1]Department of Engineering, Nagoya University, Japan
[2]Department of Science and Engineering, Kansai University, Japan

1-1-DP-24 **Post-processing trade-offs at ITO/poly-Si contacts for perovskite/TOPCon tandem solar cells**

Huien Zhong[1] , Theodore Hobson[1] , Sebastian Bonilla[1] *
[1]Department of Materials, University of Oxford, UK

1-1-DP-25 **PDINN Buffer Layer for High-Performance Semi-Transparent Perovskite Solar Cells**

Songhyun Lee[1] , Junseop Byeon[1] , Ahreum Lee[1] , Yu Jin Kim[1] , Junyeong Lee[1] , Sungjun Hong[1] , Wooik Jung[1] , SeJin Ahn[2] *
[1]Department of Photovoltaics Research, Korea Institute of Energy Research, Republic of korea
[2]Department of Creative Convergence Engineering, Hanbat National University, Republic of korea

1-1-DP-26 **Suppressing Degradation Pathways in Wide-Bandgap Perovskites via Grain Boundary Engineering for Efficient Perovskite/Silicon Tandem Solar Cells**

Gwisu Kim[1] , Hanul Min[1] *
[1]Department of Integrative Energy Engineering, KU-KIST Graduate School of Converging Science and Technology, Korea University, Republic of Korea

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1-1-DP-27 **Scalable Fabrication of Perovskite Top Cells for Perovskite/Silicon Tandem Solar Cells via Fluidic and Crystallization Control in Blade Coating**

Yujin Kim[1] , Junseop Byeon[1] , Ahreum Lee[1] , Junyeong Lee[1] , Sung-jun Hong[1] , Yimhyun Jo[2] , Minjin Kim[2] , Sejin Ahn[1] *

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1-1-DP-28 **Buried-Interface Engineering via Slot-Die Coating for Si/Perovskite Tandem solar cells**

Junyeong Lee[1] , Junseop Byeon[1] , Sejin Ahn[1] *

[1]Department of Photovoltaic Research Department, Korea Institute of Energy Research, Republic of korea

1-1-DP-29 **Mixed Self-Assembled Monolayers of Br-2EPT and Me-4PACz for Mitigating Molecular Aggregation and Interface Engineering in Inverted Perovskite Solar Cells**

Chidingozi Osigwe[1] , Hong Sungjun[1] *

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1-1-DP-30 **Molecular-Level Interfacial Engineering for Efficient Perovskite/Silicon Tandem Solar cells**

Bo Gao[1] *

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1-1-DP-31 **Modulating preferred crystal orientation via CsBr buried interlayer for efficient and stable inorganic perovskite solar cells**

Zobia Irshad[1] , Muhammad Adnan[1] , Wonjong Lee[1] , Siwon Yun[1] , Hyeji Han[1] , Jongchul Lim[1] *

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1-1-DP-32 **Redox-Active NiOx-Catalyzed Li+ Capture-Extraction Strategy for tBP-Free Spiro-OMeTAD Enables Exceptional Damp-Heat Stability in Perovskite Solar Cells**

Minjin Kim[1], Yun Seop Shin[2] , Sungjun Hong[3] , Inyoung Jeong[3] , Junseop Byeon[3] , Yimhyun Jo[1] , Dong Suk Kim[4] , Sejin Ahn[3] *

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1-1-DP-33 **Vapor-Deposited Complementary Dual-SAM Contacts for Efficient Wide-Bandgap Perovskite Solar Cells**

Yujin Kim[1] , Seungon Jung[1] , Hyesung Park[1] *

[1]Department of KU-KIST Graduate School of Converging Science and Technology, Korea University, Republic of Korea

1-1-DP-34 **Loss Analysis of Perovskite/Silicon Tandem Solar Cells Using Z-Parameter Based Spectrometric Characterization**

Md Halim Hossain[1] , Jeongho Lee[2] , Giryeong Kwon[3] , Seunghoon Lee[4] , Sungju Park[4] , Dohkwon Lee[3] , Inho Kim[1] *

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1-1-DP-35 **Coating Process Dependent Surface States and Optimized Passivation for Large-Area Perovskite Solar Cells**

Yimhyun Jo[1] , Se-Jin An[1] * , Minjin Kim[1] , Sungjun Hong[1] , Junseop Byun[1]

[1]Department of Ulsan Advanced Energy Technology R&D Center, Korea Institute of Energy Research, Republic of korea

1-1-DP-36 **Synergistic Enhancement of Efficiency and Longevity in Bi-facial Perovskite/Silicon tandem solar cells**

Junseop Byeon[1] , Sejin Ahn[1] *

[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea

1-1-DP-37 **Improvement of Interlayer ICO Properties by Metal Ion Doping for High-Efficiency Perovskite/Silicon Tandem Solar Cells**

Masahiro Okada[1] * , Genki Sugiura[1] , Terunobu Ando[1] , Taiga Misu[1] , Masako Kurono[1] , Hyunju Lee[3] , Yuta Shinohara[2] , Atsushi Ogura[5] , Tappei Nishihara[4] , Yoshio Ohshita[1]

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1-1-DP-38 **Multiphysics Simulation and Experimental Validation of Ion Dynamics in Perovskite/Silicon Tandem Solar Cells**

Sungju Park[1] , Seunghoon Lee[1] , Md Halim Hossain[2] , Jeongho Lee[3] , Giryeong Kwon[4] , Doh-kwon Lee[4] , Inho Kim[5] *

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1-1-DP-39 **High-Mobility IWO:H Thin Films Fabricated by Reactive Plasma Deposition with Controlled H2/O2 Flow Rates for Perovskite/Silicon Tandem Solar Cells**

Genki Sugiura[1] * , Masahiro Okada[1] , Terunobu Ando[1] , Zhi Zhong Chen[1] , Yukito Soejima[2] , Hyunju Lee[3] , Atsushi Ogura[4] , Yoshio Oshita[1]

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1-1-DP-40 **Pressure-Assisted Sintering of Screen-Printed Ag Electrodes for Front-Side Metallization of Si/Perovskite Tandem Solar Cells**

Seunghoon Lee[2] , Sungju Park[5] , Jeongho Lee[3] , Giryeong Kwon[4] , Doh-Kwon Lee[6] , Inho Kim[1] * , Md Halim Hossain[7]

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1-1-DP-41 **Opto-electronic Loss Analysis of Perovskite-TOPCon Tandem Cells**
Darshit Trevadia[1] , Lina Wang[2] , Xinya Niu[3] , Zonglong Zhu[2] , Ruy Sebastian Bonilla[1] *
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[3]Department of OSCAR, Oxford Suzhou Centre for Advanced Research, China

1-1-DP-42 **Beyond Lambertian Light Trapping in Perovskite/Silicon Tandem Solar Cells via Nanophotonic Light Trapping Structures**
Jeongho Lee[1] , Inho Kim[1] * , Md Halim Hossain[1] , Seunghoon Lee[1] , Sungju Park[1] , Giryeong Kwon[1] , Doh-Kwon Lee[1] , Byeong-Kwon Ju[1]
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1-1-DP-43 **Surface Texture Engineering for Enhanced Light Management in Perovskite/Double-Sided TOPCon Tandem Solar Cells**
Yong Ryun Kim[1] * , Erik Spaans[1] , Jinhyun Kim[1] , Rosalie Guerra[1] , Gabby Luna[1] , John Arcebal[1] , Selvaraj Venkataraj[1] , Armin Aberle[1]
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1-1-DP-44 **Elucidating The Stability of All-Layer-Vacuum Processed Inorganic Perovskite Solar Cells**
Jongchul Lim[1] *
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1-1-DP-45 **From Semi-Transparent Perovskite Cells to Efficient and Stable Perovskite/Silicon Tandems: A Comprehensive Defect, Strain, and Optical Management Strategy**
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1-1-DP-46 **Development of Wide-Bandgap Perovskite Solar Cells by a Hybrid Evaporation/Blade-Coating Process for Silicon Tandem Applications**
Ahreum Lee[1] , Junyeong Lee[1] , Junseop Byeon[1] , Sung-jun Hong[1] , Sejin Ahn[1] *
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1-1-DP-47 **Stabilizing Formamidinium Iodide Sublimation for Reliable Vacuum Deposition of Perovskites**
SeungWoo Kim[1] , Hyun-Sung Yun[2] , Suji Moon[1] , Sumin Ji[1] , Jong Hun Yeo[1] , Beom-Soo Kim[1] * , Nam Joong Jeon[1]
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1-1-DP-48 **Fluoropolymer-Free Transparent Backsheets for Low-Carbon Footprint Photovoltaic Modules**
Da Young Kwon[1] , Jun Ryu[1] , Yerang Park[1] , Jae-ik Han[1] , Ha Neul Baek[1] , Jaehyeon Kim[1] , Soohyun Bae[2] , Kyung-Soo Kim[2] , Young-Joo Eo[2] , Gi-Hwan Kang[2] , Yonghwan Lee[1] *
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1-1-DP-49 **Space Photovoltaic Modules with Film-Based Ultralight Shielding and a High-Reliability Encapsulation Process**
Jun Ryu[1] , Yerang Park[1] , Da Young Kwon[1] , Jae-ik Han[1] , Ha Neul Baek[1] , Jaehyeon Kim[1] , Yonghwan Lee[1] *
[1]Department of New and Renewable Energy Research Center, Korea Electronics Technology Institute, Republic of korea

1-1-DP-50 **Transparent Shielding Glass Technology for Space Photovoltaic Modules**
Yerang Park[1] , Jun Ryu[1] , Da Young Kwon[1] , Jae-ik Han[1] , Ha Neul Baek[1] , Jaehyeon Kim[1] , Yonghwan Lee[1] *
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1-1-DP-51 **A Study on Temperature Stabilization for Output Measurement of PVSK/Si Tandem PV module**
Jongrok Lim[1] , TaeHee Jung[1] , Seong-Won Kim[1] * , PilKyu Kim[1] , Sungmin Han[1]
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1-1-DP-52 **Ray-tracing-based design of down-conversion EVA encapsulation for high-efficiency and reliable perovskite-Si tandem photovoltaic modules**
Minju Lee[1] , Jinyoung Hwang[1] * , Myunghun Shin[1]
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1-1-DP-53 **Solvent Engineering and Interface Passivation for ALD-Free Monolithic Perovskite/Perovskite/Silicon Triple-Junction Solar Cells**
Yeo Jin Choi[1] , Sung Yeon Lim[1] , Jin young Kim[1] *
[1]Department of Materials Science and Engineering, Seoul National University, Republic of korea

1-1-DP-54 **Decoupling Charge-Transfer Complex Formation from p-Doping Performance in Fully Vacuum-Deposited Perovskite/Si Tandems**
Suji Moon[1] , Nam Joong Jeon[1] * , Beom-Soo Kim[1]
[1]Department of Photonic Energy Research Center, Korea Research Institute of Chemical Technology, Republic of Korea

1-1-DP-56 **Dark-Annealing Interface Passivation of n-TOPCon Bottom Cells Enables Albedo-Enhanced Four-Terminal Perovskite/Silicon Tandems**
Hasnain Yousuf[1] , Alamgeer[1] , Rafi Ur Rahman[2] , Mengmeng Chu[1] , Maha Nur Aida[3] , Shurouq Abdulqadir Mohammed[2] , Xiaobo Wang[2] , Hyejeong Jin[2] , Muhammad Quddamah Khokhar[2] , Junsin Yi[4] *
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[4]Department of College of Information and Communication Engineering, Sungkyunkwan University, Republic of korea

1-1-DP-57 **Optical Properties of Quantum Dot-Coated Glass for Spectral Conversion in Tandem Photovoltaic Applications**
Cheolwook Kwon[1] , Dohyun An[1] , Soohyun Bae[1] , Young-Joo Eo[1] , Hae-Seok Lee[2] *
[1]Department of Photovoltaic Research Department, Korea Institute of Energy Research, Republic of korea
[2]Department of Energy and Environment, Korea University, Republic of korea

1-1-DP-59 **EDAI$_2$/3F-PEAI Mixed Passivation for Efficient Vacuum-Deposited Silicon–Perovskite Tandem Solar Cells**
Wonkyu Lee[1] , Seung Woo Kim[1] , Minjun Cho[1] , Su ji Moon[1] , Jong Hun Yeo[1] , Su Min Ji[1] , Nam Joong Jeong[1] , Beom-Soo Kim[1] *
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1-1-DP-60 **Efficient Charge Carrier and Light Management for Perovskite-Silicon Tandem Solar Cell Through Controlling Electron Transporting Contact**
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1-1-DP-61 **Direct Heterojunction Architectures of Silicon and Perovskite Investigated through SCAPS-1D Modelling**
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1-1-DP-62 **Implementation and Closed-Loop Optimization of a Programmable Beam Shaper for Thin-Film PV Laser Scribing**
Bert Stegemann[1] * , Tadeus Ranisch[1] , Christof Schultz[1] , Nicolas Otto[1] , Guillermo Farias-Basulto[2] , Albrecht Lindinger[3]
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[3]Department of Institut für Experimentalphysik, Freie Universität Berlin, Germany

1-1-DP-63 **Hole-Selective Interface Engineering for Perovskite-Based Tandem Solar Cells**
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Area 1-2. Thin-Film Based Tandem Solar Cells and Modules

1-2-DP-01 **Role of sodium in widening the process window of air-processable DMF-based CISSe solar cells for tandem application.**
Ivan Opao[1] , SeJin Ahn[1] * , Junseop Byeon[1] , Huyen Tran[1]
[1]Department of Photovoltaic Research Department, Korea Institute of Energy Research, Republic of korea
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1-2-DP-02 **Unveiling Local Structural and Chemical Evolutions in Perovskite Solar Cells via Synchrotron-Based X-ray Absorption Fine Structure**
Inhui Hwang[1] *
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1-2-DP-04 **In-Situ Vacuum Oxidation-Assisted ALD-SnO2 for High-Performance Perovskite Solar Cells toward Tandem Photovoltaics**
Jiyoon Kim[1] , Yumin Maeng[1] , Jung Un Shin[2] , Minha Kim[2] , Jungwon Min[2] , Tae Woong Kim[1] *
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[2]Department of BioWellness Convergence, Konkuk University GLOCAL Campus, Republic of korea

1-2-DP-05 **RIE-Assisted Defect Engineering of ALD-SnO_2 for Perovskite-Based Tandem Solar Cells**
Yuna Choi[1] , Sumin Shin[1] , Chan Ryeol Im[1] , Yun Hoo Jo[2] , Min Young Hong[2] , Tae Woong Kim[1] *
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1-2-DP-06 **Simulation-based Analysis of Recombination Junctions for All-Perovskite Tandem Photovoltaics**
Beat Ruhstaller[2] , Urs Aeberhard[1] * , Christoph Kirsch[2] , Hamilton Carrillo-Nuñez[1] , Roman Hiestand[1] , Simon Zeder[1] , Balthasar Blülle[1] , Sandra Jenatsch[1]
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1-2-DP-07 **Performance Optimization of All-Perovskite Tandem Solar Cells**
Madina Seisembayeva[1] * , Askhat Nuraly[2] , Kuanysh Tlekova[2] , Gulnaz Toleubay[2] , Yeldos Seikozhanov[1,3] , Askhat Jumabekov[4] , Erik Shalenov[1]
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1-2-DP-08 **Enhancing the Short-Circuit Current Density of Wide-Bandgap Semitransparent Perovskite Solar Cells for Perovskite/CIGS Tandem Top-Cell Applications**
Kimihiko Saito[1] * , Tomoya Matsunaga[1] , Chihiro Mizushima[1] , Kazuya Inoue[1] , Hirotaka Shishido[1] , Ryousuke Ishikawa[1]
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1-2-DP-09 **Fabrication of Inorganic Perovskite Solar Cell using Vacuum Deposition System**
Minkyu Kim[1] , Muhammad Adnan[1] , Zobia Irshad[1] , Wonjong Lee[1] , Siwon Yun[1] , Hyeji Han[1] , Jongchul Lim[1] *
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1-2-DP-10 **Controllable Synthesis of PTAA for High-Performance Perovskite Solar Cells**
Sora Oh[1] , Bon Joo Koo[1] , Hyun-Sung Yun[1] *
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1-2-DP-11 **Interfacial Degradation Pathway of the Perovskite/CIGS Tandem Solar Cells**
Ahreum Lee[1] , Inchan Hwang[1] , Awet Mana Amare[1] , Junseop Byeon[1] , Ara Cho[1] , Jeonghun Park[1] , Soomin Song[1] , Seung kyu Ahn[1] , Donghyeop Shin[1] , Kihwan Kim[1] , Inyoung Jeong[1] *
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1-2-DP-12 **Molecular Engineering of Phenothiazine-Based Self-Assembled Monolayers for High-Efficiency and Stable Inverted Perovskite Solar Cells**
Sungjun Hong[1] * , Hung Van Tran[1] , Hyojin Cho[2] , Min Thein Kyaw[3] , JunSeop Byeon[1] , Donghyeop Shin[1] , Inyoung Jeong[1] , Sejin Ahn[1] , Kyung-Koo Lee[3] , Young S. Park[2]
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1-2-DP-13 **Molecular Spacer Engineering for Fully Vacuum-Processed Co-Evaporated CsPbI2Br Perovskite Solar Cells**
Yunjeong Jang[1] , Seungon Jung[1] , Yujin Kim[1] , Hyesung Park[1] *
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1-2-DP-14 **Bottom-Cell Bandgap Optimization for High-Performance Mono-Facial 4T Perovskite/CIGS Tandem Solar Cells**
Muhammad JahanKhan[2] , Seyeong LIM[2] , Woon-Joon KIM[2] , Wook Hyun KIM[1] , Dae-Ho Son[1] , Dong-Hwan JEON[1] , Jaebuk Lee[1] , Jin-Kyu Kang[1] , Kee-Jeong Yang[1] , Dae-Kue Hwang[1] , Shi-Joon Sung[1] , Dae-Hwan Kim[1] *
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1-2-DP-15 **Optimization of Laser Scribing Conditions for Flexible CIGS Bottom Cells in Tandem Applications**
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1-2-DP-16 **Flexible Stainless Steel-Based Narrow-Bandgap CIGS Bottom Cells for Tandem Applications**

Jiseon Hwang[1] , Hyo Sik Chang[1] , Kihwan Kim[2] , Jongchul Lim[1] * , Donghyeop Shin[2]
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1-2-DP-17 **Solvent-Resistant Deprotonated SAM Interfaces for High-Voltage Perovskite/Organic Tandem Solar Cells**

Jung Geon Son[1] , Ha-eun Koo[2] , Woojin Lee[2] , Dong Suk Kim[1] , Seung-Jae Shin[2] , Jin Young Kim[1] *
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1-2-DP-18 **Stress Engineering of Mo Back Contacts toward Reliable Flexible CIGS/Perovskite Tandem Solar Cells**

Jeonghun Park[1] , Jonghoo Park[2] , Yongseok Yoo[1] , Inyoung Jeong[1] , Kihwan Kim[1] , Donghyeop Shin[1] *
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1-2-DP-19 **Two-Step Hybrid Processing for High-Performance Monolithic CIGS/Perovskite Tandem Solar Cells: Overcoming Challenges in Perovskite Film Formation**

Muhammad Rehan[1] , Inyoung Jeong[1] , Awet Mana Amare[1] , Junseop Byeon[1] , Sejin Ahn[1] , Sungjun Hong[1] , Ahreum Lee[1] , Ara Cho[1] , Jihye Gwak[1] , Kihwan Kim[1] , Donghyeop Shin[1] *
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1-2-DP-20 **Annealing-Free Sputtered Bilayer NiOx with Precisely Controlled Oxidation States for Perovskite Solar Modules and Tandem Applications**

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1-2-DP-21 **Monolithic a-Si:H / a-SiC1-x:H Tandem Solar Cells for Efficient Indoor Energy Harvesting**

Gustavo Hernando Suarez[1] * , Pau Estarlich[1] , Miquel Anglada[1] , Jose Miguel Asensi[2] , Joaquim Puigdollers[1] , Cristobal Voz[1] , Gerard Masmitjà[1]
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[2]Department of Física Aplicada, Universitat de Barcelona, Spain

1-2-DP-22 **Efficiency Enhancement of Perovskite Solar Cells through Structure-Engineering-Based Design for Tandem Applications**

Junyeong Lee[1] , Sejin Ahn[1] *
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1-2-DP-23 **Development of Perovskite Dry Process Technology for CIGS/Perovskite Monolithic Tandem Solar Cells**

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[2]Department of Solar Cell Center, Korea Institute of Energy Research, Republic of korea

1-2-DP-24 **Density Functional Theory Study on Interfacial Materials in Low-Bandgap Perovskite Solar Cells for Tandem Applications**

YuJin Kim[1] , Sejin Ahn[1] *
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea

1-2-DP-25 **Process Stabilization of ALD/CVD Perovskite Films for Tandem Solar Cell Manufacturing via In-situ Chamber Cleaning**

Yeongeun Kim[1] *
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1-2-DP-26 **Robust IZO Top Contacts with Silver Interlayer for Bifacial Perovskite Solar Cells**

Anuj Kumar Palariya[1] , Sushobhan Avasthi[2] , Satish Patil[1] *
[1]Department of Solid State Structural Chemistry Unit, Indian Institute of Science Bangalore, India
[2]Department of Centre for Nano Science and Engineering, Indian Institute of Science Bangalore, India

1-2-DP-27 **Fabrication and Characterization of Perovskite Optoelectronic devices Based on a Chemical Vapor Deposited PPV Hole Transport Layer**

Daeun Jeong[1] , Jongchul Lim[1] * , Minkyu Kim[2] , Hyeji Han[2] , Won Kyung Park[3] , Kyung Jin Lee[3]
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1-2-DP-28 **Elucidating Charge Carrier Dynamics at the Buried Interface in Perovskite Solar cells**

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1-2-DP-29 **Buried Interface Reconstruction via Co-SAM Strategy toward Efficient and Stable Perovskite-Based Tandem Solar Cells**

GyuHwang Lee[1] , Yongseok Yoo[1] , Ahreum Lee[1] , Kihwan Kim[1] , Jongchul Lim[2] , Inyoung Jeong[1] *
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1-2-DP-30 **Surface Passivation Treatment for Wide-Bandgap Perovskite Solar Cells Enabling High-Performance Perovskite/CIGS Tandem Solar Cells**

Huyen Tran[1] , Inyoung Jeong[1] * , Dong Gyu Lee[2] , Inchan Hwang[1] , Jun Hyeok Choi[2] , Ahreum Lee[1] , Junseop Byeon[1] , Jihye Gwak[1] , Sungjun Hong[1] , SeJin Ahn[1] , Tae Kyung Lee[2]
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1-2-DP-31 **Synergistic Optimization of Bandgap and Device Architecture for High-Efficiency Bifacial 4-Terminal Perovskite/CIGS Tandems**

Amanat Ali[1] , Dae-Hwan Kim[1] *
[1]Department of Interdisciplinary Engineering, Daegu Gyeongbuk Institute of Science and Technology, Interdisciplinary Engineering, Republic of korea

1-2-DP-32 **Understanding the role of interlayers in the degradation of perovskite absorbers in CdS-free Cu(In,Ga)Se2 (CIGS)/perovskite monolithic tandem solar cells.**

Sunil Suresh[1] * , Jessica De Wild[1] , Raju Pusapati[1] , Joost Caeyers[1] , Tom Aernouts[1] , Bart Vermang[1]
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Area 1-3. Reliability for Tandem PV Cells and Modules

1-3-DP-01 **Development of a Low-Temperature Encapsulation Process for Tandem Photovoltaic Modules**

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1-3-DP-03 **What if There Is a Lack of Established Standards For Perovskite/Silicon Tandem Solar Cells? Insights into Korea's Fast-Track Certification System to Bridge the Standardization Gap**

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1-3-DP-04 **Outdoor performance and stability of PVK/CIGSe tandem solar cells with different carrier recombination layers over 900 hours of exposure**

Dung Nakamoto[1] * , Chihiro Mizushima[2] , Ryousuke Ishikawa[2] , Yukiko Kamikawa[3] , Shogo Ishizuka[3] , Takayuki Negami[1] , Takashi Minemoto[4]
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[4]Department of Electrical and Electronic Engineering, Ritsumeikan University, Japan

1-3-DP-05 **Cell-to-Cell Variation in Degradation Rate Limits the Long-Term Performance of Perovskite/c-Si 2T Tandem PV Modules**

Hyung Jun Song[1] * , MinKyu Park[1] , Seohyun Park[1] , Taesang Bae[1] , Chanwoo Kim[1] , Subin Lee[1]
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1-3-DP-06 **Atmosphere-Dependent Nanomechanical Signatures of Degradation in Perovskite/Silicon Tandem Solar Cells**

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[3]Department of Advanced Technology Institute, School of Computer Science and Electronic Engineering, University of Surrey, UK

1-3-DP-07 **Outdoor Reliability of Perovskite/Silicon Tandem Solar Cells: Environmental Degradation and the Role of Encapsulation**

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[3]Department of Computer Science and Electronic Engineering, University of Surrey, UK

1-3-DP-08 **Molecular Dynamics Simulation on the Passivation Effects of Quasi-2D Perovskites against Moisture-Induced Degradation**

Wongyu Choi[1] , Jaeseong Jeong[1] *
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1-3-DP-09 **Temperature-Dependent Performance and Yield Modelling of Perovskite-CIGSe Tandems**

Bert Stegemann[1] * , Nicolas Otto[1] , Yokozuna Schirmer[1] , Jonas Preuschoff[1] , Tadeus Ranisch[1] , Thede Mehlhop[2] , Ayman Maqsood[2] , Guillermo Farias-Basulto[2] , Rutger Schlatmann[2] , Klaus Jäger[3] , Christof Schultz[1]
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[3]Department of Optics for Solar Energy, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany

1-3-DP-10 **Design and Reliability Assessment of a Low-Temperature Sn-Bi-Based Solder for Tandem PV Interconnections**

Heung-Ju Cha[1] * , Jae Jeong Lee[1]
[1]Department of Non ferrous Metal Research Center, Institute for Advanced Engineering, Republic of korea

1-3-DP-11 **Evaluation of Rheological and Adhesion Characteristics of TPO Encapsulants for Low-Temperature Lamination**

Taehyung Kim[1] , Yongki Min[1] * , Chung-Hyun Kim[1]
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1-3-DP-12 **Effect of Encapsulant Properties on Low-Temperature Lamination and Reliability of Perovskite/Silicon Tandem PV Modules**

Dohyun An[1] , Cheolwook Kwon[1] , Kyung-soo Kim[1] , Soohyun Bae[1] , Young-Joo Eo[1] , Hae-Seok Lee[2] *
[1]Department of Photovoltaic Research Department, Korea Institute of Energy Research, Republic of korea
[2]Department of Energy and Environment, Korea University, Republic of korea

1-3-DP-13 **Low-Temperature Encapsulation of Silicon/Perovskite Tandem Cell Using UV-Curable Epoxy Resin for Enhanced Reliability**

Jiyeon Moon[1] , Hyunsoo Lim[1] , Sung Hyun Kim[1] *
[1]Department of New Renewable Energy Research Center, Korea Electronics Technology Institute, Republic of korea

1-3-DP-14 **Degradation Kinetics of Second-Order Antioxidants in Polyolefin Elastomer (POE) Encapsulants**

Marius Luedemann[1] * , Ralph Gottschalg[1] , Robert Heidrich[1]
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1-3-DP-15 **KIER's Approach to Photovoltaic Performance Measurement of Perovskite/c-Si Tandem Solar Cells and Modules**

Seungkyu Ahn[1] * , Young-joo Eo[1] , Hee-eun Song[1] , Sung Ho Shin[1] , Gi-hwan Kang[1] , Se Jin Ahn[1] , Jihye Gwak[1] , Sang Min Lee[1] , Soo Min Song[1] , Ahreum Lee[1] , Junseop Byeon[1] , Soohyun Bae[1] , In Chan Hwang[1] , In Young Jeong[1] , Donghyup Shin[1] , Kyung-soo Kim[1] , Ara Cho[1] , Kihwan Kim[1] , Sung-jun Hong[1]
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1-3-DP-16 **Performance Comparison and Seasonal Analysis of Perovskite/Silicon Tandem and N-TOPCon PV Modules under Outdoor Demonstration**

Jung Ho Jung[1] , Seung Ah Ur[1] , Doo Hee Lee[1] , Chan Gon Park[1] , Je Hyun Baeg[1] *
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1-3-DP-17 **Analysis of Requirements in Hot-Spot Endurance Test Based on IEC 61215-2 for Perovskite/Silicon Tandem Modules**

Seungmo Kang[1] * , Taehee Jung[1]
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1-3-DP-18 **Analysis of Output Degradation Under Applied Current Conditions During Thermal Cycling Tests of Perovskite/Silicon Tandem Modules**

Taehee Jung[1] , Seungmo Kang[1] *
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1-3-DP-19 **Atmospherically Formulated Perovskite films Utilizing Dual-Anti-solvent Methodology in Inverted perovskite solar cells**
Eun Chong Chae[1] , Do-Ha Kim[2] , Jin Young Kim[3] , Soonil Hong[2] , Nam Joong Jeon[2] *
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1-3-DP-20 **Quantifying Ion-Induced Degradation in Perovskite–Silicon Tandem Solar Cells via Bias-Assisted Charge Extraction**
Hangyeol Choi[1] *
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1-3-DP-21 **Inverter Clipping in Perovskite/Crystalline Silicon Tandem Module and the Development of Dedicated Inverters to Mitigate Cell Degradation**
Changmin In[1] *
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1-3-DP-22 **Synthesis and characterisation of EVA nano composite to reduce WVTR for Perovskite solarcell encapsulation**
Maruthi Avula[1] * , Gulnaaz[1] , Anjana P C[1] , Shivam Vishwanath[1] , Sudhanshu Mallick[1]
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Area 6-1. PV-driven Energy Conversion and Hybrid Concepts

6-1-DP-01 **Enhancing PV-Assisted Solar Hydrogen Generation via Methanol Oxidation through Cr-Modified FeOOH/FeCo-LDH Interface Engineering**
Mayur Gaikwad[1] , Jin Hyeok Kim[1] *
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6-1-DP-02 **Electrochemically Oscillation-Driven Self-Reconstruction Inducing CoNi-MnO2 Heterogeneous Separation for Enhanced Hydrogen Evolution and Efficient Overall Water Splitting**
Zhenhua Fang[1] , JinHyeok Kim[1] *
[1]Department of Materials Science and Engineering, Chonnam National University, Republic of Korea

6-1-DP-03 **Carrier-Selective Layer Design for Rear-Heterojunction InGaAsP Laser Power Converters under 1064 nm Illumination**
Sho Aonuki[1] * , Takaya Oshimo[2] , Kotona Tabata[2] , Takeru Yamada[2] , Hibiki Kai[2] , Hiyou Miyagaki[2] , Natsuha Ochiai[1] , Yukiko Suzuki[1] , Yuka Oshima[1] , Masakazu Arai[2] , Masato Suzuki[1] , Madoka Takahashi[1]
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6-1-DP-04 **Delaminated Mo_2CT_x MXene-Coupled NiCo-LDH Nanosheets as Efficient Anodes for Anion Exchange Membrane Water Electrolysis**
Soojin Kwon[1] , Yujin Cho[1] , Komal Patil[1] , Daim Choe[1] , Jiwon Choi[1] , Jongsung Park[1] *
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6-1-DP-05 **Engineering Crystalline Interfaces in Ti3C2Tx MXene for Highly Active NiCoFe Oxygen Evolution Electrodes in AEM Water Electrolysis**
Yujin Jo[1] , Patil Komal[2] , Jongsung Park[2] * , Daehyun Cho[3]
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[3]Department of Mechatronics Engineering, Gyeongsang National University, Republic of Korea

6-1-DP-06 **Facile Immersion-Derived Fe-doped NiMo@NF Backbone for Stable AEM Electrolysis**
Daim Choe[1] , Jongsung Park[1] *
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6-1-DP-07 **Hybrid Offshore Wind-Solar PV Scenarios for Green Hydrogen Production in Saudi Territorial Waters of the Red Sea**
Shafiqur Rehman[1] * , Mohamed Ghazy[1] , Mohamed Zayed[1] , Kashif Irshad[2] , Mohamed Mohandes[3] , Azher Syed[1] , Luai Alhems[3]
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6-1-DP-08 **Development of Ga-Modified Mo2CTx MXene-Supported Ru-Co Bimetallic Catalysts for Anion Exchange Membrane Water Electrolysis**
jiwon Choi[1] , Jongsung Park[1] *
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6-1-DP-09 **Floatable Photothermal-Photocatalyst Sheet for Highly Selective Solar-Driven Carbon Dioxide to Methane Conversion**
Jia-Mao Chang[1] , Ting-Han Lin[2] , Kai-Chi Hsiao[3] , Yin-Hsuan Chang[1] , Ming-Chung Wu[1] *
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6-1-DP-10 **Optimization of Sputter-Derived BiVO4 Photoanodes toward Efficient Photoelectrochemical Water Splitting**
Youseong Park[1] , Jin Hyeok Kim[1] *
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6-1-DP-11 **ZnO/In2Te3 Heterostructure Photocathodes for Efficient Solar-Driven Hydrogen Evolution Reaction**
Hoki Son[1] , Hyegyeong Hwang[2] , Wonjung Choi[1] , Yeoson Sim[3] , Jinsung Kwak[1] *
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[2]Department of Materials Convergence and System Engineering, Changwon National University, Republic of Korea
[3]Department of Chemical sciences and engineering, Argonne National Laboratory, USA

6-1-DP-12 **Mo-Induced Electronic Modulation in $Ni_3S_2/FeNi_2S_4$ toward Efficient Alkaline AEM Water Electrolysis**
Daim Choe[1] , Komal Patil[1] , Jongsung Park[1] *
[1]Department of Energy Engineering, Gyeongsang National University, Republic of Korea

6-1-DP-13 **Strategic Spatial Segregation in Silicon Photoelectrodes: Decoupling Catalytic and Optical Functions for High-Efficiency Solar Water Splitting**
Soohyeok Park[1] , Dongho Seo[2] , Yejin Han[1] , Seongmin Lee[1] , Jihwan Jeong[1] , Taewan Kim[1] , Gayeong Lee[1] , Sehwan An[1] , Ki min Nam[2] , Han-Don Um[1] *
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6-1-DP-14 **Comparison of HfO2 and TiO2 Protective Layers for Stability Control in CZTSSe-Based Photocathodes**
Seong Ha Hwang[1] , Jin Hyeok Kim[1] *
[1]Department of Materials Science and Engineering, Chonnam National University, Republic of Korea

6-1-DP-15 **Highly Porous Potassium-Inserted NiFe2O4 with Enhanced Charge Transfer for Efficient and Long Term Stable Oxygen Evolution Reaction**
Dhanaji Malavekar[1] , Jin HyeoK Kim[1] *
[1]Department of Material Science and Engineering, Chonnam National University, Republic of Korea

6-1-DP-16 **Visible-Light-Driven Overall Water Splitting Using Transition-Metal-Doped Calcium Titanate**
Kota Kato[1] , Shigeru Ikeda[2] *
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[2]Department of Institute for Energy Conversion Materials, Konan University, Japan

6-1-DP-17 **Electronic Coupling–Driven Synergistic Catalysis in CoWO4/Fe-doped Ni2P/NF Heterostructures for Enhanced Bifunctional Alkaline Water Splitting**
Ruturaj Jadhav[1] , Kim Jin Hyeok[1] *
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6-1-DP-18 **Structural Evaluation of GaAsN Films Using FME-CBE**
Masahiro Kawano[1] * , Kota Muroga[1] , Rikuto Honda[1] , Yoshio Ohshita[1]
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6-1-DP-19 **Current State-of-the-Art of Stimulated Emission in Luminescent Solar Concentrator Photovoltaic Devices**
Sebastian Robben[1] * , Kabilan Arumugam[1] , Michael Debije[2] , Angèle Reinders[1]
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6-1-DP-20 **Integrated Photovoltaic–Electrochemical Water Splitting Using Earth-Abundant Electrocatalysts for High-Efficiency and Cost-Effective Hydrogen Production**
Mohaseen Tamboli[1] , Zuhaib Hassan[1] , Chinho Park[1] *
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6-1-DP-21 **Interface Engineered Co3O4@NiMo-LDH towards Overall Water Splitting in Alkaline Medium**
Abhishek Jamdar[1] , Archana Kalekar[2] , Jin Hyeok Kim[1] *
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[2]Department of Physics, Institute of Chemical Technology, India

6-1-DP-22 **Tailoring the WO3/BiFeO3 Heterojunction Interface via Cycle-Controlled SILAR Deposition for Enhanced Photoelectrochemical Water Splitting**
Yeji Jang[1] , Alaa Magdy Saad[1] , Gyeongmin Lee[1] , Woo Kyoung Kim[1] *
[1]Department of Chemical Engineering, Yeungnam University, Republic of Korea

6-1-DP-23 **Constructing Metal-Doped UiO-66 MOF/TiO2 Nanorod Hybrid Photoanodes for Enhanced Photoelectrochemical Water Splitting**
Gyeongmin Lee[1] , Alaa Magdy Saad[1] , Yeji Jang[1] , Woo Kyoung Kim[1] *
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6-1-DP-24 **A Multi-Output Photovoltaic-Thermal Platform Combining HDH and Thermoelectric Desalination with PEM-Based Hydrogen Generation**
Ehab Abdelaal[1] * , Ahmed Alsaman[1] , Ridha Ben Mansour[1] , Rached Ben-Mansour[1]
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6-1-DP-25 **A PV-Driven Hybrid Desiccant–Vapor Compression System for Energy- and Water-Recovering Air Conditioning in Coastal Regions**
Mohamed Ahmed[1] *
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6-1-DP-26 **Role of CdS/TiO_2 Interfacial Layers in Enhancing PEC Hydrogen Evolution from CZTSSe-Based Photocathodes**
Soohwa Kim[1] , Jin Hyeok Kim[1] *
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6-1-DP-27 **Two Particle Luminescent Solar Concentrators**
Franka Gädeke[1] * , Felix Lindner[1]
[1]Department of Institute of Physical and Theoretical Chemistry, Technische Universität Braunschweig, Germany

6-1-DP-28 **Numerical Study and Sustainable Evaluation of a PVT-Powered Desalination System Hybrid with PEM Electrolysis for Green Hydrogen and Freshwater Co-Production**
Ahmed Alsaman[1] * , Ehab Ali[1] , Rached Ben-Mansour[1] , Ridha Ben Mansour[1]
[1]Department of Interdisciplinary Research Center for Sustainable Energy Systems, Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals, Saudi arabia

6-1-DP-29 **A Dual-Purpose Solar PVT System Combining Adsorption Cooling and Desalination with PEM-Based Hydrogen Production**
Ehab Abdelaal[1] * , Ahmed Alsaman[1] , Ridha Ben Mansour[1] , Rached Ben-Mansour[1]
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6-1-DP-30 **Machine Learning-Guided Design of Li-Enriched NiFe/MnO_2 Electrocatalysts for Selective Nitrate-to-Ammonia Conversion**
Junho Shim[1] , Seonghyeon Park[1] , Uk Sim[1] *
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6-1-DP-31 **Binder-Free Microcubic Nickel Cobalt Oxide Electrocatalyst for Solar-Assisted Nitrate Reduction to Ammonia**
Seonghyeon Park[1] , Hyojung Lim[1] , Jinuk Choi[2] , Junho Shim[1] , Gyoung Hwa Jeong[2] , Uk Sim[1] *
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6-1-DP-32 **Single-Atom Cu Sites Promoting Fast Iodine Conversion for High-Performance Zinc–Iodine Batteries**
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6-1-DP-33 **Unlocking the Catalytic Potential of Ni Foam: Electrochemically Reconstructed High-Performance Electrode for Sustainable Water Splitting: Toward Solar-Assisted Green Hydrogen Production**
Seonghyeon Park[1] , Dongin Choi[2] , Subramani Surendran[2] , Uk Sim[1] *
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6-1-DP-34 **Electrochemical Ammonia Production via Nitrogen Reduction Using a Wadsley–Roth Structured Catalyst**

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6-1-DP-35 **Donor Engineering of BTD-DTP photocatalysts for Visible-Light-Driven Lignin Oxidation**

Chanki Jeon[1] , Hyeongcheol Kang[1] , Junyeong Ryu[1] , Jae-joon Lee[1] *
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6-1-DP-36 **Modeling and Quantifying Dynamic Wind-Turbine Shading Losses in Hybrid Wind– Solar Systems: Onshore PV and Offshore Floating PV**

Sri Sathya Sai Shanka Vasuki[1] * , Tijn Weij[1] , Vasiliki Psaraki[1] , Teddy Simanjuntak[2] , Olindo Isabella[1] , Rudi Santbergen[1]
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[2]Department of Shell Global Solutions International B.V., Shell Global Solutions International B.V., Netherlands

6-1-DP-37 **Intermeshed Back Contact (IMBC) Boron-Free a-$Si_{(1-x)}C_{(x)}$:H 3J Tandem Solar Cells for Direct Solar-to-Hydrogen Generation**

Miquel Anglada[1] * , Gustavo Alvarez-Suarez[1] , Pau Estarlich[1] , José Miguel Asensi[3] , Cristobal Voz[1] , Oriol Segura[1] , Edoardo Maggi[1] , Gerard Masmitjà[1] , Luis Soler[2] , Jordi Llorca[2] , Joaquim Puigdollers[1]
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6-1-DP-38 **Illumination-Dependent Charge Carrier Dynamics and Photoelectrochemical Performance of LaFeO3**

Donghwan Hwang[1] , GyeongCheon Choi[1] , Gayoung Ham[2] , Changyu Yoon[1] , Minkyu Son[3] , Hyojung Cha[2] , Jiyoun Seo[1] *
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6-1-DP-39 **Measurement Protocol for High-Accuracy Characterization of Thermoradiative Diode Power Generation using Lock-in Detection**

Shuhei Yagi[1] * , Naoya Sagawa[1] , Ayaka Miyazaki[1] , Muhammad Waleed Akram[1] , Hiroyuki Yaguchi[1]
[1]Department of Science and Engineering, Saitama University, Japan

6-1-DP-40 **ZIF-67-Derived Co3O4 Hollow Nanocages Decorated with NiFe2O4 Nanosheet Arrays for Advanced Membrane Electrode Assemblies in Anion Exchange Membrane Water Electrolyzers**

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[1]Department of Research and Development, GHS Co Ltd, Republic of Korea
[2]Department of Advanced Materials Science and Engineering, Kumoh National Institute of Technology, Republic of Korea

6-1-DP-41 **Transition-Metal/Metalloid Intermetallic Electrocatalysts for Anodic Reactions in Photovoltaic-Coupled Water Electrolysis**

Hassan Zuhaib[1] , Mohaseen S. Tamboli[1] , Chinho Park[1] *
[1]Department of Hydrogen Energy, Korea Institute of Energy Technology, Republic of Korea

6-1-DP-42 **Ethanol-Assisted Growth of α-MnO2 Nanorods for High-Performance Aqueous Zinc-Ion Batteries**

Shital Bachankar[1] , Taeksoo Ji[1] *
[1]Department of Intelligent Electronic Computer Engineering, Chonnam National University, Republic of Korea

6-1-DP-43 **Direct Synthesis of Eco-Friendly TiO_2–$AgBiS_2$ Heterojunction Photoanodes via Aqueous Electrophoretic Deposition for Solar Conversion Hydrogen Production**

Jin Young Park[1] , Jongmin Choi[1] *
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6-1-DP-44 **One-Step Mixed Hole-Selective Layer Improves Surface Coverage in Perovskite-Organic Tandem Solar Cells for Bias-Free Solar Ammonia Production**

Dong Hyun Shin[1] , Tack Ho Lee[1] *
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6-1-DP-45 **Electrochemical Construction of Core–Shell CuFe Prussian Blue Analog structures for Redox-Active Carbon Nanofiber Electrodes**

Minsun Kim[1] *
[1]Department of Division of Energy & Environmental Technology, Daegu Gyeongbuk Institute of Science & Technology, Republic of Korea

6-1-DP-46 **Successive performance records enabled by hydrogen treatment in Cu2ZnSnS4: from photovoltaics to solar water splitting**

Ao Wang[1] * , Kaiwen Sun[1] , Xiaojing Hao[1]
[1]Department of SPREE/ENG, University of New South Wales, Australia

6-1-DP-47 **Extending the Operating Range of Air-Cooled Concentrating Photovoltaic/Thermal Receivers with an Additive-Manufacturing-Enabled Gyroid Heat Exchanger**

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Area 6-2. PV for Space and Extreme Environments

6-2-DP-01 **Comparative Investigation of Proton Radiation Resilience in $PDAI_2$- and F-PEAI-Passivated Ultra-Wide-Bandgap Perovskites for Space Applications**

Sangwon Kang[1] , Jae Sung Yun[4] , Jong Sung Park[6] * , Daseul Lee[3] , Suhwan Kim[2] , Kitaek Oh[4] , Minwoo Lee[5] , Tommy H. Richards[4]
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[6]Department of Energy System Engineering, Future Convergence Technology Research Institute, Gyeongsang National University, Republic of Korea

6-2-DP-02 **Impact of Low-Energy Proton-Induced Displacement Damage on Wide-Bandgap Perovskite Solar Cells for Space Applications**

Suseong Jang[1] , Da Seul Lee[2] , Suhwan Kim[3] , Jongsung Park[1] *
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6-2-DP-03 **Artificial Intelligence for Performance-Degradation Prediction and Test-Efficiency Enhancement of Perovskite Solar Cells for Space Applications**

Donghan Kang[1] , Jongsung Park[1] * , Suwhan Kim[2] , Daseul Lee[3] , Wonki Bae[4]
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6-2-DP-04 **Interface Engineering of Perovskite Solar Cells for Space-Relevant Radiation and Thermal-Shock Stability**

Ekyu Han[1] , Jung-Ho Yun[1] *
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6-2-DP-05 **Step-Graded InAlGaAs Metamorphic Buffers for Low-Bandgap InGaAs Solar Cells on GaAs**

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6-2-DP-06 **Laser Drilled via Metal Wrap Through Multijunction Solar Cell Fabrication Process for High Concentration Applications**

Quoc Huy Nguyen[1] * , Yansong Wang[1] , N.J. Ekins-Daukes[1] , Stephen Bremner[1]
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6-2-DP-07 **Prototype Fabrication and Evaluation of a Concentrating Cone Toward the Development of Low-Concentration Photovoltaic Modules for Space Applications**

Shuntaro Hashimoto[1] * , Tatsuya Takamoto[1] , Kenji Araki[1] , Kensuke Nishioka[1]
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6-2-DP-08 **Evaluation of Thermal Degradation Characteristics of CIGS Solar Cells for Space Applications**

Kosei Kakihara[1] * , Noriaki Setoguchi[2] , masayoshi Takani[2] , Yoshiyuki Chiba[2] , Tatsuya Takamoto[1] , Kensuke Nishioka[1]
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6-2-DP-09 **Effects of B2O3 interfacial layer on the in-plane uniformity SiGe layers formed by screen-printing of Al–Ge alloys onto Si substrates and subsequent annealing**

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[2]Department of Advanced Technology Headquarters, Toyo Aluminium K.K., Japan

6-2-DP-10 **TCAD-Guided Design Optimization of Silicon Solar Cells for Low-Earth-Orbit Applications**

Ian Shen[1] , Hui-Chung Lee[1] , Yu-Cheng Chen[1] , Po-Yang Chang[1] , Chun-Ping Lin[2] , Ying-Yuan Huang[1] *
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6-2-DP-11 **Low-Temperature Atomic Layer Growth (ALG) of High-Performance III-V Solar cells on Heterogeneous Substrates**

kwangsu Yoo[1] , Seungyong Han[1] , Jae Hee Cho[1] , Wontae Cho[1] *
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6-2-DP-12 **Optimization of Series Connection Ratio in Voltage-Matched InGaP/GaAs/CIGS Solar Cells Considering Radiation-Induced Degradation**

Taketo Aihara[1] * , Tetsuya Nakamura[1] , Yuta Matsumoto[2] , Hiroshi Yamagachi[2] , Hiroshi Tomita[3] , Shin-ichiro sato[4] , Takeshi Ohshima[4]
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[3]Department of Advanced Technology Research Laboratories, Idemitsu Kosan Co., Ltd., Japan
[4]Department of Takasaki Advanced Quantum Science Institute, National Institutes for Quantum Science and Technology, Japan

6-2-DP-13 **Design and Optimization of High-Efficiency Four-Junction Solar Cells for Space Applications**

Dongjun Kang[1] , Yoonyeong Ko[1] , Han-Youl Ryu[1] *
[1]Department of Physics, Inha University, Republic of Korea

6-2-DP-14 **Optimal Design of Double-Layer Anti-Reflection Coating on Ito Contact for Solar Cells in Space Application**

Yoonyeong Ko[1] , Dongjun Kang[1] , Han-Youl Ryu[1] *
[1]Department of Physics, Inha University, Republic of Korea

6-2-DP-15 **An Integrated Performance Prediction Model Incorporating Radiation-Induced Degradation and Recovery for Space Solar Cells**

Shirou Kawakita[1] *
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6-2-DP-17 **Interfacial Stabilization Enhances Proton-Radiation Tolerance of 1.77 eV Wide-Bandgap Perovskite Solar Cells for Space Photovoltaics**

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6-2-DP-18 **A-site Cation Composition Enables Recoverable Perovskite Solar Cells for Space Photovoltaics**

Minwoo Lee[1] , Youngmin Kim[2] , Dong Gyu Lee[3] , Dong Gyu Lee[4] , Chanhyeok Kim[2] , Kihoon Kim[2] , Jinsoo Park[2] , Sangheon Lee[5] , Dong Hoe Kim[5] , Bong Joo Kang[6] , Jun Hyeok Choi[3] , Jincheol Kim[7] , Jan Seidel[8] , Martin A. Green[1] , Tae Kyung Lee[3] , Xiaojing Hao[1] , Hanul Min[2] , Hanul Min[9] , Jae Sung Yun[1] *
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6-2-DP-19 **Unraveling the Mechanism of Proton-induced Degradation in PbS Colloidal Quantum Dot Solar Cells for Space Applications**

Chanwoo Lim[1] , Tai Nguyen[2] , Do Young Kim[2] , Hyeonggeun Yu[1] *
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6-2-DP-20 **Proton-Induced Interfacial Degradation of CdSe/ZnS Quantum Dot Light-Emitting Diodes for Space Applications**
Chanwoo Lim[1] , Tai Nguyen[2] , Chanmin Kim[1] , Bibhudutta Rout[3] , Doyoung Kim[2]
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Area 6-3. AI and Data-driven PV Innovation

6-3-DP-01 **Advancing the Integration between Photovoltaics Research and Advanced Artificial Intelligence Methodology**
Wei Wang[1] , Xuesi Liu[1] , Hualin Zhan[1] , Marco Ernst[1] *
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6-3-DP-02 **Multi-channel Deep Learning Framework for PV Power Forecasting without External Data Dependency**
Doyun Lee[1] , Hae-Seok Lee[2] *
[1]Department of Energy and Environment, Korea University, Republic of Korea
[2]Department of Integrative Energy Engineering, Korea University, Republic of Korea

6-3-DP-03 **Predicting Ambient-Processed Perovskite Solar Cell Performance Using Dew Point and Machine Learning**
Beomgyu Oh[1] , Yoonmook Kang[2] *
[1]Department of Energy and Environment, Korea University, Republic of Korea
[2]Department of Integrative Energy Engineering, Korea University, Republic of Korea

6-3-DP-04 **AI-Assisted Stability Diagnosis of Perovskite Solar Cells and Modules Using J-V Tail Features**
Hochan Hyun[1] , Suk Hoon Choi[3] , Hanseul Lee[1] , Yejin Kim[1] , Pravin Pawar[1] , Jaewon Seo[1] , Bo Gyeong Park[1] , Kyeongsu Kim[3] , Dong Hoe Kim[2] , Gee Yeong Kim[1] *
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6-3-DP-05 **Development of a budget PV cell I-V curve tracer using Arduino**
Prasan Pankaew[1] , Montri Aiempanakit[1] , Orawan Aumporn[1] *
[1]Department of Physics, Faculty of Science, Silpakorn University, Thailand

6-3-DP-06 **Anomaly Detection of Photovoltaic Systems Using Two Key Performance Indicators**
Sukwhan Ko[1] * , Youngchul Ju[1] , Woogyun Shin[1] , Hyemi Hwang[1] , Byungki Jeon[1] , Jinseok Lee[1]
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6-3-DP-07 **A Statistical Framework for Correcting Selection Bias in Perovskite Stress-Interaction Analysis**
Yujin Seo[1] , Yeonwoo Park[1] , Jae Ho Yun[1] *
[1]Department of Energy Engineering, Korea Institute of Energy Technology, Republic of Korea

6-3-DP-08 **A Specificity Test for Selection-Bias-Corrected Synergy Screening in Perovskite Solar Cells**
Yujin Seo[1] , Yeonwoo Park[1] , Jae Ho Yun[1] *
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6-3-DP-09 **Web Application for Automated, Format-Independent Parsing and Analysis of J-V and EQE Data in Solar Cells**
Dong-Gun Lee[1] , Dong-Won Kang[2] *
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6-3-DP-10 **Data-Driven Discovery of Green Solvents for Sustainable, High-Performance Perovskite Solar Cells**
Jae Won Kim[1] , Bong Joo Kang[1] , Nam Joong Jeon[1] *
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6-3-DP-11 **Consumer-Centric LCOE Optimization for Industrial Rooftop PV: Leveraging Generation Forecasting and Load Shifting toward VPP Integration**
Hyejeong Yang[1] , YoungAh Park[1] , Minkook Kim[1] , Yonghyun Kim[1] *
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6-3-DP-12 **Residual Correction-Based Transfer Learning for Photovoltaic Power Forecasting in Data-Scarce East–West PV Systems**
Young Ah Park[1] , Yong Hyun Kim[1] * , MinKook Kim[1]
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6-3-DP-13 **Enhancing CNN-Based EL Image Defect Diagnosis through Dataset Construction and Augmentation**
Min-jae Oh[1] , Yong Hyun Kim[1] *
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6-3-DP-14 **Comparison of AI-Based and Numerical Weather Model Solar Irradiance Forecasts at Observation Sites in Japan**
Takahiro Takamatsu[1] * , Hideaki Ohtake[1] , Takashi Oozeki[1]
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6-3-DP-15 **Explainable Machine Learning and Deep Learning Framework for Power Prediction of Solar Photovoltaic Power Plants in Multiple Cities at Various Weather Conditions**
Ravi Kumar Kottala[1] , Mansour Alhazmi[2] * , Vinoth Kumar Selvaraj[1] , Mohammed Alhaji Mohammed[1], Mohammed A. Al-Osta[1]
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Area 7-1. Policy, Economics and Finance for the PV Transition

7-1-DP-01 **Propposal of a methodology for obtaining the agrivoltaic potential, Integrating Agricultural Biomass and Solar Energy Explorer in Chile**
Patricio Lefort[1] * , Diego Moraga[1]
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7-1-DP-02 **Potential of business models without incentives in Japanese PV market: Self consumption and Corporate PPAs**
Naofumi Ezawa[1] * , Yoshiyuki Ohashi[1] , Koichi Sugibuchi[1] , Haruki Yamaya[1] , Satsuki Kanai[1] , Osami Ikki[1]
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7-1-DP-03 **Future Prospects for Photovoltaic Deployment in Japan toward 2040: The Role of Agrivoltaics**
Koichi Sugibuchi[1] * , Naofumi Ezawa[2] , Yoshiyuki Ohashi[2] , Haruki Yamaya[2] , Satsuki Kanai[2] , Izumi Kaizuka[3] , Osamu Ikki[3]
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[3]Department of Company Executive, RTS Corporation, Japan

7-1-DP-04 **From Technical Potential to Realized Adoption: Combining Market Viability and Peer Effects to Prioritize Solar PV Sites in South Korea**
Changyeol Yun[1] , ChangKi Kim[1] , JinYoung Kim[1] , Jihye Gwak[1] , YongIl Kim[1] *
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7-1-DP-07 **Current Status and Future Forecast of PV in China**
Sicheng Wang[1] *
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7-1-DP-08 **Evolution of the Public R&D Portfolio for Solar Cell Technologies under National Energy Policies in South Korea**
Minhee Park[1] *
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7-1-DP-09 **Photovoltaic Standards in ASEAN: Lessons Learned from Thailand for Regional Harmonization**
Tanokkorn Chenvidhya[1] , Yaowanee Sangpongsanont[1] , Manit Seapan[1] , Dhirayut Chenvidhya[1] , Krissanapong Kirtikara[1] , Patamaporn Sripadungtham[2] *
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Area 7-2. Industry Strategies and Geo-economics of Solar Manufacturing

7-2-DP-01 **Upstream PV manufacturing: a Techno-Economic Analysis of Polysilicon Production in Australia**
Nathan Chang[1] * , Michelle Vaqueiro Contreras[1] , Simao Lin[1] , Oliver Hartley[2]
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7-2-DP-02 **Exploring Technological Maturity in All Generations of Photovoltaic Cells through International Patent Trajectories**
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7-2-DP-03 **Integrated PV Manufacturing: A Life Cycle Costs Analysis For Different Production Strategies**
Elina Bosch[1] * , Philippe Macé[1] , Gaëtan Masson[1] , Ian Kenchington[1] , Melodie Buot de l'Epine[2]
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7-2-DP-04 **Resource-use Criticality in the Photovoltaic Value Chain**
Malte Vogt[1] * , Mohammad Abdelbaky[1] , Olindo Isabella[1]
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7-2-DP-05 **Are Solar Projects Financed on Accurate Energy Yield Assumptions?**
Harald Hammer[1] *
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7-2-DP-06 **Development of PV Reference Cell traceability Calibration System for PV Quality Assurance in Thailand**
Yaowanee Sangpongsanont[1] * , Chamnan Limsakul[1] , Manit Seapan[1] , Thada Keawprasert[2] , Anuchit Tiabun[2] , Chayut Charoenkij[2] , Pollawat Jamparuang[2]
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Area 7-3. Flexible and Resilient Energy Systems with PV Integration

7-3-DP-01 **Hybrid Ensemble Artificial Intelligence Models for Simultaneous Optimization of Solar Photovoltaic Power to Green Hydrogen Production**
Mohamed Zayed[1] * , Shafiqur Rehman[1] , Mohamed Ghazy[1] , Asim Ahmad[1] , Kashif Irshad[1]
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7-3-DP-02 **Photovoltaic-Powered Refrigerated Logistics for Resilient and Sustainable Food Supply Chains in Australia**
Tharika Kahandawa Arachchi[1] * , Christophe Camille[1] , Etienne Elegido[1] , Olivia Mirza[1] , Ali Hellany[1] , Keivan Bamdad Masouleh[1] , Anton Van Der Berg[2]
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7-3-DP-03 **ShapeFormer-Based Estimation of Solar Radiation Forecast Error Ranges for Low-Frequency Risk Events Using GPV-GSM Data**
Ren Yanagida[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
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7-3-DP-04 **Intraday Short-Term PV Power Forecasting Using a Hybrid Physical-Statistical and Cascade Machine Learning Approach**
Yuta Uchino[1] * , Jindan Cui[1] , Kenji Utsunomiya[2] , Jun Sasaki[2] , Maki Okada[2] , Koji Yamaguchi[2] , Yuzuru Ueda[1]
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[2]Department of Renewable Energy Section, Japan Weather Association, Japan

7-3-DP-05 **Hybrid Battery–Hydrogen Storage for Curtailment Reduction and Grid Flexibility Enhancement in a 1.5 GW PV Power Plant Under Saudi Desert Conditions: A Real-Data Case Study**
Mohamed Ghazy[1] * , Shafiqur Rehman[1] , Mohamed E. Zayed[1] , Kashif Irshad[1]
[1]Department of Interdisciplinary Research Centre for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals, Saudi arabia

7-3-DP-06 **Estimation of Electricity Generation from Solar Mini-Grid and PV-Diesel Hybrid Systems for Rural Areas**
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7-3-DP-07 **Area-Wide Photovoltaic Power Generation Forecasting Using Model-Input Averaging and a Machine Learning Ensemble**
Yudai Yabe[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
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7-3-DP-08 **Day-ahead PV Power Forecasting Using a Multi-stage Ensemble Architecture with Multivariate Meteorological Error Correction**
Koki Yanagisawa[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
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7-3-DP-09 **HERITAGE – Heat Robustness in Ageing Cities: Progress in the Domain of Solar Energy**
Angelina Reinders[1] *
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7-3-DP-10 **Scenario-based evaluation of Storage Battery Capacity and Supply–Demand Operation for Areawide PV and Wind Power Integration Using GPV Data**
Tomoko Sugiura[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
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7-3-DP-11 **Improvement of Long-Term Degradation Analysis Accuracy for PV Systems through Enhanced Loss Quantification in the Updated SV Method**
Shinya Kumasaka[1] * , Jindan Cui[1] , Yuzuru Ueda[1]
[1]Department of Electrical Engineering, Tokyo University of Science, Japan

7-3-DP-12 **Fuzzy-PI Adaptive Switching-Penalty Tuning for FCS-MPC-Based Single-Phase Shunt Active Power Filter in Bidirectional EV Charging: G2V and V2G Power Quality Analysis**
Thanet Phugun[1] , Wiwat Tippachon[1] * , Worrajak Muangjai[1]
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7-3-DP-13 **Fuzzy-PI Adaptive Switching-Penalty Tuning for FCS-MPC-Based Single-Phase Shunt Active Power Filter in PV-Integrated Bidirectional EV Charging Stations: G2V and V2G Power Quality Analysis**
Thanet Phugun[1] , Wiwat Tippachon[1]
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7-3-DP-14 **BESS integrated with PV - An Overview of Business Models, Recent Major Market Developments, and Near-term Technical Outlook**
Darryl Wang[1] *
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7-3-DP-15 **Determination of Optimal BESS Capacity in Distribution Systems with High PV Penetration**
Yuta Shigematsu[1] * , Masahiro Furukakoi[1] , Kazuhiro Kajikawa[1]
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Area 7-4. Sustainability and Circular Pathways

7-4-DP-01 **Eco-Friendly Recycling of End-of-Life Photovoltaic Silicon into NiMn-MOF@Si/C for High-Performance Lithium-ion Battery Anodes**
Janaranjani P[1] * , Srinivasan M[1]
[1]Department of Physics, Sri Sivasubramaniya Nadar College of Engineering-Chennai, India

7-4-DP-02 **Sustainable Recovery of High-Purity Silicon and Materials from Waste Photovoltaic Modules via Thermal-Chemical Treatment**
Mariyappan Raman[1] , Srinivasan Manickam[1] *
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7-4-DP-03 **A Comparison of the Environmental and Economic Impacts of Advanced Recycling, Standard Recycling, and No Recycling for End-of-Life Photovoltaic Modules**
Yuma Nakamura[1] * , Ryuto Shigenobu[2] , Akiko Takahashi[3] , Masakazu Ito[2] , Takashi Oozeki[4] , Yuki Tsuno[5]
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7-4-DP-04 **Exploitation Pathways for Circular Manufacturing within Integrated Photovoltaics**
Chang Chuan You[1] * , Sigrid Rønneberg[1]
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7-4-DP-05 **Examining the effect of pulsed nanosecond infrared laser on silicon and EVA encapsulant during photovoltaic module recycling**
Olivia Bowen[1] * , Matthew Murphy[2] , Zibo Zhou[1] , Michael Nielsen[1] , Rong Deng[1]
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7-4-DP-06 **Thermal and Etching Approaches for Impurity Reduction in Recycled Silicon**
Per Anders Hansen[1] * , Rune Søndenå[1] , Jean-Patrick Pinheiro[2] , Stefanie Wahl[3]
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7-4-DP-07 **Smart Sustainability as an Integrated Framework for Low-Carbon, Circular Crystalline-Silicon Photovoltaics**
Moonyong Kim[1] * , Catherine Chan[1] , Li Wang[1] , Hasret Sahin[2] , Bruno Vicari Stefani[1] , Nathan Chang[1] , Ran Chen[1] , Christian Breyer[2] , Brett Hallam[1]
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7-4-DP-08 **Induction Heating Repair of Solder Joints for Performance Recovery in Photovoltaic Mini-Modules**
Yu Kawano[1] * , Ryo Hashimoto[2] , Chikao Okamoto[2] , Takashi Minemoto[2]
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7-4-DP-09 **Evaluation of the Photocatalytic Performance of Silicon Nanoparticles Prepared by Mechanical Milling Processes**

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7-4-DP-10 **Process-Engineered Nano-Silicon from End-of-Life Photovoltaic Waste through Controlled Metal Impurity Removal**

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7-4-DP-11 **Delamination of Photovoltaic Modules for Recycling Using Pulsed Lasers**

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7-4-DP-12 **Solar PV Waste Management in Thailand: Challenges and Policy Directions**

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7-4-DP-13 **Identifying diode defects in second life PV-Modules**

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7-4-DP-14 **Upcycling Recycled Silicon from End-of-Life Photovoltaic Modules into High-Performance Silicon Nitride**

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7-4-DP-15 **A Study on Recycling and Regeneration of Silicon Heterojunction Solar Cells from Easily Disassembled Modules**

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7-4-DP-16 **Regional Carbon Payback Time of Low-Carbon Photovoltaic Modules**

Bruno Vicari Stefani[1] * , Moonyong Kim[1] , Fiacre Rougieux[1] , Yanyan Yao[2] , Xiao Qin[2] , Zi Ouyang[2] , Brett Hallam[1]

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7-4-DP-17 **Characterization of Thermoelectric Properties and Microstructure in Al-doped Mg2Si Alloys Utilizing Waste Silicon Solar Cells**

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7-4-DP-18 **Potential Capacity of Ground-mounted Photovoltaic Power Generation Systems to Abandoned Farmlands and/or Mountain Forests**

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7-4-DP-19 **Low-Temperature Hydrated Molten Alkali Etching for Direct Silver Metallisation Recovery from Crystalline Silicon Photovoltaic Cells**

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7-4-DP-20 **Recycling silicon waste into thermoelectric materials: influence of Fe on magnesium silicides performance**

Vincent Bocquet[1] , Ajisha Anthony[1] , Noritaka Usami[1] , Takashi Itoh[1] *

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7-4-DP-21 **End-of-Life Photovoltaic Module Recycling Process for Rapid and Encapsulant-Residue-Free Cell Recovery**

Da Young Kwon[1] , Yerang Park[1] , Jun Ryu[1] , Jae-ik Han[1] , Ha Neul Baek[1] , Jaehyeon Kim[1] , Yonghwan Lee[1] *

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7-4-DP-22 **Verification of Carbon Reduction and Economic Effects via On-site Processing of End-of-Life PV Panels Using a Mobile Recycling System**

Sang-Hun Lee[1] * , Cheong-Min Noh[1] , Byeol-I Im[1] , Kwang-Min Seo[1] , Yeon-Ju Kim[1] , Woo-Seok Hong[1]

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7-4-DP-23 **Circular Economy Pathways for Perovskite-Silicon Tandem PV**

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7-4-DP-24 **A Preliminary Review of LCI Database Frameworks for Photovoltaic Systems: From Scope 1 to Cradle-to-Grave Accounting**

Jungyoon Seo[1] , Jin-Young Kim[3] , Kyung Taek Jeong[2] , Hyejoo Shim[4] , Ik Kim[4] , Jong-Nam Kim[1] , Jihye Gwak[2]

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7-4-DP-25 **Achievements in Human Resource Development through the Regional Energy Cluster**

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7-4-DP-26 **Valorization of Waste Photovoltaic Glass into Ultra-Lightweight Glass–Ceramic Foams with Enhanced Thermal Insulation Performance**

Jamal Eldin FM Ibrahim[1] * , Mohammed A. Al-Huri[1] , Ismail M. Budaiwi[1] , Mohammed Alhaji Mohammed[1]
[1]Department of Interdisciplinary Research Center for Construction and Building Materials, King Fahd University of Petroleum and Minerals, Saudi Arabia

7-4-DP-27 **Forecasting Retired Grid-Scale LFP Batteries and Recycling Potential for Saudi Arabia's Solar PV Transition**

Sikandar Abdul Qadir[1] * , Amjad Ali[1] , Muhammad Shahid[1]
[1]Department of Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum & Minerals, Saudi Arabia

7-4-DP-28 **Sustainable Transport Transition in Saudi Arabia: A LEAP-Based Scenario Analysis**

Muhammad Shahid[1] *, Amjad Ali[1] , Sikandar Abdul Qadir[1] , Saddam Hussain[1] , Rahma Aman[1]
[1]Department of Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum & Minerals, Saudi Arabia

7-4-DP-29 **Experimental Investigation of End-of-life On-grid and Off-grid photovoltaic modules towards sustainable recycling**

Divya Jain[1] *, Douglas Halliday[1] , Marek Szablewski[1] , Namrata Sengar[2]
[1]Department of Physics, Durham University, UK
[2]Department of Physics & Applied Physics, University of Kota, India

WCPEC-9
2026 DAEJEON

Global Outreach Program

Global Outreach & Special Session

Program Overview

The WCPEC-9 Global Outreach Committee (GOC) presents a diverse series of special sessions to realize the conference's vision as the "Solar Olympics" - a truly global gathering for photovoltaics. By engaging established PV communities and countries historically underrepresented at WCPEC, particularly across Africa, the Middle East, and West Asia, these sessions aim to achieve the broadest national participation in the conference's history. Highlights include Asia–Africa, Korea–China–Japan, Korea–Singapore–Malaysia, Asia–Europe, EU–Korea, Korea-India symposia alongside Women in PV networking and IEA PVPS workshops on markets, policy, and sustainability. Bringing together experts from academia, research institutes, and industry, these events foster knowledge exchange, inclusive professional networks, and international partnerships. Together, they advance PV research, innovation, and deployment worldwide while connecting established and emerging solar communities in a shared pursuit of a sustainable energy future.

DAY	Sunday, 15 Nov.	Monday, 16 Nov.	Tueday 17, Nov,				Wednesday 18, Nov.		Thurday 19, Nov.			
ROOM	Room 6 (204+205)	Room 2 (103)	Room 1 (101+102)	Room 2 (103)	Room 3 (105+106)	Room 7 (301)	Room 1 (101+102)	Room 2 (103)	Room 1 (101+102)	Room 2 (103)	Room 3 (105+106)	Room 6 (204+205)
08:30-09:00				The 2nd Asia-Africa (A^2) Joint PV Symposium								Asia-Europe Emerging Materials for Thin Film Solar Cells
09:00-09:30												
09:30-09:50												
09:50-10:00												
10:00-10:30				The 2nd Asia-Africa (A^2) Joint PV Symposium						"INDUSTRY FORUM I" Solar & Storage - Scaling Solar Through Storage		Asia-Europe Emerging Materials for Thin Film Solar Cells
10:30-11:00												
11:00-11:20												
11:20-11:30												
11:30-12:00												
12:00-12:30												
12:30-13:00								Women In PV				
13:00-13:30	The 10th Korea-China-Japan Joint Workshop on Photovoltaics											
13:30-14:00									Korea-India Joint PV Symposium	"INDUSTRY FORUM II" Power System Flexibility - Transforming Power Systems for a Solar-Dominated Future	Asia-Europe Emerging Materials for Thin Film Solar Cells	
14:00-14:30				The 2nd Asia-Africa (A^2) Joint PV Symposium		Daejeon Speacial Session: Powering Daejeon's Future with Solar Energy						
14:30-14:50	The 10th Korea-China-Japan Joint Workshop on Photovoltaics											
14:50-15:00												
15:00-15:30		IEA PVPS Workshop: Asia in Focus - Market & Policy	Next-Generation BIPV Forum		EU-Korea Cooperation : PV R&I Challenges		From Belgium to Beyond Europe : How Does PV Innovation Move from Lab to Industry?	The 4th Korea-Singapore-Malaysia Joint PV Symposium	Korea-India Joint PV Symposium			
15:30-16:00	The 10th Korea-China-Japan Joint Workshop on Photovoltaics			The 2nd Asia-Africa (A^2) Joint PV Symposium								
16:00-16:20												
16:20-16:30												
16:30-17:00	The 10th Korea-China-Japan Joint Workshop on Photovoltaics	IEA PVPS Workshop: Asia in Focus - Market & Policy						The 4th Korea-Singapore-Malaysia Joint PV Symposium	Korea-India Joint PV Symposium		IEA PVPS Workshop: Task 12 - PV Sustainability	
17:00-17:30												
17:30-17:50												

The 10th Korea-China-Japan Joint Workshop on Photovoltaics

Workshop Chairs: Min Jae Ko (Hanyang University), Meicheng Li (North China Electric Power University), Keisuke Ohdaira (Japan Advanced Institute of Science and Technology)

Program Chair: Hae-Seok Lee (Korea University)

General Secretary: Beom-Soo Kim (Korea Research Institute of Chemical Technology)

Date November 15 (Sun), 2026

Venue Room 204-205, Daejeon Convention Center (DCC)

Time	Program	Speaker
13:00-13:20	**Opening Session - Opening Remarks From Korea, China, and Japan**	
	Technical Session 1: Technologies and Policies in Korea, China, and Japan Chair: Hae-Seok Lee, Korea University	
13:20-13:40	**K-Moonshot Solar Cell Mission: A Roadmap Toward Highly Efficient Multijunction Photovoltaic Modules**	Hyunjung Shin, National Research Council of Science & Technology
13:40-14:00	**China's Photovoltaic Policy and Industry: Key Judgments and Policy Directions**	Meicheng Li, North China Electric Power University
14:00-14:20	**PV Industry and R&D Status in Japan : An Overview of NEDO's Activities**	Yoshiko Yamamoto, New Energy and Industrial Technology Development Organization
	Technical Session 2: Recent Progress in Industrial Si PV Chair: Keisuke Ohdaira, Japan Advanced Institute of Science and Technology	
14:20-14:40	**Introduction of Hanwha Qcells (Commercialization of Perovskite Tandem Technology)**	Jaeseung Seol, Hanwha Qcells
14:40-15:00	**Recent Progress in Industrial Silicon PV and Standardization in China**	Liu Zhengxin, Shanghai Institute of Microsystem and Information Technology
15:00-15:20	**Environmental Consciousness and Field Demonstration of Perovskite/Silicon Tandem Solar Cells**	Mengmeng Chen, Toshiba
	Break 15:20-15:40	
	Technical Session 3: Recent Progress in Perovskite based PV Chair : Meicheng Li, North China Electric Power University	
15:40-16:00	**Expanding the Processing Window for Scalable Manufacturing of Perovskite Solar Modules**	Young Yun Kim, Korea Research Institute of Chemical Technology
16:00-16:20	**Recent Progress in Perovskite-Based Photovoltaics**	Zhang Xiaodan, Nankai University
16:20-16:40	**Molecular Approaches for Lead-Free Tin Perovskite Solar Cells**	Tomoya Nakamura, Kyoto University
	Technical Session 4: Recent Progress in Thin Film based PV Chair: Beom-Soo Kim, Korea Research Institute of Chemical Technology	
16:40-17:00	**High-Efficiency Perovskite/Cigs Tandem Solar Cells Via Bottom Bandgap Engineering and Their Expansion to Flexible, Multi-Junction, and Space Applications**	Kihwan Kim, Korea Institute of Energy Research
17:00-17:20	**High-Efficiency and High-Functionality Chalcopyrite Solar Cells**	Takahito Nishimura, Institute of Science Tokyo
17:20-17:30	Closing Remarks	

Global Outreach & Special Session

IEA PVPS Workshop: Asia in Focus - Market & Policy

Chair: Izumi Kaizuka (RTS Corporation)

Co-Chair: Emily Mitchell (IEA Photovoltaic Power Systems Programme)

Date November 16 (Mon), 2026

Venue Room 103, Daejeon Convention Center (DCC)

Time	Program	Speaker
Introduction and overview		
15:00–15:05	**Asia in Focus Workshop Opening Remarks**	Chang Sik Son, WCPEC-9 Organizing Committee
15:05–15:20	**Welcome Remarks and IEA PVPS Overview**	Daniel Mugnier, International Energy Agency Photovoltaic Power Systems Programme
15:20–15:35	**Overview of Asian PV Market Trends by IEA PVPS Task 1**	Melodie de l'Epine, Becquerel Institute
Country Presentations – PV Sector Status (Markets and Policies)		
15:35–15:50	**China's PV Sector Markets and Policies - Status Update**	Lyu Fang, PV Committee of China Green Supply Chain Alliance
15:50–16:05	**Malaysia's PV Sector Markets and Policies - Status Update**	Nurul Nazli Rosli, Sustainable Energy Development Authority
16:05–16:20	**India's PV Sector Markets and Policies - Status Update**	Jai Prakash Singh, National Institute of Solar Energy
16:20–16:35	**Indonesia's PV Sector Markets and Policies - Status Update**	Deon Arinaldo, Institute for Essential Services Reform
16:35–16:50	**Pakistan's PV Sector Markets and Policies - Status Update**	Muhammad Mustafa Amjad, Renewables First
16:50–17:05	**The Philippines' PV Sector Markets and Policies - Status Update**	Clarita S. De Jesus, Renewable Energy Management Bureau
17:05–17:20	**Mongolia's PV Sector Markets and Policies - Status Update**	Dugarjav Bayasgalan, National University of Mongolia
Discussion and summary		
17:20–17:50	**Panel Discussion**	All Session Speakers
17:50–18:00	**Closing Remarks**	Izumi Kaizuka, RTS Corporation

The 2nd Asia-Africa (A^2) Joint PV Symposium

Chair: Woo Kyoung Kim (Yeungnam University)

Co-Chair: Daniel Ayuk Mbi Egbe (African Network for Solar Energy), Ammar Nayfeh (Khalifa University)

Date November 17 (Tue), 2026

Venue Room 103, Daejeon Convention Center (DCC)

Time	Program	Speaker
Session 1	Chair: Woo Kyoung Kim, Yeungnam University	
08:30-08:35	**Welcome Address**	Min Jae Ko, President of Korean Photovoltaic Society
08:35-09:00	**(Keynote) CAST: An Open Innovation Platform for Next-Generation PV Technology**	Young Joo Eo, Korea Institute of Energy Research
09:00-09:30	**(Keynote) Engineering Light at the Nanoscale: Plasmonic Strategies for Next-Generation Organic Photovoltaics**	Newayemedhin A. Tegegne, Addis Ababa Univeristy
09:30-09:50	**Structural Color for BIPV: Color-Performance Trade-Off in Photonic-Glass-Based Colored PV Modules**	Alpan Bek, Middle East Technical University
Break 09:50-10:00		
Session 2	Chair: Daniel Ayuk Mbi Egbe, African Network for Solar Energy	
10:00-10:20	**Design and Assembly of a low-cost Solar PV kit for rural households in Cameroon**	Jerome Ndam Mungwe, University of Bamenda
10:20-10:40	**Achieving 10.3% Efficiency in CZTSSe Solar Cells through Selenization and Zn Composition Engineering**	Bobur Ergashev, Physical Technical Institute
10:40-11:00	**Enhancing dye-sensitized solar cell performance by introducing Fe/Co into the B-site of Sr0.7Sm0.3BO2.89 perovskite photoanodes**	Samantha Ndlovu, University of KwaZulu-Natal
11:00-11:20	**Radiation Stability of Perovskite Optoelectronic Devices under Ionizing Irradiation**	Askhat N. Jumabekov, Nazarbayev University
Break 11:20-14:00		
Session 3	Chair: Alpan Bek, Middle East Technical University	
14:00-14:30	**(Keynote) High-Performance Ambient-Air-Fabricated Perovskite Solar Cells**	Meicheng Li, North China Electric Power University
14:30-15:00	**(Keynote) PV Industry and R&D Status in Japan: An Overview of NEDO's Activities**	Yoshiko Yamamoto, New Energy and Industrial Technology Development Organization
15:00-15:20	**Materials design for organic photovoltaics: A "conservative" approach in the study of the effect of alkoxy side chains**	Daniel A. M. Egbe, African Network for Solar Energy
Break 15:20-15:30		
Session 4 (MENA)	(*) Middle-East and North-Africa (MENA) Special Session Chair: Tyler Grassman, The Ohio State University	
15:30-16:00	**(Keynote) Solar Photovoltaics in the UAE Current Status and Future Outlook**	Ammar Nayfeh, Khalifa University
16:00-16:20	**Solar Deployment in Desert and Mining Environments: Operational Challenges, Soiling Mitigation, and the Emerging PV R&D Ecosystem in Morocco**	Abdellatif Ghenniou, Green Energy Park
16:20-16:40	**Failure-Modes of Photovoltaic Systems Installed in a Desert Climate**	Amir A. Abdallah, Qatar Environment and Energy Research Institute
16:40-16:50	**Closing Remarks**	Woo Kyoung Kim, Yeungnam University

Global Outreach & Special Session

EU–Korea Cooperation: PV R&I Challenges

Chair: Sejin Ahn(Korea Institute of Energy Research)
Co-Chair: Melodie de l'Epine (Becquerel Institute)

Date November 17 (Tue), 2026
Venue Room 105-106, Daejeon Convention Center (DCC)

Time	Program	Speaker
15:00–15:05	**Opening**	
	R&I Programme	
15:05-15:15	**Global R&D Collaboration Program in Europe**	Maria Getsiou, European Commission
15:15-15:25	**Global R&D Collaboration Program in Korea**	Seung Hae Lee, Korea Institute for Advancement of Technology
	PV Market	
15:25-15:35	**PV Market Trend in Europe**	Arnulf Jaeger Waldau, European Commission
15:35-15:45	**PV Market Trend in Korea**	Jae Ho Yun, Korea Institute of Energy Technology
	Case Study	
15:45-16:05	**PEPPERONI: Pilot line for European Production of PEROvskite-Silicon taNdem modules on Industrial scale**	Bernd Stannowski, Helmholtz Zentrum Berlin
16:05-16:25	**ALLEGRO: Project on innovative kerfless silicon wafer manufacturing**	Alex Kim, FORTIX Co., LTD
16:25-16:30	**Closing**	

Daejeon Special Session - (in Korean)

- Building a BIPV Industry Ecosystem and Expanding Solar Energy for Shared Local Prosperity

This session is supported by Korea Institute of Energy Research (KIER) and Korea Environment Industry & Technology Institute (KEITI) through National R&D program on Integrated Management Technology Carbon Regulations, funded by Ministry of Climate, Energy, and Environment (MCEE), and was carried out by the GHG Reduction Potential Assessment Consortium based on the Technology Database for Carbon Neutrality(RS-2025-02213126).

Chair: Jihye Gwak (Korea Institute of Energy Research)

Date November 17 (Tue), 2026
Venue Room 301, Daejeon Convention Center (DCC)

Time	Program	Speaker
14:00–14:05	**Introduction of Distinguished Guests**	
14:05-14:15	**Commemorative Address**	Tae-Jeong Heo, Mayor, Daejeon Metropolitan City
14:15-14:25	**MOU Signing Ceremony**	Daejeon Metropolitan City, Korea Institute of Energy Research (KIER), KEPCO KDN
PART 1	**Buildings as Energy Generators** BIPV Industry Competitiveness and Opportunities for Daejeon	
14:25-14:45	**Changes in Korea's Renewable Energy Policy and Future Directions**	Jeong-seok Lee, Korea Energy Agency
14:45-15:05	**The Urban and Architectural Value of Building-Based Photovoltaics**	Ji-uk Lee, Korea Product Safety Association
15:05-15:25	**Daejeon's BIPV Industry Ecosystem and Commercialization Strategies**	Hun-rae Kim, SJ Materials Co., Ltd.
	Break Time 15:25 - 15:40	
PART 2	**Sharing the Benefits of Solar Energy Locally** An Energy Transition with Industrial Parks and Citizens	
15:40-16:00	**Miho-dong: An Energy Self-Sufficient Village for All**	Heung-mo Yang, Haeyu Social Cooperative
16:00-16:20	**Industrial Park Rooftop Solar: Installation Case Studies and Revenue Models**	Seung-bok Baek, S-Energy Co., Ltd.
16:20-16:50	**Panel Discussion | A Solar Energy Model for Daejeon Connecting Business Participation with Citizen Benefits**	**Panelists: Speakers and Invited Panelists** Je-seon Kim | District Mayor, Jung-gu, Daejeon Metropolitan City Sang-yeol Yu | Director, Energy Policy Division, Daejeon Metropolitan City Cheong-hun Kim | Professor, Department of Electrical and Electronic Engineering, Pai Chai University Yang-gyun Oh | Executive Director, KyeRyong Construction Industrial Co., Ltd. Jin-seop Lee | CEO, SG Energy Co., Ltd
16:50-17:00	**Wrap-up and Closing**	Key Recommendations and Next Steps for Collaboration

Global Outreach & Special Session

From Belgium to Beyond Europe: How Does PV Innovation Move from Lab to Industry?

– Discover the EnergyVille-Thor Park Innovation Ecosystem

Chair: Bart Vermang (EnergyVille)
Hosting Organization: POM Limburg
Supporting Partner: Flanders Investment & Trade

Date November 18 (Wed), 2026
Venue Room 101-102, Daejeon Convention Center (DCC)

Time	Program	Speaker
15:00 -15:10	**Welcome & Opening**	Yu Chen, POM Limburg Yunjung Choi, POM Limburg
15:10-15:20	**From Research Excellence to Industrial Leadership: What's Next for Global PV Innovation?**	Pierre Verlinden
15:20-15:30	**The European Energy Innovation Ecosystem: EnergyVille–Thor Park as a Gateway to Europe.**	Annelies Gorissen, POM Limburg
Expert panel Building Successful Innovation Partnerships: From European Research Excellence to Global Industrial Impact.		
15:30-16:15	**Belgium; Next-Generation Perovskite Photovoltaics**	Moderator: Aslihan Babayigit, UHasselt / EnergyVille
	Thin-Film and Tandem PV; Connecting Research and Industrial Applications	Bart Vermang, IMEC / EnergyVille
	PV Systems, Power Electronics and Renewable Energy Integration	Patrizio Manganiello, UHasselt / EnergyVille
	Solar Energy Research and International PV Collaboration	Jihye Gwak, Korea Institute of Energy Research
	PV Markets, Policy and Commercialization	Gaëtan Masson, Becquerel Institute
	Thin-Film PV and European Research Collaboration	Negar Naghavi, CNRS
16:15-17:30	**Networking Reception (Invitation Only)**	
17:30	**Closing**	

Women in PV

Chair: Jinjoo Park (Cheongju University)
Co-Chair: Martha Lenio (Mars Green Consulting), Melodie de l'Epine (Becquerel Institute)

Date November 18 (Wed), 2026
Venue Room 103, Daejeon Convention Center (DCC)

Time	Program	Speaker
12:30-13:30	**Career Journeys, Challenges, and Opportunities for Women in Science and Engineering**	Anita Ho-Baillie, University of Sydney
		Claudia Buerhop, Forschungszentrum Jülich / HI ERN
		Sunyoung Sohn, Sangji University

Global Outreach & Special Session

The 4th Korea-Singapore-Malaysia Joint PV Symposium

Chair: Jin Young Kim (Seoul National University)
Co-Chair: Aberle Armin Gerhard (Solar Energy Research Institute of Singapore), Ahmad Wafi Mahmood Zuhdi (University Tenaga Nasional)

Date November 18 (Wed), 2026
Venue Room 103, Daejeon Convention Center (DCC)

Time	Program	Speaker
Moderator: Han-Don Um, Kangwon National University		
15:00-15:10	**Opening Remarks**	Min Jae Ko, President of Korean Photovoltaic Society
15:10-15:30	**Perovskite-silicon 2-terminal tandem solar cell research at NUS-SERIS**	Armin G. Aberle, National University of Singapore
15:30-15:50	**Enabling Scalable and Durable Flexible Perovskite Solar Cells: Synergistic Advances in Materials Processing and Interface Design**	Norasikin Ahmad Ludin, University of Malaysia
15:50-16:10	**Engineering Phase Formation and Crystal Growth in Solution- and Vapor-Deposited Halide Perovskites**	Jin-Wook Lee, Seoul National University
16:10-16:30	**Upscaling Perovskite–Silicon Tandems: From 1 cm^2 Lab Cell Breakthroughs to Industrial Wafer Manufacturing**	Yi Hou, National University of Singapore
Break 16:30-16:50		
16:50-17:10	**Progress in Thin-Film Photovoltaics and Photoelectrochemical Research at UNITEN**	Ahmad Wafi Mahmood Zuhdi, Universiti Tenaga Nasional
17:10-17:30	**Toward High-Performance All-Perovskite Tandem Solar Cells through Architecture-Specific Interface Engineering**	Jun Hong Noh, Korea University
17:30-17:50	**Ultra-Lightweight Solar Technologies (Single-Junction, Tandems) for Novel Urban Applications**	Thomas Reindl, Solar Energy Research Institute of Singapore
17:50-18:00	**Closing Remarks**	Woo Kyoung Kim, Vice President of Korean Photovoltaic Society

Asia-Europe Emerging Materials for Thin Film Solar Cells

Chair: Byungha Shin (Korea Advanced Institute of Science and Technology)
Organizer: Edgardo Saucedo (Polytechnic University of Catalonia), Qingbo Meng (Chinese Academy of Sciences), Xiaojing Hao (University of New South Wales)

Date November 19 (Thu), 2026
Venue - Session 1 & 2: Room 204-205, Daejeon Convention Center (DCC)
- Session 3: Room 105-106, Daejeon Convention Center (DCC)

Time	Program	Speaker
Session 1 (Room 204-205)	**Chair: Byungha Shin, Korea Advanced Institute of Science and Technology**	
08:30-08:50	**What Journal Can Do to Facilitate Science Create Real-World Impact?**	Rose Zhu, Editor of Watt
08:50-09:10	**Wide Bandgap Kesterite for Advanced Energy Applications**	Edgardo Saucedo, Polytechnic University of Catalonia
09:10-09:30	**Opportunities and Challenges of Copper Zinc Tin Sulfur Selenium Thin Film Solar Cells**	Qingbo Meng, Chinese Academy of Sciences
09:30-09:50	**The Pathway to Realizing Record Efficiency Antimony Chalcogenide Solar Cells**	Xiaojing Hao, University of New South Wales
Break 09:50-10:00		
Session 2 (Room 204-205)	**Chair: Edgardo Saucedo, Polytechnic University of Catalonia**	
10:00-10:20	**Progress in Antimony Chalcogenide Thin-Film Photovoltaics: From Materials and Device Innovation to Indoor Applications**	Nicolae Spalatu, Tallinn University of Technology
10:20-10:40	**Co-Evaporated Antimony Chalcogenide Thin-Film Solar Cells with Substrate and Superstrate Configurations**	Shi-Joon Sung, Daegu Gyeongbuk Institute of Science and Technology
10:40-11:00	**Research on Inorganic Cu2ZnSnS4 Thin-Film Solar Cells and Photovoltaic-Like Structural Photoelectrodes**	Shou Chen, Shenzhen University
11:00-11:20	**Wide-Bandgap Sb_2S_3 Solar Cells: From Material Growth to Anisotropic Photocarrier Response**	Stela Canulescu, Technical University of Denmark
Break 11:20-13:30		
Session 3 (Room 105-106)	**Chair: Xiaojing Hao, University of New South Wales**	
13:30-13:50	**Solution Chemical-Linkage Strategy for Single-Phase Crystallization of Chalcopyrite for Efficient Solar Cells**	Hao Xin, Nanjing University of Posts and Telecommunications
13:50-14:10	**Perovskite-Inspired Materials for Indoor Photovoltaics**	Paola Vivo, Tampere University
14:10-14:30	**Elucidation of Charge Transport and Interfacial Electronic Structure of Sb2Se3 Solar Cells Studied by Kelvin-Probe Force Microscopy**	William Jo, EWHA WOMANS UNIVERSITY
14:30-14:50	**Wide-Bandgap Kesterite Thin-Film Solar Cells for Indoor Applications**	Achmad Nasyori, Tallinn University of Technology

Global Outreach & Special Session

Industry Forum Ⅰ Solar & Storage – Scaling Solar Through Storage

Chair: Arnulf Jäger-Waldau, European Commission Joint Research Centre
Laurie Burnham, Sandia National Laboratories

Date November 19 (Thu), 2026
Venue Room 103, Daejeon Convention Center (DCC)

Time	Program	Speaker
10:00-10:30	**Scaling Solar Through Storage: How Low-Cost Battery Manufacturing Can Accelerate Global PV Deployment**	Peter Fath, RCT Solutions GmbH
10:30-11:30	**Panel Discussion**	Gaëtan Masson, Becquerel Institute
		Danielle Merfeld, QCells
		Sungtaek Lim, OCI Power
		Shin Han, H2 Inc.

Industry Forum Ⅱ Power System Flexibility - Transforming Power Systems for a Solar-Dominated Future

Chair: Christian Breyer, Lappeenranta–Lahti University of Technology
Junhyun Cho, Korea Institute of Energy Research

Date November 19 (Thu), 2026
Venue Room 103, Daejeon Convention Center (DCC)

Time	Program	Speaker
13:30-13:50	**Economic Impacts of Distributed Energy Resources for Utility Scale and Commercial and Industrial Scale Photovoltaics Plus Battery Energy Storage Systems for Power Grid Stability**	Benjamin Damiani, Cherry Street Energy
13:50-14:10	**Flexibility, Storage and Curtailment in High VRE Power Grids**	Jan Remund, Meteotest AG
14:10-14:30	**From "How Much" to "What, When, and What to Prepare": The Right Questions for Power System Models in the Solar Century**	Seung Wan Kim, Korea Institute of Energy Technology
14:30-15:00	**Q&A**	

Korea-India Joint PV Symposium

Date November 19 (Thu), 2026
Venue Room 101-102, Daejeon Convention Center (DCC)

Time	Program	Speaker
2DO.11 Korea–India Collaboration in Silicon PV: Materials, Manufacturing, and Circularity		
13:30-13:50	**India-Korea scientific collaboration: Past, present and Future**	Vineet Saini, Government of India
13:50-14:10	**Bridging Research and Industry for Advanced Silicon Photovoltaics at the CAST (Center for Advanced Solar Technology)**	Sang Hee Lee, Korea Institute of Energy Research
14:10-14:30	**Development of Silicon Ingots and Solar Cell Fabrication: Modeling & Machine Learning**	Srinivasan Manickam, Vellore Institute of Technology
14:30-14:50	**CAST: An Open Innovation Platform for Next-Generation PV Technology**	Young Joo Eo, Korea Institute of Energy Research
2DO.12 Industrial Silicon Cell Technologies and Module Integration		
15:00-15:20	**Research and Development of Silicon Heterojunction Solar Cells**	Vamsi K. Komarala, Indian Institute of Technology Delhi
15:20-15:40	**A HIGHLY FIRE-RESISTANT BIPV MODULE**	Ian Lee, Korea Energy Service
15:40-16:00	**TOPCon Technology: Driving the Next Generation of Silicon Solar Cells**	S. Saravanan, EMMVEE Solar Group
16:00-16:20	**Redefining Interfacial Defects Dynamics in Silicon Heterojunctions via Decomposition of Dual-Phase Capacitance Transients**	Ka-Hyun Kim, Chungbuk National University
2DO.13 Interface and Optical Engineering for Advanced Photovoltaic Devices		
16:30-16:50	**Bridging the Energy Yield Gap in India's Solar Photovoltaic Installations: System-Specific Generation Bottlenecks and Mitigation via Quality Assurance, AI/ML, and Digital Twins**	Chandan Banerjee, Ministry of New and Renewable Energy
16:50-17:10	**Beyond Transparency: Optically Engineered Crystalline Silicon Solar Cells and Modules**	Kwanyong Seo, Ulsan National Institute of Science and Technology
17:10-17:30	**Czochralski Mono-Silicon Ingot Manufacturing at Gigawatt Scale for High-Efficiency Solar Cells**	Avinash Kumar, Raana Semiconductors Private Limited
17:30-17:50	**Impact of short circuit current deviation on the performance of perovskite and colored c-Si photovoltaic modules**	Hyung Jun Song, Seoul National University of Science and Technology

Global Outreach & Special Session

IEA PVPS: Task 12-PV Sustainability

Chair: Keiichi Komoto (University of Miyazaki)

Date November 19 (Thu), 2026

Venue Room 105-106, Daejeon Convention Center (DCC)

Time	Program	Speaker
Chair: Keiichi Komoto, University of Miyazaki		
16:30-16:50	**Overview of IEA PVPS Task 12 Activities**	Malte Vogt, Delft University of Technology
16:50-17:10	**Global Status of PV Module Recycling**	Keiichi Komoto, University of Miyazaki
17:10-17:30	**Primary and Secondary Material Flows for the Future Global Deployment of Silicon-based Photovoltaic Systems**	Malte Vogt, Delft University of Technology
17:30-17:50	**Deconstructing PPE2 Accuracy: Systematic Over- and Underestimation Across the Monocrystalline Silicon Value Chain**	Moonyong Kim, University of New South Wales



Sunday, November 15

The 10th Korea-China-Japan Joint Workshop on Photovoltaics 1

Chair(s) Haeseok Lee(Korea University)

KCJ-1-1 **K-Moonshot Solar Cell Mission: A Roadmap Toward Highly Efficient Multijunction Photovoltaic Modules**

Hyunjung Shin[1,2,3]
[1]Department of Energy Science and Future Energy Engineering, Sungkyunkwan University, Republic of Korea
[2]SKKU National Lab. For Intelligent Energy Solution Technology, Sungkyunkwan University, Republic of Korea
[3]K-Moonshot Project Director, National Research Council of Science and Technology and Ministry of Science and ICT, Republic of Korea

KCJ-1-2 **China's Photovoltaic Policy and Industry: Key Judgments and Policy Directions**

Meicheng Li[1,2]
[1]Dean and Professor of the School of New Energy at North China Electric Power University
[2]Director of the Photovoltaic Committee of the China Renewable Energy Society

KCJ-1-3 **PV Industry and R&D Status in Japan : An Overview of NEDO's Activities**

Yoshiko YAMAMOTO[1] *
[1]New Energy and Industrial Technology Development Organization, Japan

The 10th Korea-China-Japan Joint Workshop on Photovoltaics 2

Chair(s) Keisuke Ohdaira(Japan Advanced Institute of Science and Technology)

KCJ-2-1 **Introduction of Hanwha Qcells (Commercialization of Perovskite Tandem Technology)**

Jaeseung Seol[1]
[1]Hanwha Qcells, Republic of Korea

KCJ-2-2 **Recent Progress in Industrial Silicon PV and Standardization in China**

Zhengxin Liu[1] *, Hailing Li[1] , Huichuan Pei[1] , Wei Pei[1] , Meicheng Li[1]
[1]Photovoltaic Committee, China Renewable Energy Society, China
[2]Research Center for New Energy Technology, National Key Laboratory of Materials for Integrated Circuits, Shanghai Institute of Microsystem and Information Technology, China

KCJ-2-3 **Environmental Consciousness and Field Demonstration of Perovskite/Silicon Tandem Solar Cells**

Mengmeng Chen[1] *, Takeshi Gotanda[1] **
[1]Toshiba corporation, Japan

The 10th Korea-China-Japan Joint Workshop on Photovoltaics 3

Chair(s) Meicheng Li(North China Electric Power University)

KCJ-3-1 **Expanding the Processing Window for Scalable Manufacturing of Perovskite Solar Modules**

Young Yun KIM[1] *,**
[1]Division of Advanced Materials, Korea Research Institute of Chemical Technology, Republic of Korea

KCJ-3-2 **Recent Progress in Perovskite-Based Photovoltaics**

Zhang Xiaodan[1,2]
[1]Institute of Photoelectronic Thin Film Devices and Technology, Renewable Energy Conversion and Storage Center, State Key Laboratory of Photovoltaic Materials and Cells, Nankai University, China
[2]Tianjin Key Laboratory of Efficient Utilization of Solar Energy, China

KCJ-3-3 **Molecular Approaches for Lead-Free Tin Perovskite Solar Cells**

Tomoya Nakamura[1,2] *,**, Atsushi Wakamiya[1]
[1]Institute for Chemical Research, Kyoto University, Japan
[2]HIKARI-COOL Kyoto, Kyoto University Institute for Advanced Study, Japan

The 10th Korea-China-Japan Joint Workshop on Photovoltaics 4

Chair(s) Beom-Soo Kim(Korea Research Institute of Chemical Technology)

KCJ-4-1 **High-Efficiency Perovskite/Cigs Tandem Solar Cells Via Bottom Bandgap Engineering and Their Expansion to Flexible, Multi-Junction, and Space Applications**

Kihwan Kim[1] * **, Inyoung Jeong[1], Donghyeop Shin[1], Inchan Hwang[1], Soomin Song[1], Ahreum Lee[1], Ara Cho[1] Jihye Gwak[1]
[1]Photovoltaics Research Department, Korea Institute of Energy Research, Republic of Korea

KCJ-4-2 **High-Efficiency and High-Functionality Chalcopyrite Solar Cells**

Takahito Nishimura[1] *
[1]Department of Electrical and Electronic Engineering, Institute of Science Tokyo, Japan

Monday, November 16

IEA PVPS Workshop: Asia in Focus - Market & Policy

Chair(s) Izumi Kaizuka(RTS Corporation)

IEA-MP-1 **PV Committee of China Green Supply Chain Alliance**
Lyu Fang[1]
[1]PV Committee of China Green Supply Chain Alliance(ECOPV)

IEA-MP-2 **Malaysia's PV Sector Markets and Policies - Status Update**
Nurul Nazli Rosli[1]
[1]Sustainable Energy Development Authority

IEA-MP-3 **India's PV Sector Markets and Policies - Status Update**
Jai Prakash Singh[1]
[1]National Institute of Solar Energy

IEA-MP-4 **Indonesia's PV Sector Markets and Policies - Status Update**
Deon Arinaldo[1]
[1]Institute for Essential Services Reform

IEA-MP-5 **Pakistan's PV Sector Markets and Policies - Status Update**
Muhammad Mustafa Amjad[1]
[1]Renewables First

IEA-MP-6 **The Philippines' PV Sector Markets and Policies - Status Update**
Clarita S. De Jesus[1]
[1]Renewable Energy Management Bureau

IEA-MP-7 **Mongolia's PV Sector Markets and Policies - Status Update**
Dugarjav Bayasgalan[1]
[1]National University of Mongolia

Tuesday, November 17

The 2nd Asia-Africa (A2) Joint PV Symposium 1

Chair(s) Woo Kyoung Kim(Yeungnam University)

AF-1-1 **CAST: An Open Innovation Platform for Next-Generation Photovoltaic Technology**
Young Joo Eo[1] *
[1]Department of Photovoltaics Research Department, Korea Institute of Energy Research, Republic of korea

AF-1-2 **Engineering Light at the Nanoscale: Plasmonic Strategies for Next-Generation Organic Photovoltaics**
Newayemedhin Tegegne[1] *
[1]Department of Physics, Addis Ababa Univeristy, Ethiopia

AF-1-3 **Structural Color for BIPV: Color-Performance Trade-Off in Photonic-Glass-Based Colored PV Modules**
Alpan Bek[1] * , Ilknur Ozbayrak[1], Parisa Sharif1[1], Sahin Coskun[2], Husnu Emrah Unalan[1], Talat Ozden[1]
[1]Department of IntegratedPV, The Center for Solar Energy Research and Applications, Türkiye
[2]Department of Metallurgical and Materials Engineering, Osmangazi University, Türkiye

The 2nd Asia-Africa (A2) Joint PV Symposium 2

Chair(s) Daniel Ayuk Mbi Egbe(African Network for Solar Energy)

AF-2-1 **Design and Assembly of a low-cost Solar PV kit for rural households in Cameroon**
Jerome Ndam Mungwe[1] *, Mbah Aloysius Njei[1], Alombah Henry Njimboh[1]
[1]Department of Electrical and Electronic Engineering, College of Technology, The University of Bamenda, Cameroon

AF-2-2 **Achieving 10.3% Efficiency in CZTSSe Solar Cells through Selenization and Zn Composition Engineering**
Bobur Ergashev[1] *, Kudrat Kuchkarov[1], Ramozan Khurramov[1], Ruhiddin Yuldoshov[1], Diyorbek Isakov[1], Muhammad Pirimmatov[1], Javokhir Bekmirzoyev[1], Sherzod Bobomuradov[1], Abdukodir Eshkorayev[2]
[1]Department of Photoelectronics laboratory, Physical-Technical Institute, Uzbekistan Academy of Sciences, Uzbekistan
[2]Department of General Physics, Termez State University, Uzbekistan

AF-2-3 **Enhancing dye-sensitized solar cell performance by introducing Fe/Co into the B-site of Sr0.7Sm0.3BO2.89 perovskite photoanodes**
Samantha Ndlovu[1], Edigar Muchuweni[1], Vincent Nyamori[1] *
[1]Department of Chemistry, School of Agriculture and Science, University of KwaZulu-Nata, South africa

Tuesday, November 17

AF-2-4 **Radiation Stability of Perovskite Optoelectronic Devices under Ionizing Irradiation**
Askhat Jumabekov[1] *, Alimzhan Serikbekov[1], Yersain Nurmagambetov[1], Hryhorii Parkhomenko[2], Mussakhan Aryslan[1], Azamat Maktayev[1], Yerassyl Yerlanuly[1], Pablo Betancur[3], Teresa Ripolles[3], Pablo Boix[4], Marat Kaikanov[1], Zhe Liu[5], Gauhar Mussabek[6], Annie Ng[7]
[1]Department of Physics, Nazarbayev University, Kazakhstan
[2]Department of Faculty of Physics and Astronomy, Adam Mickiewicz University, Poland
[3]Department of Instituto de Ciencia de los Materiales, Universidad de Valencia, Spain
[4]Department of Instituto de Tecnología Química, Universitat Politècnica de València, Spain
[5]Department of Materials Science and Engineering, Northwestern Polytechnical University, China
[6]Department of Faculty of Physics and Technology, Al-Farabi Kazakh National University, Kazakhstan
[7]Department of Electrical and Computer Engineering, Nazarbayev University, Kazakhstan

The 2nd Asia-Africa (A2) Joint PV Symposium 3

Chair(s) Alpan Bek(Middle East Technical University)

AF-3-1 **High-Performance Ambient-Air-Fabricated Perovskite Solar Cells**
Meicheng Li[1] *, Hao Huang[1], Luyao Yan[1], Yingying Yang[1], Peng Cui[1]
[1]Department of New Energy, North China Electric Power University, China

AF-3-2 **PV Industry and R&D Status in Japan: An Overview of NEDO's Activities**
Yoshiko Yamamoto[1] *
[1]Department of Renewable energy Department, New Energy and Industrial Technology Development Organization, Japan

AF-3-3 **Materials design for organic photovoltaics: A "conservative" approach in the study of the effect of alkoxy side chains**
Daniel Egbe[1] *
[1]Department of Head Office, African Network for Solar Energy, College of Science and Technology University of Rwanda, Johannes Kepler University Linz Austria, Germany

The 2nd Asia-Africa (A2) Joint PV Symposium 4

Chair(s) Tyler Grassman(The Ohio State University)

AF-4-1 **Solar Photovoltaics in the UAE Current Status and Future Outlook**
Ammar Nayfeh[1] *
[1]Department of Electrical Engineering, Khalifa University, UAE

AF-4-2 **Solar Deployment in Desert and Mining Environments: Operational Challenges, Soiling Mitigation, and the Emerging PV R&D Ecosystem in Morocco**
Abdellatif Ghennioui[1] *, Mounir Abraim[1]
[1]Green Energy Park, Morocco

AF-4-3 **Failure-Modes of Photovoltaic Systems Installed in a Desert Climate**
Amir Abdallah[1] *, Mohamed Abdelrahim[1], Mohamed Elgaili[1], Maulid Kivambe[1]
[1]Department of Energy Center, Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University, Qatar

EU–Korea Cooperation: PV R&I Challenges

Chair(s) Sejin Ahn(Korea Institute of Energy Research)

EU-KOR-1 **Global R&D Collaboration Program in Europe**
Maria Getsiou[1]
[1]European Commission

EU-KOR-2 **Global R&D Collaboration Program in Korea**
Seung Hae Lee[1]
[1]Korea Institue for Advancement of Technology

EU-KOR-3 **PV Market Trend in Europe**
Arnulf Jaeger Waldau[1]
[1]European Commission

EU-KOR-4 **PV Market Trend in Korea**
Jaeho Yun[1]
[1]Korea Institute of Energy Technology

EU-KOR-5 **PEPPERONI: Pilot line for European Production of PEROvskite-Silicon taNdem modules on Industrial scale**
Bernd Stannowski[2], Fabian Fertig[1]
[1]Hanwha Qcells
2Helmholtz Zentrum Berlin

EU-KOR-6 **ALLEGRO: Project on innovative kerfless silicon wafer manufacturing**
Alex Kim[1]
[1]FORTIX Co., LTD

Wednesday, November 18

The 4th Korea-Singapore-Malaysia Joint PV Symposium

Chair(s) Han-Don Um(Kangwon National University)

KSM-1-1 **Perovskite-silicon 2-terminal tandem solar cell research at NUS-SERIS**
Armin ABERLE[1] *
[1]Department of Solar Energy Research Institute of Singapore, National University of Singapore, Singapore

KSM-1-2 **Enabling Scalable and Durable Flexible Perovskite Solar Cells: Synergistic Advances in Materials Processing and Interface Design**
Norasikin Ahmad Ludin[1] *, Nadrah Azmi[1] Puvaneswaran Chelvanathan[1], Ubaidah Syafiq[1], Mohd Sukor Su'ait[1], Suhaila Sepeai[1], Nurfarhana Alyssa Ahmad Affandi[1], Akrajas Ali Umar[1], Fareed Farihin Mohd Firdaus[1], Adamu Ahmed Goje[1]
[1]Department of Solar Energy Research Institute, University Kebangsaan Malaysia, Malaysia

KSM-1-3 **Engineering Phase Formation and Crystal Growth in Solution- and Vapor-Deposited Halide Perovskites**
JinWook Lee[1] *
[1]Department of Transdisciplinary Innovation, Seoul National University, Republic of korea

KSM-1-4 **Upscaling Perovskite–Silicon Tandems: From 1 cm^2 Lab Cell Breakthroughs to Industrial Wafer Manufacturing**
Yi Hou[1] *
[1]Department of SERIS, NUS, Singapore

KSM-1-5 **Progress in Thin-Film Photovoltaics and Photoelectrochemical Research at UNITEN**
Ahmad Wafi Mahmood Zuhdi[1] *
[1]Department of Institute of Sustainable Energy, Universiti Tenaga Nasional, Malaysia

KSM-1-6 **Toward High-Performance All-Perovskite Tandem Solar Cells through Architecture-Specific Interface Engineering**
Jun Hong Noh[1] *
[1]Department of Civil Environmental Architectural Engineering & Department of Integrative Energy Engineering, Korea University, Republic of korea

KSM-1-7 **Ultra-Lightweight Solar Technologies (Single-Junction, Tandems) for Novel Urban Applications**
Thomas Reindl[1]*
[1]Solar Energy Research Institute of Singapore

Thursday, November 19

Asia-Europe Emerging Materials for Thin Film Solar Cells 1

Chair(s) Byungha Shin(Korea Advanced Institute of Science and Technology)

ASIA-EU-1-1 **What Journal Can Do to Facilitate Science Create Real-World Impact?**
Rose Zhu[1]
[1]Editor of Watt

ASIA-EU-1-2 **Wide Bandgap Kesterite for Advanced Energy Applications**
Edgardo Saucedo[1]
[1]Polytechnic University of Catalonia

ASIA-EU-1-3 **Opportunities and Challenges of Copper Zinc Tin Sulfur Selenium Thin Film Solar Cells**
Qingbo Meng[1]
[1]Chinese Academy of Sciences

ASIA-EU-1-4 **The Pathway to Realizing Record Efficiency Antimony Chalcogenide Solar Cells**
Xiaojing Hao[1]
[1]University of New South Wales

Asia-Europe Emerging Materials for Thin Film Solar Cells 2

Chair(s) Edgardo Saucedo(Polytechnic University of Catalonia)

ASIA-EU-2-1 **Progress in Antimony Chalcogenide Thin-Film Photovoltaics: From Materials and Device Innovation to Indoor Applications**
Nicolae Spalatu[1]
[1]Tallinn University of Technology

ASIA-EU-2-2 **Co-Evaporated Antimony Chalcogenide Thin-Film Solar Cells with Substrate and Superstrate Configurations**
Shi-Joon Sung[1]
[1]Daegu Gyeongbuk Institute of Science and Technology

ASIA-EU-2-3 **Research on Inorganic Cu2ZnSnS4 Thin-Film Solar Cells and Photovoltaic-Like Structural Photoelectrodes**
Shou Chen[1]
[1]Shenzhen University

ASIA-EU-2-4 **Wide-Bandgap Sb_2S_3 Solar Cells: From Material Growth to Anisotropic Photocarrier Response**
Stela Canulescu[1]
[1]Technical University of Denmark

Thursday, November 19

Asia-Europe Emerging Materials for Thin Film Solar Cells 3

Chair(s) Xiaojing Hao(University of New South Wales)

ASIA-EU-3-1 **Solution Chemical-Linkage Strategy for Single-Phase Crystallization of Chalcopyrite for Efficient Solar Cells**
Hao Xin[1]
[1]Nanjing University of Posts and Telecommunications

ASIA-EU-3-2 **Perovskite-Inspired Materials for Indoor Photovoltaics**
Paola Vivo[1]
[1]Tampere University

ASIA-EU-3-3 **Elucidation of Charge Transport and Interfacial Electronic Structure of Sb2Se3 Solar Cells Studied by Kelvin-Probe Force Microscopy**
William Jo[1]
[1]Ewha Womans University

ASIA-EU-3-4 **Wide-Bandgap Kesterite Thin-Film Solar Cells for Indoor Applications**
Achmad Nasyori[1]
[1]Tallinn University of Technology

IEA PVPS: Task 12-PV Sustainability

Chair(s) Keiichi Komoto(University of Miyazaki)

Task12-1 **Global Status of PV Module Recycling**
Keiichi Komoto[1] *
[1]Department of The Headquarters of Advanced Research Promotion, University of Miyazaki, Japan

Task12-2 **Primary and Secondary Material Flows for the Future Global Deployment of Silicon-based Photovoltaic Systems**
Malte Vogt[1] *, Mohammad Abdelbaky[1], Chengjian Xu[1], Olindo Isabella[1]
[1]Department of ESE, TU Delft, Netherlands

Task12-3 **Deconstructing PPE2 Accuracy: Systematic Over- and Underestimation Across the Monocrystalline Silicon Value Chain**
Moonyong Kim[1] *, Bruno Vicari Stefani[1]
[1]Department of photovoltaic and renewable energy engineering, University of New South Wales, Australia



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광주 캠퍼스 / 경기도 광주시 (2022)

Yongin R&D Center



주성 용인 R&D 센터 / 경기도 용인시 (2020)

매출액
(2025년 기준)
3,107억원

R&D 인력비중
(2025년 기준)
63%

R&D 투자비중
(5개년 평균기준)
61%

특허수
(2025년 기준)
약 3,420개

Company Information

회 사 명	주성엔지니어링㈜ (KOSDAQ 036930)
대표이사	황 철 주, 황 은 석
설 립 일	1993년 4월 13일
상 장 일	1999년 12월 24일
주요사업	반도체, 태양광, 디스플레이 제조장비
회사위치	광주본사-경기도 광주시 오포로 240 용인R&D센터-경기도 용인시 기흥구 신정로 79

Introduction ＼ 회사 소개

1993년 설립된 주성엔지니어링은 전량 해외 수입에 의존하던 반도체, 디스플레이, 태양광 핵심 전(前)공정 장비를 독자적인 기술 개발을 통해 대한민국 장비 산업의 세계화를 실현한 첫번째 기업입니다. 주성은 끊임없이 혁신에 투자하여 세계 최초 기술 27개를 개발하는 등 세계 최초, Only 1 기술 경쟁력을 확보해 새로운 시장을 개척해 나가며 장비산업에 새로운 패러다임을 제시하는 기업으로 성장하고 있습니다.

Main Product ＼ 주요 제품

반도체 제조장비



반도체 제조과정의 핵심공정인 '증착'을 담당하는 당사의 SDP System (Space Divided Plasma) 장비는 하나의 챔버에서 웨이퍼 5~6장의 증착이 동시에 가능해 생산성을 크게 향상시킨 장비입니다. High Quality 막질에 초점을 둔 차세대 반도체 장비인 'Guidance Series'는 Step Coverage 비율과 박막의 응력 조절이 가능해 고순도 막질을 정밀하게 구현하고 시공간분할 조절을 통해 다양한 Recipe와 Application 수요 충족이 가능해 Capacitor, Transistor, Interconnector 등 폭넓은 공정으로 확대 전개가 가능합니다.

디스플레이 제조장비



국내 최초로 대면적 프리미엄 TV의 핵심이 되는 8G에 이어 10.5G TFT MOALD/PECVD 장비를 개발하여 모든 세대의 디스플레이 패널 양산 대응이 가능합니다. 또한, 세계 최초로 초고선명 · Foldable · Rollable · Stretchable · 투명 OLED 등 폼팩터 혁신이 가능한 차세대 OLED 디스플레이의 핵심 기술인 Oxide TFT용 CVD/ALD IGZO 장비와 Hybrid Encapsulation 장비를 개발하여 시장의 핵심이 되는 신기술 분야의 경쟁 우위를 선점하고 있습니다.

태양광 제조장비



세계 최초로 ALG, ALD 와 CVD 를 접목한 태양전지 셀공정 라인 솔루션을 제시하고 있으며 , HJT(Hetero Junction Technology) 태양전지 부문에서 양산성을 기반으로 세계 최고 효율을 갱신하고 있습니다 또한 , 반도체 초미세 공정 기술과 OLED 대면적 증착 기술을 기반으로 HJT 와 Perovskite 기술을 결합한 탠덤 (Tandem) 장비를 개발하여 지속적인 연구개발을 통해 35% 이상의 효율을 구현해 전기자동차 UAM 등 NEW 모빌리티 산업 및 Application 에 폭넓게 적용할 수 있는 차세대 태양전지 제조 장비를 시장에 최초로 선보여 시장에 새로운 패러다임을 제시할 것입니다.

CEO's Comment

황철주 대표이사 / 회장



90년대 초, 반도체 제조 장비에 들어가는 나사 하나조차 만들지 못하던 대한민국에서 주성엔지니어링은 기술 독립을 목표로 30년간 혁신의 길을 걸어왔습니다. 앞으로 주성의 30년은 혁신, 신뢰, 협력하는 시스템을 통해서 더 큰 성장을 만들어가는데 선택과 집중을 다하고자 합니다. 주성의 성장동력인 반도체, 디스플레이, 태양광 산업 기술은 인류가 존재하는 한 반드시 필요한 핵심 산업 기술입니다. 이러한 핵심 산업기술을 바탕으로 주성의 경영철학은 행복, 신뢰, 성장에 초점을 두고 있습니다. 행복은 혁신을 통해서, 신뢰는 투명을 통해서, 성장은 시스템을 통해서 달성하겠습니다. 기업은 고객과 투자자들, 기업 구성원들이 더 잘 살고 더 행복해질 수 있도록 하기 위해 존재한다고 생각합니다. 주성엔지니어링의 모든 선수들은 이러한 목표를 명확히 하고, 목표를 지켜 나갈 수 있도록 최선을 다하겠습니다.

주성은 행복을 만드는 곳이고, 가정은 행복을 즐기는 곳이다!

SCOTRA

ENERGY ON WATER, ENGINEERED BY SCOTRA

FLOATING SOLAR SYSTEM SPECIALIST

SCOTRA provides integrated engineering, manufacturing, and installation for floating solar systems, including floats, structures, and mooring, and is further advancing into a specialized energy development company. Proven through major dam and reservoir projects such as Hapcheon Dam, SCOTRA is setting a safer, more sustainable standard for floating solar.

PROVEN CORE TECHNOLOGIES

HAPCHEON DAM | GUNSAN RESERVOIR | IMHA DAM

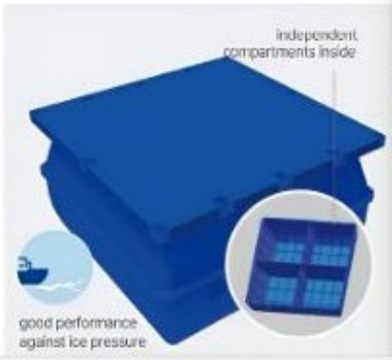
Float

Material: Metallocene PE

8th Gen | Dimensions: 1,000 X 700 X 600(mm)
Weight: 24.25kg | Bouyancy Force: 330kg

12th Gen. | Dimensions: 1,060 X 1,060 X 600(mm)
Weight 34kg | Bouyancy Force: 510kg

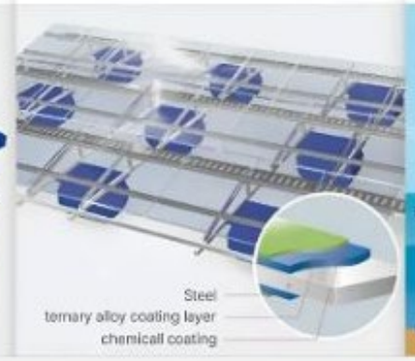
- 6 independent compartments inside, with constant buoyancy,
- stability and strength in case of breakage and leakage.
- great performance to reduce wave stress



Structure for FPV

High-Corrosion-Resistant
Zinc-Aluminum-Magnesium Alloy-Coated Steel
Developed with POSCO's Proprietary Technology

- 5 times higher corrosion-resistance comparing to galvanized steel
- good performance of corrosion-resistance as stainless steel
- Certified to Meet the Drinking Water Hygiene and Safety Standards

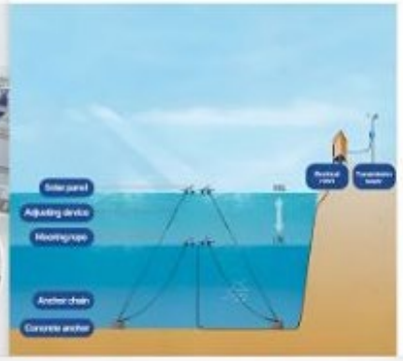


SCOTRA Mooring

Adjusting Device

- Patent No. 10-135999





Solar & Green-Energy Show

Overview

Title Solar & Green-Energy Show

Date November 16(Mon), 2026 - November 19(Thu), 2026

Time 10:00-18:00

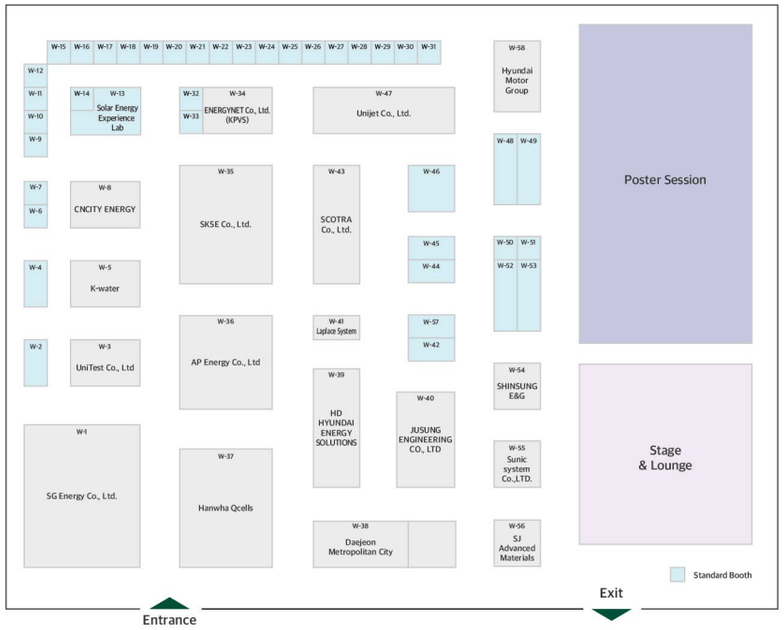
Venue Daejeon Convention Center – DCC 2 Exhibition Hall(2~4), Daejeon, KOREA

Program Exhibition, Exhibition Opening Ceremony, Exhibition Tour, Poster Session, Industry Forum, Solar Energy Convergence Experience Lab, Networking Lounge

Exhibitor Categories (Total 58 Exhibitors, 241 booths):

- Solar Cells, Modules & Materials
- Wind Farm Design & Construction
- Solar PV Applications & Diversified Systems
- Eco-friendly Smart City Infrastructure
- Energy Storage Systems
- Lifestyle Energy Solutions
- Wind Power Systems & Components
- Power and Energy Conversion Systems
- Smart Grid & Power Transmission
- Facility O&M, Safety Management & Monitoring
- Smart Lighting & Optical Engineering
- Hydrogen Production & Transmission Infrastructure
- Manufacturing, Testing & Analysis Equipments
- Wind Power O&M, Safety Management & Monitoring
- Solar PV Structures, Construction & Installation
- Eco-friendly Mobility & Charging Systems
- Hydrogen Fuel Cells & Power Generation
- Environmental Circulation & Carbon Neutrality

Floor Plan



Booth #	Exhibitor
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W-2	Korea Institute of Energy Research
W-3	UniTest Co., Ltd.
W-4	EFfective Co., Ltd.
W-5	K-water
W-6	InfinityLabs Inc.
W-7	Hojeonable
W-8	CNCITY ENERGY
W-9	Hankook Electric Power Information (HEPI)
W-10	OMA
W-11	JMON Co., Ltd.
W-12	GRANDSUN Co., Ltd.
W-13	WCPEC-9 Solar Energy Convergence Experience Lab
W-14	New Energy Fair OSONG 2027 (NEO 2027)
W-15	Korea Conformity Laboratories
W-16	Research Institute of Industrial Science & Technology (RIST)
W-17	Korea Testing Certification Institute
W-18	Tau Science Corporation
W-19	KOS, Inc.
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W-22	ENCOSYS CO., LTD.
W-23	SUZHOU TDM TECHNOLOGY CO., LTD.
W-24	Delicacy Laser Optoelectronics (Langfang) Technology Co., Ltd.
W-25	FLUXiM AG
W-26	PVQuick LLC
W-27	Eternal Sun | WAVELABS
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W-29	LayTec AG

Booth #	Exhibitor
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W-32	Novel Technology Co., Ltd.
W-33	McScience Inc.,
W-34	ENERGYNET Co., Ltd. (KPVS)
W-35	SKSE Co., Ltd.
W-36	AP Energy Co., Ltd.
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W-46	KOREA GREEN ENERGY, Inc.
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W-48	Korea Southern Power (KOSPO) / Korea Institute of Materials Science (KIMS)
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List of Exhibitors (A-Z)

W-36

AP Energy Co., Ltd.

에이피에너지(주)

Company Introduction

Since its establishment in 2004, AP Energy Co., Ltd. has built extensive experience and technical expertise in the renewable energy sector. The company specializes in engineering, procurement, and construction (EPC) of solar photovoltaic (PV) systems and actively participates in government-supported renewable energy deployment programs and Renewable Energy Service Company (ReSCO) projects. Through continuous research and development and a strong portfolio of patents, AP Energy has established a competitive technological edge, including the world's first commercialization of precast concrete floating structures for floating solar PV systems.

Exhibition Items Introduction

1. Carport Solar Power System Using PEB (Pre-Engineered Building) Structures
The carport solar power system utilizing PEB (Pre-Engineered Building) structures is a next-generation solar solution that ensures both structural stability and construction efficiency. Compared to conventional steel structures, PEB structures can achieve longer span lengths, enabling wider open spaces and reducing foundation construction costs. In addition, the system maximizes the use of idle parking spaces by combining parking facilities with solar power generation, while also allowing integration with EV charging systems and other eco-friendly infrastructure.

2. Floating Solar Power System Using Precast Concrete Floats
This floating solar power system is the world’s first to apply precast floats, providing an eco-friendly energy solution with outstanding durability and structural stability. The factory-based precast construction method ensures consistent quality and improved construction efficiency, while offering excellent maintenance performance for long-term operation. The system is a next-generation floating solar platform applicable to a wide range of inland water and offshore environments.

W-52

BUSAN TECHNO PARK

재단법인 부산테크노파크

Company Introduction

Busan Technopark Energy Tech Center implements policy initiatives in renewable energy technologies (solar, wind, and offshore wind), secondary batteries, hydrogen, nuclear energy (SMR), and ammonia bunkering, committed to strengthening regional energy autonomy.

Exhibition Items Introduction

Exhibition of 2027 Gijang-gun Convergence Support Project (Gijang 5 Lights RE100 Domino) and 2026 Gangseo-gu project achievements in renewable energy policy projects. Showcasing multi-energy models (solar, solar thermal, geothermal), regional energy autonomy ecosystem construction cases, RE100 industrial complex-linked projects, and future-oriented distributed energy infrastructure development strategies to demonstrate energy transition leadership and technological capabilities.

List of Exhibitors (A-Z)

W-8

CNCITY ENERGY / CNCITY Solarnet Corporation

씨엔씨티에너지 주식회사 / 씨엔씨티솔라넷 주식회사

Company Introduction

CNCITY Energy is a comprehensive energy company whose businesses span city gas supply, solar power generation, district energy, landfill gas (LFG) bioenergy, and energy consulting. Drawing on decades of experience in operating energy infrastructure, the company plays a central role in providing a stable energy supply to local communities. It continues to expand its energy portfolio through tailored energy efficiency solutions based on eco-friendly resources and new business models, including rooftop solar projects.

CNCITY Solarnet Co., Ltd. is a specialized solar PV management company overseeing five independent Special Purpose Companies (SPCs). Operating as a Strategic Investor (SI) that directly owns and manages power generation assets, the company secures stable cash flows while diversifying its project development strategies and structuring customized solar energy solutions.

Exhibition Items Introduction

CNCITY Energy

[Comprehensive Energy Solutions]
Our commitment to carbon neutrality is realized through a comprehensive and integrated energy portfolio. We optimize energy management via 'Total Energy Consulting' and provide stable heat and electricity through our 'District Energy Business' in the Daejeon-Hakha district. Complementing these efforts, our 'Alternative Natural Gas (LFG, Biogas) Business' builds a sustainable circular economy by converting waste into energy.

[Solar Power Generation Business]
Our solar power operations are robustly expanding through direct land purchases and corporate roof-lease agreements. Building on our first ground-mounted solar project in 2019, our operational capacity is scaling from 11.4MW in 2024 and 25.1MW in 2025 to an expected 40MW in 2026. Driven by a long-term target of a 60MW operational portfolio, we continue to lead the transition toward clean, eco-friendly energy.

CNCITY Solarnet

[Current Status of Solar PV Portfolio]
As of Q2 2026, the company is developing a total solar power generation pipeline of 54.1 MW, of which 34.16 MW has achieved commercial operation (COD) and is currently in stable operation. Within the operational capacity, approximately 3.41 MW represents ground-mounted solar assets developed on acquired land (fields and forest areas) across the Chungcheong region through small-scale power generation projects. The remaining 30.75 MW consists of rooftop solar assets developed by leasing the rooftops of commercial and industrial facilities, which constitutes the primary core of our operating portfolio.

[Business Models in Solar Power Generation]
Anchored by its core IPP (Independent Power Producer) business—which directly owns and operates power generation assets to secure stable, long-term cash flows—the company is actively diversifying its solar development strategies tailored to various project structures. Key portfolio lines include a Brokerage business, where new solar assets are developed and sold to pre-arranged off-takers. In addition, the company is expanding its footprint by offering comprehensive energy solutions through a Solar Leasing model (installing and leasing behind-the-meter solar systems at B2B client sites) and a specialized O&M business providing plant maintenance and performance guarantees for power producers.

List of Exhibitors (A-Z)

W-24

Delicacy Laser Optoelectronics (Langfang) Technology Co.,Ltd

Company Introduction

Delicacy Laser is a professional solar simulator manufacturer that has been deeply engaged in the testing field for over 20 years. Boasting profound technical accumulation, the company offers a wide range of product types, with its business covering multiple fields such as photovoltaic, aerospace and automotive.

Exhibition Items Introduction

We will exhibit the items including Xenon Lamp Steady-state Solar Simulator, LED Steady-state Light Solar Simulator, Large-size AM0 Multi-junction Spectrum adjustable Solar Simulator, Steady-state Light Integrated With Glove-box Solar Simulator, 36-channel MPPT Solar Simulator, and Pulsed Xenon Lamp Solar Simulator.

W-4

EFfective Co., Ltd.

주식회사 이프

Company Introduction

EF Co., Ltd. will not rest on the achievements it has made so far. Instead, we will further strengthen our core capabilities and prepare solidly for the future, doing our utmost to become a company that earns the trust of our customers and is ultimately loved by them through products and solutions that deliver the highest customer value.

With a mission to create a sustainable and better future, we also promise to fulfill our role as a specialist in the energy sector, including energy storage systems, renewable energy, and efficient energy management. Through the positive achievements we create, we will give back to all stakeholders, including our employees, customers, local communities, and partner companies.

Exhibition Items Introduction

EF GridAdapt ESS is an integrated design-build-operate control solution for grid-interconnected Energy Storage Systems. GridLink ESS PMS is composed of an industrial PC server, a multi-protocol gateway, and control modules, and links to KEPCO's ADMS and upper-level VPP platforms via Modbus TCP/RTU to support grid stabilization through active/reactive power control modes such as Constant Q, Fixed PF, Watt-Var, and Volt-Var. It also features LVRT/HVRT ride-through to sustain operation during voltage sags, surges, and frequency fluctuations, along with a fire-prevention safety system using humidity/pressure sensors and IMD-linked insulation monitoring. By analyzing daily SMP tables, it automatically generates optimal charge/discharge schedules to maximize profitability. The solution is applied across various business models expanded solar grid capacity, VPP integration, sunshine-income villages, and shared ESS serving as a key flexibility resource that resolves grid saturation issues such as connection limits and curtailment.

List of Exhibitors (A-Z)

W-22

ENCOSYS CO., LTD.

(주)엔코시스

Company Introduction

Maximizing Solar Efficiency through Precision Measurement: ENCOSYS

ENCOSYS specializes in the two most critical components of solar performance monitoring: Advanced Weather Stations and High-Precision Pyranometers. Backed by 20 years of technical expertise, we provide specialized consulting that transforms environmental data into cost savings and increased productivity. Our premium measurement solutions ensure the highest level of accuracy for solar irradiance, guiding your project to peak efficiency. Discover how ENCOSYS's trusted insights can power the future of your renewable energy portfolio.

Exhibition Items Introduction

Weather Station, Pyranometer, Datalogger, Environmental Sensors (Temperature, Humidity, etc.)

W-34

ENERGYNET Co., Ltd.

주식회사 에너지넷

Company Introduction

ENERGYNET Co., Ltd. is an energy technology company specializing in Building-Integrated Photovoltaics (BIPV) by integrating next-generation perovskite solar technology with BIM-based digital design. Leveraging BIM-based 3D design and power generation analysis, we provide optimized photovoltaic design solutions, as well as integrated energy services including Building and Factory Energy Management Systems (FEMS) and energy efficiency consulting. We are also committed to commercializing perovskite-based BIPV technologies and contributing to global carbon neutrality and the advancement of the future energy industry through sustainable energy solutions that connect the entire process from design to operation.

Exhibition Items Introduction

At WCPEC-9, ENERGYNET Co., Ltd. will showcase an integrated energy solution that combines next-generation perovskite photovoltaic technology with BIM-based digital design. The exhibition will feature perovskite solar modules, Building-Integrated Photovoltaics (BIPV) solutions, the BIM-based 3D design and power generation analysis platform (ZEN), Factory Energy Management Systems (FEMS), and energy efficiency consulting services. Visitors will experience technologies covering the entire lifecycle of energy projects, from building design and power generation forecasting to energy management and operation. Through real-world applications and digital design and analysis technologies, we will demonstrate the potential of next-generation BIPV solutions and present innovative approaches to energy optimization. We look forward to fostering global collaboration and sharing technologies that contribute to sustainable buildings, carbon neutrality, and the future of the renewable energy industry.

List of Exhibitors (A-Z)

W-27

Eternal Sun | WAVELABS

Company Introduction

Eternal Sun | WAVELABS is a leading innovator in highly accurate LED-based solar simulation technology, enabling precise performance measurements of solar cells and photovoltaic modules. Our advanced sun simulators are designed to deliver exceptional spectral accuracy, stability, and repeatability, supporting research laboratories, certification institutes, and solar manufacturers around the world. By replicating natural sunlight with unmatched precision, our systems help customers validate product performance, improve manufacturing quality, and accelerate innovation in photovoltaic technology. Driven by engineering excellence and commitment to reliability, Eternal Sun | WAVELABS empowers the global solar industry with measurement solutions that build confidence, ensure quality, and advance the transition to sustainable energy.

Exhibition Items Introduction

Before the exhibition, we will schedule meetings with our existing customers and potential prospects in Korea. Although we will not display physical products, our booth will serve as a dedicated space for business discussions and networking. We will showcase scientific posters featuring our sun simulators and provide product brochures to introduce our technologies.
Having a booth will strengthen our brand visibility, demonstrate our commitment to the Korean market, and facilitate new business opportunities.

W-57

JEONNAMGWANGJU GOHEUNG COUNTY

전남광주통합특별시 고흥군

Company Introduction

Goheung County, Jeonnam-Gwangju Special Metropolitan City is a local government developing an integrated distributed energy model that links agrivoltaics on national reclaimed land with ESS, wind power and hydrogen.

Exhibition Items Introduction

Goheung County operates two connected booths to present the “Goheung Model” for rural energy transition. [Booth 1] Integrated distributed energy model on national reclaimed land: a system concept combining 835 MW of agrivoltaics at the Goheung Bay, Haechang Bay and Guam reclaimed lands with 1,023 MW/3,686 MWh ESS, 30 MW wind power, 50 MW electrolysis and VPP/EMS, shown through site maps, system diagrams and videos, together with the 100 MW Haechang Bay pilot zone and the progress of the national strategic zone designations. [Booth 2] Goheung renewable energy vision and partnership desk: the county’s 10 GW renewable energy vision, a community-participatory 345 kV transmission line proposal, and a direction for agriculture and energy to coexist, with a consultation space for companies, research institutes and financial institutions.

List of Exhibitors (A-Z)

W-25

FLUXiM AG

플럭심

Company Introduction

Fluxim AG has been supporting both academic and industrial R&D in the solar sector since 2007. Our simulation software Setfos and Laoss are widely used for the design, optical modeling, and electrical analysis of perovskite, organic, thin-film, and other emerging photovoltaic devices. For experimental research, we offer advanced characterization tools including Paios, as well as stability testing systems Litos and Litos Lite for ageing studies in line with established ISOS protocols, enabling fast, reliable insights from fresh device measurements to long-term degradation analysis.

Exhibition Items Introduction

LITOS LITE: ISOS-Compliant Stability Tester with Parallel JV & MPP Tracking
PAIOS: Advanced electrical and optical characterization platform for organic and perovskite solar cells
SETFOS: Optical and electrical simulation software for organic and perovskite solar cells (device scale)
LAOSS: Simulation software for the design, and optimization of large-area organic and perovskite solar cells

W-12

GRANDSUN

그랜드썬기술단

Company Introduction

Since its establishment in 2005, Grand Sun Technical Group has been a leading specialist in solar power, dedicated to advancing the distribution of renewable energy for a sustainable future. We maximize project success and power efficiency by integrating AI-driven precision analysis solutions into the initial stages of project planning and feasibility studies. Furthermore, we provide comprehensive, one-stop energy solutions that encompass the entire project lifecycle—from professional design and licensing to responsible construction and systematic post-installation maintenance (O&M). We go beyond simple infrastructure deployment; we are committed to continuous research and technical development to ensure optimal performance in an ever-evolving energy market. With our innovative AI-based technical expertise and unwavering reliability, we stand as your premier partner, leading the way in the era of carbon neutrality.

Exhibition Items Introduction

As a leading EPC (Engineering, Procurement, and Construction) specialist in the renewable energy sector, Grand Sun Technical Group maximizes project efficiency by integrating AI-driven precision analysis solutions from the initial feasibility study stage. We provide a one-stop total energy solution that encompasses the entire lifecycle of a solar power project—including meticulous professional design, stable procurement of high-quality materials, responsible construction, and systematic post-installation maintenance (O&M). Through our differentiated EPC capabilities and continuous investment in R&D, we offer optimal power generation infrastructure and future-oriented business models to realize carbon neutrality.

List of Exhibitors (A-Z)

Your Future with Sun! (주)해전쏠라

W-50

HAEJEONSOLAR Co.,Ltd.

(주)해전쏠라

Company Introduction

Haejeon Solar Co., Ltd. is an eco-friendly energy solutions company based on solar power generation systems and GFRP composite material technology. We lead the future of the energy industry through carbon-reducing materials and innovative solar technologies.

Exhibition Items Introduction

Haejeon Solar Co., Ltd. exhibits GFRP (Glass Fiber Reinforced Plastic) composite products, which are gaining attention as carbon-reducing alternative materials. GFRP is a next-generation composite material that is lightweight, corrosion-resistant, durable, and highly electrically insulating compared to conventional metal materials, making it suitable for various industries. Key exhibits include GFRP rebar, fences, and solar structures, demonstrating their diverse applications in solar power facilities, electrical equipment, cable trays, and construction and civil engineering. In particular, we present sustainable material solutions that combine solar energy with GFRP composite materials to overcome the limitations of conventional steel, while contributing to weight reduction, improved corrosion resistance, enhanced maintenance efficiency, and carbon reduction. Based on Korea's first GFRP composite material technology, we propose new possibilities for the clean energy industry. Through these solutions, we aim to enhance the stability and efficiency of solar power facilities and demonstrate the competitiveness of composite materials for future energy infrastructure.

HEPi Hankook Electric Power Information Co., Ltd.

W-9

Hankook Electric Power Information

한국전력정보(주)

Company Introduction

Hankook Electric Power information is a specialized energy IT company at the forefront of distributed power grid innovation, leveraging AI agent-based data analytics technologies and advanced optimization algorithms for distributed energy resources.

Exhibition Items Introduction

AI-Based Virtual Power Plant (VPP) and Energy Management System (EMS) Platform for Integrated Distributed Energy Management - The platform integrates LoRa wireless network-based gateways with solar power plants and energy storage system (ESS) infrastructure, enabling real-time data acquisition, on-site monitoring, and remote control. Equipped with AI agent technology, the platform performs precision analysis of weather data and historical power generation records. Its advanced capabilities include renewable energy output forecasting and optimized ESS charging and discharging algorithms, thereby contributing to enhanced power grid stability.

List of Exhibitors (A-Z)

W-37

Hanwha Qcells

한화큐셀

Company Introduction

Hanwha Qcells is the renewable energy division of Hanwha Solutions. Qcells offers comprehensive energy solutions, including solar cell & module manufacturing, and energy consultations for RE100 and VPP. Headquartered in Seoul, Qcells operates global R&D centers in South Korea, Germany, and the United States. With manufacturing bases in South Korea, the U.S, and Malaysia, our annual production capacity reaches 11.2 GW for modules and 8.9 GW for cells as of 2025. Qcells is dedicated to leading the transition to a sustainable energy future through world-class technology and superior quality.

Exhibition Items Introduction

Hanwha Qcells presents four solutions spanning the entire solar energy lifecycle, from technology development to end-of-life module recycling.

"Energy Core Solutions" showcases the technology and manufacturing capabilities at the heart of solar energy. Premium modules incorporating cells manufactured at Qcells' facilities in South Korea, together with next-generation perovskite-silicon tandem technology, demonstrate the company's technological leadership. "Energy Infrastructure Solutions" focuses on solar power plant construction, featuring agrivoltaic systems that enable crop cultivation and electricity generation on the same land. Moving from power generation to energy operations, "Energy Operation Solutions" introduces power purchase agreements (PPAs) and virtual power plant (VPP) services that connect power producers, corporate customers, and electricity markets. Finally, "Energy Resource Circularity Solutions" highlights EcoRecycle by Qcells, which separates and recovers valuable materials from end-of-life solar modules for recycling, bringing resources back into use.

W-39

HD HYUNDAI ENERGY SOLUTIONS

HD현대에너지솔루션

Company Introduction

HD Hyundai Energy Solutions is a vertically integrated solar company spanning cell to module, delivering trusted energy solutions worldwide through 20+ years of technology and quality.

Exhibition Items Introduction

At WCPEC-9, HD Hyundai Energy Solutions presents "Proven Technology," a three-stage journey from continuous innovation to the future of solar. Stage 1 showcases our track record of over 20 years through Grade-1 TOPCon cells, HJT cells, and multi-busbar modules on display, alongside our product development history and quality leadership. Stage 2 demonstrates how proven technology delivers answers in any environment, featuring high-durability, eco-friendly modules suited for floating and agrivoltaic applications, together with our EPC capabilities. Finally, Stage 3 features our main exhibit item — tandem cells and mini-modules combining perovskite and HJT technology — presenting a technology roadmap aligned with the conference's core themes of high efficiency, mass production, and reliability. Through this experience, visitors will follow a journey from verification to application to future vision, reinforcing HD Hyundai Energy Solutions' position as a trusted technology leadership partner in the global solar industry.

List of Exhibitors (A-Z)

W-7

Hojeonable

(주)호전에이블

Company Introduction

We supply epoxy solder paste (ESP) and epoxy flux paste (EFP), and we are developing mass production technology for Ag-coated Cu-based HJT silicon solar cell electrode material and paste that reduces Ag consumption while improving efficiency.

Exhibition Items Introduction

Ag-coated Cu paste is a next-generation electrode material for high-efficiency HJT silicon solar cells, securing suitable electrical and thermal properties while significantly reducing Ag consumption and contributing to lower manufacturing costs and the renewable solar energy industry.

W-21

HS SOLAR ENERGY CO., LTD.

(주)에이치에스쏠라에너지

Company Introduction

From the construction of small-scale power facilities to large-scale power plants, we provide a one-stop service for solar power systems, including consulting, after-sales management, electrical safety management, and maintenance. We are the specialist with a superior track record and technology in RPS solar, rural solar, agrivoltaic solar, industrial park solar, and floating solar power plants.

Exhibition Items Introduction

Exhibition of solar module recycling technology (Crystalline silicon recovery technology using microwaves)
「Development of AI-based full-cycle solar module history management technology to establish a solar energy recycling/reuse system」 R&D project objectives and achievement prom.

List of Exhibitors (A-Z)

W-58

Hyundai Motor Group

현대자동차

Company Introduction

Hyundai Motor Company is a global mobility solutions provider spanning passenger and commercial vehicle manufacturing, EV/hydrogen electrification, robotics, and advanced air mobility, driving the future of mobility through sustainable innovation.

Exhibition Items Introduction

1. Solar Mobility Concept Vehicle (1 kW Solar Car PoC)
This concept vehicle integrates solar cells across the exterior body of a Genesis-based vehicle, including the roof, hood, doors, and trunk lid, delivering up to 1 kW of power generation capacity. To meet pedestrian safety requirements, conventional glass panels were replaced with lightweight plastic body panels. The vehicle can generate electricity both while driving and while parked, enabling up to 17 km of daily driving range from solar energy alone under North American conditions. The concept demonstrates the potential to reduce charging frequency and achieve up to 24% CO_2 emission reduction through solar-powered mobility.

2. Mini Solar Roof with Next-Generation Solar Cells
This exhibit features a mini solar roof incorporating next-generation perovskite solar cells on a GFRP (Glass Fiber Reinforced Plastic) substrate. The lightweight and structurally versatile design showcases the potential of advanced solar technologies for future vehicle applications. The model serves as a research platform to evaluate the feasibility, performance, and integration of high-efficiency solar cells into next-generation mobility systems.

W-30

IEA PVPS

International Energy Agency
Photovoltaic Power Systems Programme

Company Introduction

The IEA Photovoltaic Power Systems Programme (IEA PVPS) is an international collaborative research and development programme established in 1993. Bringing together experts from around the world, IEA PVPS facilitates knowledge exchange and international cooperation to advance the role of PV in sustainable energy systems.

Through its international research activities, IEA PVPS provides independent, reliable information on PV markets, technologies, applications, performance, sustainability and integration into energy systems. Its reports, fact sheets and other publications support researchers, industry stakeholders, policymakers and decision-makers worldwide.

Exhibition Items Introduction

Discover international PV research and insights at Booth W-30.

At WCPEC-9, IEA PVPS will present its latest publications and research findings covering key developments across the global PV sector.

Visitors can explore topics including:
· **Global PV markets and trends**: International market developments, deployment figures and policy insights.
· **PV performance and reliability**: Research on system quality, operation, performance and lifetime.
· **Sustainability and circularity**: Environmental impacts, life cycle assessment, recycling and material flows.
· **Innovative PV applications**: Building-integrated PV, floating PV, agrivoltaics and PV in transport.
· **PV integration**: Grid integration, flexibility, forecasting and energy storage.

Meet IEA PVPS experts, learn about our international research activities and discover our latest reports and fact sheets, all available to download free of charge.

Visit us at Booth W-30 or explore our publications at www.iea-pvps.org.

List of Exhibitors (A-Z)

W-6

Infinity Labs Inc.

주식회사 인피니티랩스

Company Introduction

Infinity Labs develops and supplies eco-friendly SnO2 and ZnO ETL inks for next-generation solar cells based on direct synthesis technology.

Exhibition Items Introduction

Infinity Labs is an advanced nanomaterial company specialize in metal oxide dispersion based on eco-friendly direct synthesis processes. At this exhibition, we will present metal oxide ETL materials for next-generation solar cells, including alcohol-based SnO_2 dispersions, water-based SnO_2 dispersions, and ZnO sol-gel materials.

Our SnO_2 dispersions consist of uniform nanoparticles with an average size of approximately 5 nm and are available in various solvent systems, including water, ethanol, IPA, butanol, and hexanol. These materials are designed for use as electron transport layers (ETLs) in perovskite and tandem solar cells.

W-11

JMON Co.,Ltd

(주)제이몬

Company Introduction

JMON develops and provides deposition sources and solutions for a wide range of industries, including thin-film solar cells, semiconductors, and displays, leveraging its expertise in materials science and ultra-high vacuum technologies.

Exhibition Items Introduction

The deposition sources, including effusion cells and crackers, are designed based on optimized thermal shielding technology to ensure excellent thermal stability and temperature uniformity even in high-temperature environments. In addition, high thermal stability materials are applied to minimize impurity incorporation that can affect the electrical properties of deposited thin films.

*** Development plan for the effusion cells**

- Precision temperature control(< ±0.05°C @1,000°C)
- Atomic layer thickness control
- High purity thin film coating
- Parallel operation : composition control of several materials
- Use high capacity crucible for continuous process
- Mass production, high-rate deposition technology

*** Cracker**

- Materials: Se, S
- Deposition type: Upward(Bottom-up deposition), Downward(Top-down deposition)

List of Exhibitors (A-Z)

W-40

JUSUNG ENGINEERING CO., LTD

주성엔지니어링(주)

Company Introduction

Established in 1993, JUSUNG Engineering is a South Korean advanced process equipment company that designs and manufactures core process equipment for the semiconductor, display, and solar industries based on its proprietary technology.

Exhibition Items Introduction

1. ALG/CVD (Atomic Layer Growth / Chemical Vapor Deposition)
   One of the core processes for high efficiency perovskite & III-V solar cell. ALG deposition is a process of depositing a high-quality thin layer of molecular/atomic units on substrate.
2. PECVD (Plasma-Enhanced Chemical Vapor Deposition)
   One of the core processes (Passivation & Doped Layer) for HJT (Hetero Junction Technology) high efficiency solar cell applicable for high volume production.
3. PVD (Physical Vapor Deposition)
   One of the core processes (TCO Layer) for HJT (Hetero Junction Technology) high efficiency solar cell applicable for high volume production.
   JUSUNG has achieved over 25% cell efficiency in HJT solar technology using high-volume production equipment. JUSUNG aims to achieve over 35% cell efficiency in next-generation Perovskite Tandem solar technology. Furthermore, JUSUNG is targeting to exceed 40% cell efficiency in III-IV materials solar technology for future advancements.

W-5

K-water

한국수자원공사

Company Introduction

A specialized water-sector institution responsible for the comprehensive use and development of water resources and for the construction, operation, and management of wide-area water supply systems; a global leading water-and-energy company that spearheads the expansion of renewable energy through the installation and operation of new and renewable energy facilities

Exhibition Items Introduction

Promotional video content, printed materials(posters, brochures, etc.), models, and other items related to renewable energy promotion projects

List of Exhibitors (A-Z)

W-42

KETEP

한국에너지기술평가원

Company Introduction

The Korea Institute of Energy Technology Evaluation and Planning was established to efficiently support government projects related to energy technology development, and it serves as a climate and energy technology innovation hub leading global carbon neutrality.

Exhibition Items Introduction

Research and Development(R&D) achievements in the solar photovoltaic sector of renewable energy, etc.

W-45

KOEN

한국남동발전(주)

Company Introduction

KOEN operates five power plants across South Korea:Yeongheung, Samcheonpo, Bundang, Yeongdong (YeongdongEco), and Yeosu. KOEN's total installed capacity is 9,820 MW,accounting for approximately 8.1% of the nation's total power capacity.

Guided by its 2040 strategic vision, "Clean & Smart EnergyLeader," KOEN drives sustainable growth centered on its corevalues of safety, innovation, and expertise. Under this roadmap,KOEN is accelerating the clean energy transition by expandingcarbon-free and renewable energy sources—targeting 12 GW inrenewable capacity—while leading offshore wind and solar powerdevelopments and reinforcing its commitment to carbon neutrality.

By integrating AI-driven operational efficiency, maintainingfinancial soundness, and fostering a culture of safety-first, shared-growth management, KOEN continues to solidify its positionas a globally trusted energy leader dedicated to national development andpublic welfare.

Exhibition Items Introduction

Introduction to KOEN's Renewable Energy Business Development
- Business Progress Status, Introduction to Key Businesses

List of Exhibitors (A-Z)

W-15

Korea Conformity Laboratories

한국건설생활환경시험연구원

Company Introduction

The Korea Conformity Laboratories (KCL) is the largest testing, inspection, and certification evaluation organization in Korea, possessing expertise in the fields of performance and reliability evaluation for building materials, building envelope products, energy systems, and photovoltaic (PV) and building-integrated photovoltaic (BIPV).
In the solar sector, KCL's primary activities include supporting performance evaluations for photovoltaic and BIPV modules, and providing KS certification testing support as a designated commissioned testing institution. Additionally, KCL supports the development of standard testing procedures and test evaluations for photovoltaic products, covering electrical performance, durability, fire safety, structural safety, and compliance with relevant international standards.

Exhibition Items Introduction

- Solar Photovoltaics/BIPV Electrical/Durability Performance Evaluation
  (KS C 8561, KS C 8562, KS C 8577, IEC 61215, IEC 61646, IEC 61730-2)
- Solar Photovoltaics/BIPV Structural Performance Evaluation
  (ASTM E 283, ASTM E 331, AAMA 501.1, AAMA 501.4, ASTM E 1646 etc...)
- Solar Photovoltaics/BIPV Fire Safety Performance Evaluation
  (KS F 8414, KS F ISO 1182, KS F ISO 5660-1, UL 790, EN 13823)
- Evaluation Items Related to Balcony Solar Photovoltaic Testing
- Promotional Materials for the Building Photovoltaic Demonstration Center
- KCL PV/BIPV related Project Execution Details

W-46

KOREA GREEN SOLAR, Inc.
KOREA GREEN ENERGY, Inc.

(주)한국그린에너지

Company Introduction

Established in 2016, the company specializes in solar energy and provides comprehensive EPC solutions covering the entire process—from the development and manufacturing of solar mounting structures to the implementation of power generation projects and repowering construction.

Exhibition Items Introduction

A key feature of this design is that roof reinforcement and the installation of solar power systems can be carried out simultaneously. Unlike the conventional method of performing these tasks separately, integrating them into a single process maximizes construction efficiency. This approach is expected to yield approximately 15% in raw material savings. Furthermore, as the roofing work is executed on a cost-basis, the overall investment burden is reduced. The roofing panels used also enhance power generation efficiency by increasing the reflectivity of the solar modules' rear surfaces. One core technology is a "structural system" that is currently patent-pending. This system involves installing aluminum profiles onto existing structures, utilizing specialized connectors to link the existing C-channels with the aluminum profiles. These connectors are designed to allow for the flexible adjustment of the structure's position, thereby significantly increasing construction versatility. Consequently, the system offers the advantage of effectively accommodating both existing power plants requiring repowering and new sites with diverse conditions.

List of Exhibitors (A-Z)

W-2

Korea Institute of Energy Research

한국에너지기술연구원

Company Introduction

The Korea Institute of Energy Research (KIER) is a government-funded research institute dedicated to advancing energy technologies for carbon neutrality and energy security. Its major research areas include renewable energy, hydrogen, energy efficiency, and climate technologies. KIER also promotes industrial collaboration, technology transfer, and commercialization.

Exhibition Items Introduction

KIER showcases a range of advanced photovoltaic technologies, including lightweight and flexible thin-film solar cells for extreme environments, high-efficiency perovskite/silicon tandem solar cells, quantum-dot-based light-conversion glass for high-power PV modules, and integrated back-contact electrodes for perovskite solar cells.
The exhibition also features mass-producible photovoltaic–thermal (PVT) hybrid modules designed for separate installation, along with the Center for Advanced Solar PV Technology (CAST), a shared research facility supporting photovoltaic technology development, performance validation, and industrial collaboration.

W-49

Korea Kiyon Co., Ltd.

(주)고려기연

Company Introduction

Korea Kiyon is a specialized company designing and supplying advanced vacuum deposition equipment for perovskite tandem solar cell research and development.
Through Tandem Cluster, In-Situ PL, and CSS technology, we support high-efficiency device development and real-time performance evaluation, serving as a key partner in next-generation renewable energy research with customized solutions.

Exhibition Items Introduction

Korea Kiyon will showcase a Thermal Evaporation + Glovebox + In-situ PL integrated system and CSS equipment for perovskite tandem solar cell R&D. The system combines thin-film deposition with real-time optical characterization under vacuum and inert environments, minimizing air exposure and supporting high-efficiency, reproducible device development and process optimization.

List of Exhibitors (A-Z)

W-48

Korea Southern Power (KOSPO) / Korea Institute of Materials Science (KIMS)

한국남부발전(주) / 한국재료연구원

Company Introduction

[Korea Southern Power (KOSPO)]
Korea Southern Power is a public power enterprise under the Ministry of Climate, Energy, Environment, working in step with the nation's energy policy to produce and supply environmentally friendly and stable electricity.
We are leading the expansion of sustainable future energy sources such as renewable energy and hydrogen energy for a wise energy transition in thermal power generation.

[Korea Institute of Materials Science (KIMS)]
The Korea Institute of Materials Science (KIMS) is a government-funded research institute established under the Act on the Establishment, Operation and Fostering of Government-Funded Science and Technology Research Institutesof the Republic of Korea. KIMS conducts research and development, testing and evaluation, technical support, and technology transfer in the field of advanced materials. Through the development of core technologies in next-generation photovoltaics, energy materials, and advanced functional materials, KIMS contributes to strengthening the competitiveness of Korea's materials industry and advancing carbon neutrality.

Exhibition Items Introduction

BIPV Semi-Transparent Solar Cells
Building-Integrated Photovoltaics (BIPV) enabling direct integration of solar cells into building components such as windows and glass facades. Semi-transparent solar cells providing electricity generation while allowing natural daylight transmission, contributing to sustainable energy production without compromising indoor illumination.
Integration for BIPV Applications
Integration of semi-transparent solar cells with smart window technologies for simultaneous power generation and control of light and heat. Realization of energy-efficient, sustainable urban infrastructure and eco-friendly future buildings.
Electrochromic & Thermochromic Smart Windows
Smart window technologies regulating the amount of light and heat entering buildings. Electrochromic windows changing tint through electrical stimulation, while thermochromic windows automatically responding to temperature variations. Improvement of indoor comfort and reduction of lighting, cooling, and heating energy consumption.

W-17

Korea Testing Certification institute

(재)한국기계전기전자시험연구원

Company Introduction

Korea Testing Certification institute(KTC) is the representative testing and certification institute of KOREA.
For over 50 years since its establishment, KTC has provided testing and certification services in various fields such as electric, electronic, communication, machinery, chemistry, bio, etc., and has supported Korea's industrial growth by responding to national R&D demands.

Exhibition Items Introduction

Products handled during testing and evaluation such as PV modules and inverters, and exhibition items related to KTC's business introduction

List of Exhibitors (A-Z)

W-44

KOREASOLAR CO., LTD.

코리아솔라 주식회사

Company Introduction

Korea Solar is the only solar module distributed in Korea by TONGWEI SOLAR, the world's leading solar company.

Exhibition Items Introduction

TONGWEI SOLAR is the only solar-related company in the world to be included in the top 500 global Fortune companies, with an annual module production volume of 90GW, the 5th largest shipping volume in the world, and the 1st largest domestic production volume in China. TONGWEI SOLAR partnered with "Korea Solar" in 2024 to enter the Korean solar market in earnest.

· Key sales products
- TWMNF-66HD730-750(G12 / TNC 2.0)
  Cell TNC(N Type Monocrystalline Cell)
  Cell Specification 132[6*22)
  Module Size 2384±2*1303±2*33mm
  Weight 37.3Kg
  Maximum efficiency : 24.1%
- TWMNH-66HD635-655(G12R / TNC 2.0)
  Cell TNC(N Type Monocrystalline Cell)
  Cell Specification 132[6*22)
  Module Size 2382±2*1134±2*30mm
  Weight 32.2Kg
  Maximum efficiency 24.2%

W-19

KOS, Inc.

(주)케이오에스

Company Introduction

KOS Inc. has been supplying optical instruments, including spectrometers, cameras, and microscopes, to universities, research institutes, and industrial companies for nearly 30 years.
At this exhibition, we will participate together with our partner, Quantum Yield Berlin of Germany.

Exhibition Items Introduction

We plan to exhibit compact and high-performance spectrometers covering the spectral range from X-rays to infrared, as well as time-correlated spectroscopy systems, fluorescence analyzers, CCD and sCMOS cameras, lasers, and optical components.
We will also introduce a EL/PL quantum yield measurement system from the German company QYB.

List of Exhibitors (A-Z)

W-41

Laplace System Co., Ltd.

Company Introduction

Laplace System develops monitoring, control, and simulation solutions for solar PV and renewable energy systems. Since signing a distribution agreement with DAHAN TECH INC. in 2005, the company has actively expanded its presence in the South Korean market.

Exhibition Items Introduction

1. Monitoring Systems (L·eye, L·eye Mobile)
Real-time PV monitoring, fault alerts, and performance analysis, with smartphone access via L·eye Mobile.

2. Measurement-Linked PR Software (Mieruka Web)
Transforms PV monitoring data into visually appealing web content to promote environmental contributions.

3. PV Simulation Software (Solar Pro)
High-precision power generation simulations considering module-level shading effects, with advanced 3D shadow and reflected light analysis. Planned PVGIS integration will enable simulations using global satellite and meteorological data.

4. Self-Consumption Control (Solar Legato Ⅱ)
Uses control technology patented in Japan to minimize reverse power flow risks and maximize solar power utilization. Advanced tracking and PCS pickup control reduce unnecessary output restrictions.

5. Measurement and Control Devices (Solar Link ZERO, FLIPLINK)
Precise measurement and control devices for data collection and system integration.

W-29

LayTec AG

Company Introduction

LayTec, founded 1999 in Berlin, is a major provider of in-situ and in-line optical metrology for thin-film processes and PV encapsulation quality control. LayTec's InspiRe metrology system monitors all relevant perovskite formation processes in-situ by reflectance spectroscopy. Ideally, it can be complemented by LayTec's spectral or time-resolved photoluminescence metrology system PearL, which can be applied in-situ or in-line.
Both systems can also be used for monitoring degradation. For encapsulation testing, LayTec provides non-destructive metrology system for lamination process control as well as further solutions for polymer testing.

Exhibition Items Introduction

LayTec will present its portfolio for integrated metrology for thin film manufacturing with a focus on perovskite and tandem solar cells.
InspiRe is LayTec's spectral in-situ monitoring tool for various compound semiconductors such as perovskites and CIGS. https://laytec.de/products/inspire
PearL and t-PearL provides comprehensive photoluminescence characterization of compound semiconductor thin-films. https://laytec.de/products/pearl-tpearl
Flames provides in-line monitoring of multi-layer thin-film structures in large area processes by means of spectral reflectance. https://laytec.de/products/flames

List of Exhibitors (A-Z)

W-20

LK CHEM Co., Ltd.

(주)엘케이켐

Company Introduction

LK Chem researches and develops core materials for next-generation perovskite solar cells, leading innovation and sustainable growth in the renewable energy industry.

Exhibition Items Introduction

Among perovskite powders, FAPbI3 and MAPbI3 are widely used for high-efficiency solar cell research with bandgaps of about 1.5 and 1.6 eV. FAPbBr3 and MAPbBr3, which have relatively large bandgaps of about 2.2 and 2.3 eV, enable semi-transparent film fabrication, and research is underway for indoor solar cell materials. And mixing iodide-based black powder and bromide-based powder can easily control the bandgap. In the case of precursors, the Pb source,which is the central element and halide source, is a core material that greatly affects performance. The FA source is the main precursor for high-efficiency formulation. Besides, there are the MA source, which is the main material for formulating MA-based perovskite solar cells, and the Cs source, which is a key material for stability and bandgap adjustment. LK CHEM stably secures and sells these perovskite black powders and precursor materials, contributing to related research and commercialization.

W-33

McScience Inc.

(주)맥사이언스

Company Introduction

Founded in 2000, McScience is trying to provide the components, equipment, and test solutions to enable intelligent and efficient scientific research and development. McScience will continue to innovate and challenge itself to offer cutting-edge technologies, innovative services, and creative solutions that inspire its customers, with aims to meet customer's needs.

Exhibition Items Introduction

MOTiV is a high-precision source meter-based I-V analysis system optimized for display device measurement, supporting stable and accurate voltage/current sourcing and measurement. By featuring independent internal current measurement channels, it enables delicate current sensing and rapid response. It supports both 2-wire and 4-wire measurement methods, ensuring precise data acquisition under diverse sample conditions. Furthermore, it supports both local and remote (wired/wireless) control for flexible integration into various research environments. From R&D experiments to production line testing, MOTiV is the core solution for maximizing reliability and efficiency in display metrology.

List of Exhibitors (A-Z)

W-53

NEOMEZ

(주)네오메즈

Company Introduction

NEOMEZ specializes in precision measurement and diagnostics for the power and renewable energy industries. In Korea, we provide end-to-end diagnostic services for PV plants and power facilities, from on-site measurement to performance analysis.For international markets, we develop and supply PV MASTER and PQA, the field-proven diagnostic instruments behind these services, to O&M providers, EPC contractors, testing institutes, and research organizations.

Exhibition Items Introduction

NEOMEZ presents the instruments at the core of its diagnostic services, proven through extensive field use in Korea.

PV MASTER | PV System Diagnostics
Diagnoses the condition and performance of PV systems at the module and string level. Based on I–V curve measurement, PV MASTER goes beyond curve tracing to evaluate performance against expected values and identify underperformance and defects.

PQA | Power Quality Analysis
Measures and analyzes voltage, current, and harmonics to support stable system operation and equipment protection.

Environmental Sensors | Environmental Monitoring
Measure irradiance, module and ambient temperature, wind speed, and wind direction, providing the reference conditions for accurate performance assessment. These sensors are manufactured by Seven Sensor Solutions (Türkiye) and supplied by NEOMEZ in Korea as part of its diagnostic services.

These instruments provide the measurement data required for PV system performance evaluation, reliability verification, R&D, maintenance, and plant operation.

W-14

New Energy Fair OSONG 2027

2027 뉴에너지 페어 오송

Company Introduction

Connecting Energy, Creating the Future!
About NEW ENERGY FAIR OSONG(June 23 (Wed)–25 (Fri), 2027)
2027 NEW ENERGY FAIR OSONG is a specialized exhibition and networking platform dedicated to sharing innovative technologies and visions for the future of the energy industry in the era of carbon neutrality and energy transition.
Bringing together companies, institutions, and industry professionals across various sectors, including solar energy, hydrogen, secondary batteries, Energy Storage Systems (ESS), power technologies, and emerging energy industries, the event provides opportunities to explore the latest technologies, exchange industry insights, and foster business partnerships.
Through collaboration and innovation, NEW ENERGY FAIR OSONG aims to accelerate the growth of the energy industry and create new opportunities for a sustainable future.
Discover the Future of Energy. Connect, Collaborate, and Innovate!

Exhibition Items Introduction

2026 New Energy Fair Osong promotional items, Osco promotional booklet, etc

List of Exhibitors (A-Z)

W-32

Novel Technology Co., Ltd.

(주)노벨테크놀로지

Company Introduction

Founded in 2015, Novel Technology is a specialized solar monitoring company that develops and supplies the WMU (Web Monitoring System) series and RSD (Rapid Shutdown Device), and holds GS Grade 1 certification.

Exhibition Items Introduction

1. WMU Series

A smart solution for real-time remote monitoring of solar power facilities. Installation is possible on-site immediately without a separate internet line. Inverter generation data can be stored and analyzed on an hourly, daily, and monthly basis. Monitoring is available on both PC and smartphone, with simultaneous support for multiple inverter types. Rapid root cause analysis through fault history logging maximizes power plant operational efficiency.

- Wired Monitoring System : WMU-P[D] / WMU-Premium+
- Wireless Monitoring System : WMU-LTE

2. RSD (Rapid Shutdown Device)

An emergency shutdown device installed on the DC output line of series-connected module strings (arrays). In the event of a fire or other emergency, it immediately reduces DC voltage to prevent the risk of electric shock to firefighters and workers, ensuring safe and effective fire suppression operations.

W-10

OMA

오엠에이이엔지(유)

Company Introduction

Established in 1991, our company has been supplying high-quality components and equipment in the field of optics through technical exchanges with leading domestic research institutes, universities, and companies. Leveraging our extensive experience and know-how, we have been supplying customized systems in the solar cell sector for over 25 years, working closely with users across our diverse business fields.

Exhibition Items Introduction

Solar Cell Efficiency Measurement System

- Xenon Solar Simulator
- LED Solar Simulator
- Calibrated Standard Reference Solar Cell
- Solar Cell IV & MPPT Tracking System
- Quantum Efficiency Measurement System(External & Internal QE measurement per wavelength)
- Solar Cell Stability Analysis System at low & high temperature.

List of Exhibitors (A-Z)

W-31

Optigon Inc.

Company Introduction

Optigon is a materials characterization company with a focus on accelerating optical characterization of perovskite PV using our flagship product, the Prism. Prism is an automated, high-throughput, multi-modal system which rapidly acquires data and integrates data analysis, to speed up experimental iteration times and accelerate device insights.

Exhibition Items Introduction

We will bring a demonstration unit of the Prism (50 cm x 50 cm x 70 cm) and paper copies of specification sheets and product information. We plan to do live demos of our measurement system on reference samples (plastic microscope slides). We will also have an iPad and 2 laptops.

W-26

PVQuick LLC

Company Introduction

PVQuick LLC is a U.S.-based developer of web-based photovoltaic design and feasibility software, focused on large ground-mounted solar plants.

Exhibition Items Introduction

PVQuick supports 10 array configurations, 8,760-hour simulation, investment analysis, PV-plus-storage and solar streetlight design. Calculations have been compared with published measurements and PVPMC datasets.
An integrated AI agent and AI Hub connect design assistance with user and expert feedback.

List of Exhibitors (A-Z)

W-16

RIST

포항산업과학연구원

Company Introduction

RIST (Research Institute of Industrial Science & Technology) is a commercialization-oriented research institute fully funded and established by POSCO, conducting R&D in key areas including environment, advanced materials, hydrogen and low-carbon technologies, K-Steel innovation, energy, and analytical sciences.

Exhibition Items Introduction

Next-generation BIPV (Building-Integrated Photovoltaic) technologies and solutions
1. Color Color BIPV Front Glass: High-aesthetic colored glass achieving an optimal balance between architectural design and solar efficiency
2. Steel-Integrated Module (200x200mm): Innovative lightweight design featuring enhanced fire resistance via rear high-corrosion-resistant PosMAC
3. Metal-Panel-Integrated Module & System: Advanced building energy solutions maximizing construction efficiency and structural stability

W-28

Sangsang Technology Co., Ltd.

주식회사 상상기술

Company Introduction

Sangsang Technology Co., Ltd. was established in October 2016 as a specialized distributor of solar PV products and has continued to grow alongside the development of the domestic solar industry.

We supply and distribute key solar PV products, including solar modules and inverters, to solar installation companies, EPC contractors, and solar power plant operators across Korea.

Sangsang Technology Co., Ltd. is committed to becoming a trusted solar PV specialist that grows together with its customers through the supply of high-quality solar PV products and professional technical support.

Exhibition Items Introduction

The solar modules we supply are manufactured by JA Solar, a globally recognized Tier 1 manufacturer. Starting in November 2026, we plan to focus on supplying high-efficiency 650W-class modules with a module efficiency of 24.1%, as well as standard models with a module efficiency of 23.3%.

In addition, as the official distributor of Growatt, a global solar inverter manufacturer, we supply a wide range of inverters, primarily in the 150kW, 125kW, 50kW, 36kW, and 20kW classes, to our key customers for commercial and industrial solar power projects.

List of Exhibitors (A-Z)

W-43

SCOTRA Co.,Ltd.

스코트라(주)

Company Introduction

- Since introducing the world's first commercialized floating solar model at Hapcheon Dam with K-WATER in 2012, SCOTRA has maintained its position as the leading company in installation experience and expertise, establishing itself as a specialist in eco-friendly energy infrastructure.
- Beyond the construction of floating solar systems, SCOTRA directly manufactures key components, including floats and structural materials, and manages the entire process on a one-stop basis, from design and manufacturing to installation and operation and maintenance.
- In particular, based on approximately 60 patented technologies, SCOTRA has secured outstanding structural stability and durability even under harsh environmental conditions, while maximizing the value of floating spaces in response to the enlarged and the advanced market.
- As carbon neutrality and RE100 commitments have become essential worldwide, SCOTRA is leading the global floating platform market with strong production infrastructure and specialized expertise.

Exhibition Items Introduction

- Innovative, Durable, and Flexible Design for Challenging Water Environments.
  SCOTRA's floating solar system is engineered with an eco-friendly and flexible structural design, allowing sunlight, wind, and water to pass naturally through the system while effectively responding to external forces.
- The floating structure is designed to accommodate pressure relief, thermal expansion, and contraction, minimizing structural deformation. The buoyancy design also helps maintain system stability even in the event of partial damage to a floater.
- For enhanced durability, the structural frame utilizes highly corrosion-resistant zinc-aluminum-magnesium coated steel, providing excellent protection against corrosion and supporting long-term operation in demanding water environments.
- The system is engineered to withstand strong typhoons and severe wave conditions, with a flexible structural design capable of responding to wind speeds of 45 m/s or higher.
- Backed by extensive field experience, SCOTRA has accumulated approximately 2,000 mooring installation references and demonstrated stable mooring technology in water depths of up to 75.5 meters.

W-1

SG Energy Co., Ltd.

(주)에스지에너지

Company Introduction

SG Energy Co., Ltd. is the No.1 BIPV specialist in Korea, connecting architecture and energy through a wide range of BIPV modules including colored, white, patterned, and design products, leading a sustainable future.

Exhibition Items Introduction

This exhibition presents a diverse range of Building-Integrated Photovoltaic (BIPV) systems. It showcases standard, color, design, and media façade BIPV products applicable as architectural exterior materials, along with real-world installation cases, highlighting their technological differentiation and high product quality.

SG Energy provides fully customized solutions based on a 100% made-to-order system, enabling optimized specifications and design flexibility tailored to architectural requirements, while delivering an integrated BIPV solution covering design, manufacturing, construction, and operation. In addition, its proprietary brand 'InnoM' offers a structured product lineup for different applications, including standard, design-oriented, and functional BIPV solutions.

Notably, the anti-reflective color BIPV modules have been installed across approximately 60 sites with a total capacity of 2 MW, demonstrating proven reliability without discoloration or delamination. The Dot Pattern technology also ensures stable power generation performance without output deviation while enhancing installation efficiency.

List of Exhibitors (A-Z)

W-54

SHINSUNG E&G Co., Ltd.

㈜ 신성이엔지

Company Introduction

SHINSUNG E&G is a Korean company specializing in renewable energy and clean environment solutions. Drawing on our experience in solar module manufacturing, we provide high-efficiency solar modules and comprehensive solar energy solutions, including engineering, procurement and construction (EPC), operations and maintenance (O&M), and support for RE100 implementation. Through innovative technology and reliable quality, we are committed to building a sustainable future.

Exhibition Items Introduction

SHINSUNG E&G presents high-efficiency, high-power solar modules designed for a range of installation environments. Our solar solutions support the transition to renewable energy, from module supply to solar power system development and RE100 implementation.

W-56

SJ Advanced Materials

(주)에스제이신소재

Company Introduction

SJ Advanced Materials is an advanced materials company specializing in the development and production of colored glass for Building-Integrated Photovoltaics (BIPV), functional coatings, and semiconductor/display materials.

Exhibition Items Introduction

SJ Advanced Materials will showcase colored glass and colored modules for Building-Integrated Photovoltaics (BIPV). Based on BIPV colored glass that achieves both various color expressions and power generation performance, we present solutions that integrate architectural design with renewable energy generation. In addition, we will introduce colored modules incorporating next-generation perovskite solar cells, highlighting the future direction of high-efficiency and aesthetically advanced BIPV technologies.

List of Exhibitors (A-Z)

W-35

SKSE Co., Ltd.

(주)에스케이에스이

Company Introduction

SKSE Co., Ltd. is a specialized manufacturer that designs, produces, and constructs high-quality, high-efficiency BIPV, and is a solar energy company providing total solutions, including the distribution of PV modules and inverters as well as installation services.

Exhibition Items Introduction

Color BIPV Modules and Vision Stripe Module

W-55

Sunic system Co., Ltd.

(주)선익시스템

Company Introduction

Sunic system is a global leader in OLED evaporation equipment. Leveraging our world-class deposition technology, we lead innovation in next-generation solar (Perovskite) and display industries, providing optimized high-tech solutions.

Exhibition Items Introduction

Sunic system will showcase its perovskite solar cell evaporation system at WCPEC-9. Based on proven high-precision vacuum deposition technology, the systems deliver large-area uniform deposition, precise thickness control, and stable process reproducibility

List of Exhibitors (A-Z)

W-23

SUZHOU TDM TECHNOLOGY CO., LTD

Company Introduction

TDM Technology Co., Ltd., based in Suzhou Industrial Park, specializes in high-precision thin film measurement equipment. Guided by first-principles thinking, we pioneer non-destructive testing technologies to break technical barriers. We provide comprehensive offline, inline, and in-situ inspection solutions for strategic industries like photovoltaics, semiconductors, and advanced displays.

Exhibition Items Introduction

We provide comprehensive offline, inline, and in-situ inspection solutions for strategic industries like photovoltaics, semiconductors, and advanced displays. Offline Thin Film Measurement, Inline Production Line Measurement, In-situ Real-time Monitoring, Reliability & Electrical Safety testing equipment.

W-18

Tau Science Corporation

Company Introduction

Tau Science has designed automated metrology and inspection systems for PV customers since 2008. Tau offers several product lines and also builds custom machines to meet your specific requirements in the laboratory or manufacturing line. Our machines are used to characterize single- and multi-junction Silicon, Perovskite, CdTe, III-V, and emerging materials. Tau Science products include:

PixEL, a general purpose imaging machine that can be configured with a variety of cameras.
CMOS and InGaAs cameras for EL, PL, ERE and transmission mode imaging.
Multiple LED and Laser lightsources are available for multi-junction work.
LWIR cameras for hotspot imaging.
Please note that PixEL can be configured to measure individual cells, mini-modules or modules up to 2.6x1.6m.

MiniMod-SMU, an IV tester that can be configured with 20 to 800 individually controlled 4-quadrant Source Measure Units (SMU's). This model is optimized for minimodules up to 500mA, 22V and is intended for outdoor or rooftop use to assess long-term stability and performance. The system performs periodic IV sweeps on each connected device and holds the sample at a specified condition (Voc, Isc, or MPP) between sweeps.

Exhibition Items Introduction

We will bring electronic and printed materials to discuss PixEL, MiniMod-SMU and our custom products. Please visit us to discuss your measurement needs.

List of Exhibitors (A-Z)

W-51

TNE TECH CO., LTD.

(주)티엔이테크

Company Introduction

TNE TECH is a manufacturer and supplier of the measuring devices used in various fields, including photovoltaic, photoelectric, automotive and environmental energy. Based on research staffs in the relevant fields and the modularized technologies, TNE TECH provides you with the optimum measurement solution.

Exhibition Items Introduction

< Bifacial Tandem Module LED Solar Simulator >
- Continuous illumination solar simulator compliant with Class A++ A+ A++ performance
- Wide temperature-controlled test environment (0 °C to 80 °C)
- Advanced I-V measurement algorithms optimized for tandem PV Module

W-47

Unijet Co., Ltd.

(주)유니젯

Company Introduction

UniJet is a specialized provider of industrial inkjet systems, delivering high-precision printing and process solutions for semiconductor Packaging, Display, Waveguide for AR/VR/MR, Perovskite Solar Cells, and Fuel Cell applications. We collaborate with global customers to enable advanced manufacturing.

Exhibition Items Introduction

An inkjet printing system designed for next-generation Perovskite and Tandem Solar Cell processes. Based on high-speed transport and precision printing technology, it enhances process stability and production efficiency, while integrated inspection and maintenance functions provide an optimized solution for mass production applications.

List of Exhibitors (A-Z)

W-3

UniTest Co., Ltd

(주)유니테스트

Company Introduction

Unitest is a pioneering technology enterprise that spearheads the global semiconductor testing equipment market, while architecting a sustainable future through groundbreaking innovations in renewable energy, notably next-generation perovskite solar cells.

Exhibition Items Introduction

Beyond the Limits of Energy: Next-Generation Perovskite Solar Cell Applications
Experience the infinite potential of Perovskite Solar Cells (PSCs), a next-generation innovative technology accelerating the future of renewable energy. At WCPEC-9, we present commercially viable PSC applications that have advanced beyond the research phase and are ready for immediate integration into real-world industries and daily life. We are proud to showcase our latest prototypes and mass-production models developed for our partners, realized through our proprietary large-area mass-production technology and process optimization.

[Exhibition Highlights]

1. Smart Energy Devices for Everyday Life
   Perovskite Solar Cells for Mobile Device Covers
   A consumer-friendly (B2C) application that perfectly integrates solar cells into the covers of smartphones, wearables, and portable IT devices, providing continuous auxiliary power throughout your daily life.

2. The Core of the Eco-Friendly IoT Era: Ultra-Low Power Solutions
   Battery-Free Electronic Shelf Labels (ESL) for Indoor Light Harvesting
   A sustainable power solution for smart retail and IoT devices, capable of permanent operation without battery replacements. It demonstrates exceptional photoelectric conversion efficiency even in low-light indoor environments.

3. Adding Eco to Everyday Life : Electricity Everywhere
   Incredibly Thin and Lightweight Flexible Perovskite Solar Cells for Portable Power Banks & Notebook Covers
   These trendy, eco-friendly items seamlessly integrate incredibly thin and light flexible solar cells into portable power banks and premium notebook covers. Acting as your own small power plants, they naturally harvest and store light energy from everyday environments without a separate adapter, providing ultimate convenience to charge smart devices anytime, anywhere.

4. An Aesthetic Approach to Zero-Energy Architecture in Urban Environments
   Full-Color Building-Integrated Photovoltaics (BIPV)
   Customized full-color BIPVs that generate energy without compromising architectural design value. Capable of rendering a diverse range of colors, they seamlessly integrate into the facades and windows of urban buildings.

5. Form Factor Innovation Surpassing Limitations
   Ultra-Lightweight Flexible/Thin-Film Perovskite Solar Cells (180 cm^2, 360 cm^2)
   A culmination of our exclusive large-area coating and patterning technologies. These next-generation modules can be flexibly applied to curved surfaces and various load-sensitive structures where lightweight properties are essential.

Exhibition Stage

Date November 16(Mon)-19(Thu)

Venue Stage(nearby Hall 4, exit), DCC 2 Exhibition Hall(2~4)

Program

Time	DAY 1 Nov.16.(Mon)	DAY 2 Nov.17.(Tue)	DAY 3 Nov.18.(Wed)	DAY 4 Nov.19.(Thu)
AM (10:00 – 12:00)		Energy Talk Concert 1	Stage Busking	Stage Busking
Break				
PM (14:00 – 18:00)	Industry Forum Day 1	Industry Forum Day 2	Energy Talk Concert 2 Stage Busking	Industry Forum Day 3

Energy Talk Concert

Date - Day 1 : Nov.17.(Tue), 11:00-12:00
- Day 2 : Nov.18.(Wed), 14:00-15:00

Topic Solar Photovoltaics and Energy



Nov. 17.(Tue)
11:00-12:00

Science Communicator
EXO

- CEO of Exo Planet Co., Ltd.
- 13 years of expertise in biotechnology and stem cell research.
- A popular science educator/entertainer featured on many broadcasts, such as tvN's You Quiz on the Block



Nov. 18.(Wed)
14:00-15:00

YouTube Science Creator
HANGSUNG

- CEO, More Science Inc.
- Science Creator at popular YouTube channel "Unreal Science (안될과학)"
- Ph.D. in Astrophysics
- Featured as an expert panelist and science communicator across major broadcasts: tvN, KBS, EBS, etc.

Industry Forum

Day 1 **Solar PV Technology Innovation Forum**

Date/Time Nov. 16.(Mon), 14:00-16:00

Host KETEP

Time	Program	Speakers		
14:00-14:05	Opening			
14:05-14:10	Opening Remarks	KETEP		
14:10-14:25	Presentation / Solar PV R&D Achievements and Future Directions	KETEP		
14:25-14:40	Industry Presentation ① / Tandem PV Technologies and Solar Applications in Space and Special Environments	Hanwha Solution Qcells		Soojin Moon Director of Pangyo R&D Center
14:40-14:55	Industry Presentation ② / Next-Generation Inverters and Power Grid Integration	KEPCO		Junbo Sim Senior Researcher, KEPCO Research Institute
14:55-15:05	Panelist Introduction and Discussion Overview			
15:05-15:35	Thematic Panel Discussion and Recommendations for Publicly Funded R&D	Future Markets	Hanwha Solution Qcells	Soojin Moon Director of Pangyo R&D Center
			FLEXELL SPACE	Shinyoung Noh Chief Technology Officer
		Future Power Grids	KEPCO Research Institute	Junbo Sim Senior Researcher
			DASSTECH	Byunghun Ra Managing Director
15:35-15:50	Audience Q&A and Moderator's Summary			
15:50-16:00	Closing Remarks and Group Photo			

Exhibition Stage

Industry Forum

Day 2 **Invited Talk & Tech Pitching (Domestic companies)**

Date/Time Nov. 17.(Tue), 14:00-16:00

Time	Program	Speakers
Invited Talk		
14:00-14:40	***3 Years of SNEC: Tracking Solar Technology Trends***	Dr. Young-Joo Eo, Principal Researcher, Korea Institute of Energy Research
Tech/Company Pitching		
14:40-14:50	SG Energy Co., Ltd.	
14:50-15:00	SHINSUNG E&G Co., Ltd.	
15:00-15:10	ENERGYNET Co., Ltd.	
15:10-15:20	SKSE Co., Ltd.	
15:20-15:40	Break time	
15:40-15:50	Unitest Co., Ltd.	
15:50-16:00	SCOTRA Co., Ltd.	

Day 3 **Invited Talk & Tech Pitching (International companies)**

Date/Time Nov. 19.(Thu), 14:00-16:20

Time	Program	Speakers
Invited Talk		
14:00-14:40	***From Innovation to Industrial Impact: Key Results from the ALPACA Project***	Dr. Felipe Valencia, CTO of ATAMOSTEC, Chile
Tech/Company Pitching		
14:40-14:50	LayTec AG	
14:50-15:00	IEA PVPs	
15:00-15:10	Suzhou TDM Technology Co, Ltd.	
15:10-15:20	PVQuick LLC	
15:20-15:40	Break time	
15:40-15:50	Laplace System	
15:50-16:00	FLUXIM AG	
16:00-16:10	Tau Science Corporation	
16:10-16:20	Eternal Sun I WAVELABS	

Stage Busking

Performance Dates Day 1 : Nov.18.(Wed), 11:00 - 12:00 / 15:30 - 17:00 (2 times)
Day 2 : Nov.19.(Thu), 11:00 - 12:00

Nov. 18. (wed)

11:00-12:00



Funky & Rock-Style 4-Piece Band

Flat chacha

"Energetic performances and captivating melodies await with Flat Chacha!"

Awarded first place at the Daejeon Music Festival, they bring together diverse Korean and international music to create an exciting stage filled with vibrant energy and captivating melodies.

15:30-17:00



Ballad & Acoustic Solo Performance

Suyun Chae

"Hello! I'm Suvun Chae, a graduate student who loves singing and making music."

A solo performer with a passion for singing and music, Suvun Chae brings heartfelt ballads and acoustic melodies to the stage. Through acoustic guitar, enjoy a selection of Korean folk and indie music in a warm and intimate atmosphere.

Nov. 19. (Thu)

11:00-12:00



3-Piece Acoustic Band

Add-lib

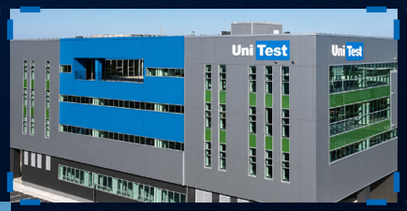
A three-piece acoustic band based in Daejeon, Add-lib explores a wide range of musical genres without boundaries. From gentle ballads to lively rhythms, their diverse repertoire creates a warm and engaging musical experience.

Creativity and Challenge
창의와 도전으로 더 나은 미래를 만듭니다.

Uni Test

세계 최고 수준의 기술력으로 지속 가능한 내일을 만드는 기업

유니테스트





설립
2000년 3월
(2006년 KOSDAQ 상장)

주요 사업
반도체 검사 장비 & Green Energy
(EPC, 차세대 태양전지)

차세대 페로브스카이트 리더

기술 선도
2016년부터 한국화학연구원과 공동 연구 및 기술 이전

NREL 공인
페로브스카이트 태양전지 모듈 효율 세계 최고 기록 (**20.6%**) 달성

안정성 입증
TUV로부터 광안정성 인증 획득

생산 인프라
평택 Pilot Line 구축 및 새만금 대규모 제조시설 투자 확약

양산 모듈 출하
IoT 제품에 적용된 첫 번째 Perovskite 양산 모듈 출하

Green Energy EPC

풍부한 실적
태양광 발전 시스템 설치 및 시공(EPC) 누적 **425MW** 달성
(ESS 144.424MW)



World-class | Technology | Sustainable | Building Tomorrow

K water 한국수자원공사

2030년 AI 물관리 세계 1위 기업

2030년 전략목표

2025 AI First 전략기획단
⊕
물에너지 Re:boot TF
산업용수 활성화 TF

2024 신성장 Speed UP 추진단
⊕
글로벌 Scale Up 추진단

2023 Inno-WAVE 추진단

- **DT 물관리** 글로벌 확산 및 세계 최초 수자원위성 본격 운영
- **AI정수장 완전 자율운영** (Level 3) 및 자체 AI데이터센터 구축
- **물에너지** 10GW 개발 및 햇빛 소득마을 447개 조성
- **기후테크** 유망기업 동반 해외진출로 수출 9,000억원 누적 달성
- **중대재해 ZERO** 종합청렴도 및 ESG 경영 최고등급 유지

CN씨티에너지

41st ANNIVERSARY 1985 — 2026

Bridge for Carbon Neutrality

1985년 창립 이후, 성장을 멈추지 않았습니다.

CN씨티에너지는 지역에 안전하고 안정적으로 도시가스를 공급해 온 경험을 바탕으로, 도시에 탄소중립 에너지를 공급하는 기업으로 변신하고 있습니다.

첫째,
대전열병합발전 현대화로 충청권의 친환경·고효율 에너지 생산 거점을 만들고 있습니다.

둘째,
태양광·LFG 바이오·에너지 컨설팅 등 신사업을 전국 분산형 전원 인프라로 넓히고 있습니다.

앞으로 배관망, 열병합 허브, 전국 분산자원을 하나로 묶은 'AI 기반 에너지 인프라 포트폴리오 기업'으로 전환하여, 국가 분산에너지 정책과 전력 계통 안정화에 기여하는 핵심 파트너가 되겠습니다.

AI 기반 에너지 인프라 포트폴리오 기업,
CN씨티에너지



안전 & 신뢰 배관망
도시가스



충청권 에너지 생산 허브
대전열병합 발전



지속가능한 ESG
태양광 발전사업

에너지넷 I ENERGYNET

Energy Net

㈜에너지넷은 한국에너지공과대학교(KENTECH) 연구 기반 창업 기업입니다.
투광형 건물일체형태양광(BIPV) 모듈 개발, BIM 기반 제로에너지건축물(ZEB) 설계 시뮬레이션, 에너지 효율화 및 탄소배출 관리 기술을 바탕으로 지속가능한 에너지 전환을 위한 통합 솔루션을 제공합니다.

ENERGYNET Co., Ltd. is a research-based startup founded on the expertise of Korea Institute of Energy Technology (KENTECH).
Leveraging its expertise in the development of semi-transparent Building-Integrated Photovoltaic (BIPV) modules, BIM-based Zero Energy Building (ZEB) design simulation, energy efficiency optimization, and carbon emissions management technologies, ENERGYNET provides integrated solutions for a sustainable energy transition.

주요사업
BUSINESS PORTFOLIO

디지털설계기술

3D BIM기반 디지털 설계 기술로 건축물의 BIPV 적용 가능성을 검토하고, 설치 설계와 에너지 성능을 체계적으로 분석
Leveraging 3D BIM-based digital design technology to assess the feasibility of BIPV integration into buildings and systematically analyze installation design and energy performance.

DIGITAL DESIGN TECHNOLOGY

BIM-ZENS플랫폼

BIM-ZENS는 건축물의 에너지 설계와 제품 정보를 연계하고, 프로젝트 참여자 간 협업 및 유지관리 서비스 활용을 지원하는 웹 기반 플랫폼
BIM-ZENS is a web-based platform that integrates building energy design with product information, facilitating collaboration among project stakeholders and supporting the use of maintenance and management services.

BIM-ZENS PLATFORM

투광형 BIPV

한국전력공사의 반투명 페로브스카이트 태양전지 관련 핵심특허 기술 이전을 기반으로 건축물 적용형 차세대 태양광 기술의 사업화를 추진
Advancing the commercialization of next-generation building-integrated photovoltaic technologies through the transfer of key patented technologies for semi-transparent perovskite solar cells from Korea Electric Power Corporation (KEPCO).

SEMI-TRANSPARENT BIPV

에너지융합시스템

태양광 발전설비 도입과 고효율 설비 개선을 통한 에너지 비용 절감 및 온실가스 감축 실현
Achieving energy cost savings and greenhouse gas emissions reductions through the deployment of solar photovoltaic (PV) systems and upgrades to high-efficiency equipment.

ENERGY CONVERGENCE SYSTEM

www.energynet.co.kr

Useful Information

Conference A to Z

Registration - WCPEC-9

Registration Desk







Conference Registration Desk	
Venue	1F Lobby, Daejeon Convention Center (DCC) – DCC1
Date/Time	November 14 (Sat), 15:00–18:00
	November 15 (Sun)-19 (Thu), 07:30-17:00
	November 20 (Fri), 07:30–11:00

Registration Fee

On-site payments are accepted by credit card only and must be made in Korean Won (KRW).

On-site Registration	
Participant	900,000 KRW
Student	300,000 KRW

Registration Package

· Items Provided: ID Card(Name Badge), Conference Kit, and 'Ontong Daejeon' Local Prepaid Card

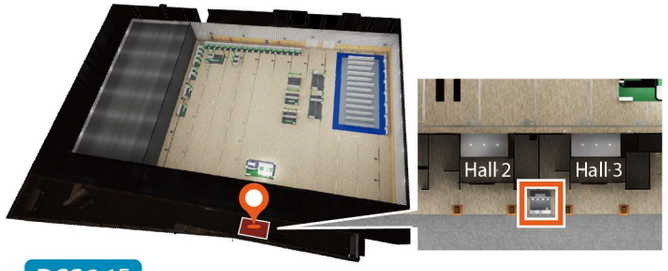
※ Items provided in addition to the ID card may vary depending on the registration category (e.g., reusable bag).

※ The 'Ontong Daejeon' card is a local prepaid card worth 40,000 KRW, which can be used at participating stores within Daejeon, Republic of Korea. It is provided in place of the lunch coupon.

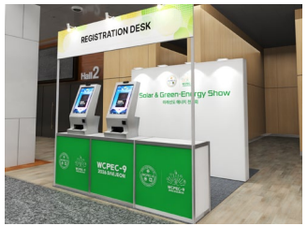
※ Not valid at department stores, Large-scale retail stores (e.g., Sungsimdang Bakery), or entertainment and gambling establishments.

Registration - Solar & Green-Energy Show

Registration Desk







※ Please note that attending the Conference sessions at Exhibition Hall 1 requires a separate paid registration.

※ Participants who have completed conference registration may visit the exhibition without separate exhibition registration.

Exhibition	
Venue	1F Lobby, Daejeon Convention Center (DCC) – DCC2
Date/Time	November 15 (Sun), 14:00–18:00
	November 16 (Mon)–19 (Thu), 09:00–17:00

Registration Fee

Admission to the exhibition is FREE of charge.

Certificate of Participation

· The Certificate of Attendance will be available for issuance through My Page on the conference website after the conference.

· If you are unable to issue the certificate through the website or require an Exhibition Participation Certificate, please contact the Secretariat Office at registration@wcpec-9.com to request its issuance.

· Certificates will be issued only to the applicant personally. Please submit your request by November 30, 2026 (Mon).

· The Certificate of Participation will be issued within two weeks of the request date.

Conference A to Z

Luncheon

How to Use



40,000 KRW Daejeon Local Prepaid Card

Ontong Daejeon

- Valid at participating stores in Daejeon, Republic of Korea.
- Please visit nearby convenience stores and restaurants to use this card.
- Not valid at department stores, Large-scale retail stores (e.g., Sungsimdang Bakery), or entertainment and gambling establishments.
- Please check with each store before using the card to confirm acceptance. (Accepted at most nearby stores.)

*'Ontong Daejeon' will be distributed to eligible registrants only.

Nearby Luncheon Locations



Coffee break

Schedule (Subject to Change)

Time	Venue (DCC1)	Nov. 15(Sun.)	Nov. 16(Mon.)	Nov. 17(Tue.)	Nov. 18(Wed.)	Nov. 19(Thu.)	Nov. 20(Fri.)
AM (~12:00)	1F (Meeting Room Lobby)			O	O	O	O
	2F Lobby			O	O	O	O
	3F Lobby	O					
PM (14:00~)	1F (Meeting Room Lobby)		**O**	**O**	**O**	**O**	
	2F (Room 204)	**O (16:00)**	**O**	**O**	**O**	**O**	
	3F Lobby	**O (16:00)**			**O**		

*The coffee break is available only at **DCC 1**.

Conference A to Z

Shuttle Bus Service

Route 1. Transportation Hub

Date	Daejeon Station (KTX Train)	DCC	Daejeon Station (KTX Train)	Note
Nov. 15 (Sun) - Nov. 19 (Thu)	7:40	8:00	8:20	
	8:20	8:40	9:00	
	9:20	9:40	10:00	
	10:20	10:40	-	
	-	13:40	14:00	
	14:00	14:20	-	
	-	16:00	16:20	
	16:20	16:40	-	
	-	20:40	21:00	ONLY on Nov. 15
	-	19:20	19:40	ONLY on Nov. 16, 17 and 19
	-	21:10	21:30	ONLY on Nov. 17
	-	18:20	18:40	ONLY on Nov. 18
Nov. 20 (Fri)	7:40	8:00	8:20	
	8:20	8:40	9:00	
	9:20	9:40	10:00	
	10:20	10:40	-	
	-	12:40	13:00	

Route 2. Dunsan

Date	Hotel Graytone Dunsan	Government Complex Daejeon	DCC	Government Complex Daejeon	Hotel Graytone Dunsan	Note
Nov. 15 (Sun) - Nov. 19 (Thu)	7:30	7:50	8:10	8:30	8:50	
	7:40	8:00	8:20	8:40	9:00	
	8:50	9:10	9:30	9:50	10:10	
	9:00	9:20	9:40	10:00	10:20	
	10:10	10:30	10:50	-	-	
	10:20	10:40	11:00	-	-	
	-	-	13:40	14:00	14:20	
	14:20	14:40	15:00	-	-	
	-	-	16:00	16:20	16:40	
	16:40	17:00	17:20	-	-	
	-	-	20:40	21:00	21:20	ONLY on Nov. 15
	-	-	19:20	19:40	20:00	ONLY on Nov. 16, 17 and 19
	-	-	21:10	21:30	21:50	ONLY on Nov. 17
	-	-	18:20	18:40	19:00	ONLY on Nov. 18
Nov. 20 (Fri)	7:30	7:50	8:10	8:30	8:50	
	7:40	8:00	8:20	8:40	9:00	
	8:50	9:10	9:30	9:50	10:10	
	9:00	9:20	9:40	10:00	10:20	
	10:10	10:30	10:50	-	-	
	10:20	10:40	11:00	-	-	
	-	-	12:40	13:00	13:20	

Route 3. Yuseong

Date	Hotel Interciti	Government Complex Daejeon	DCC	Government Complex Daejeon	Hotel Interciti	Note
Nov. 15 (Sun) - Nov. 19 (Thu)	7:50	8:00	8:10	8:20	8:30	
	8:00	8:10	8:20	8:30	8:40	
	8:30	8:40	8:50	9:00	9:10	
	8:40	8:50	9:00	9:10	9:20	
	9:10	9:20	9:30	-	-	
	9:20	9:30	9:40	-	-	
	-	-	13:40	13:50	14:00	
	14:00	14:10	14:20	-	-	
	-	-	16:00	16:10	16:20	
	16:20	16:30	16:40	-	-	
	-	-	20:40	20:50	21:00	ONLY on Nov. 15
	-	-	19:20	19:30	19:40	ONLY on Nov. 16, 17 and 19
	-	-	21:10	21:20	21:30	ONLY on Nov. 17
	-	-	18:20	18:30	18:40	ONLY on Nov. 18
Nov. 20 (Fri)	7:50	8:00	8:10	8:20	8:30	
	8:00	8:10	8:20	8:30	8:40	
	8:30	8:40	8:50	9:00	9:10	
	8:40	8:50	9:00	9:10	9:20	
	9:10	9:20	9:30	-	-	
	9:20	9:30	9:40	-	-	
	-	-	12:40	12:50	13:00	

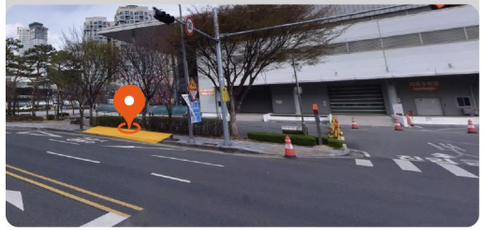
Route 4. Lunch

Date	DCC	Mannyeon-dong	DCC	Note
Nov. 15 (Sun)	13:00	13:10	-	
	-	14:20	14:30	
Nov. 16 (Mon)	11:40	11:50	-	
	-	13:20	13:30	
Nov. 17 (Tue) - Nov. 19 (Thu)	12:40	12:50	-	
	-	13:50	14:00	

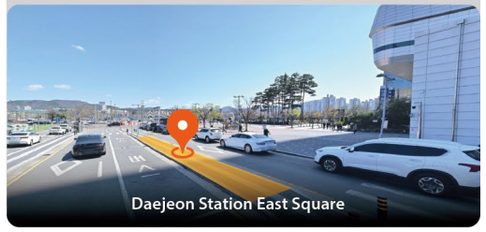
Conference A to Z

Shuttle Bus Service

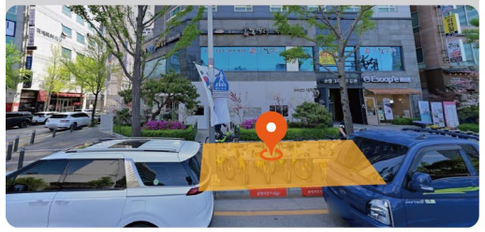
DCC



Daejeon Station (KTX Train)



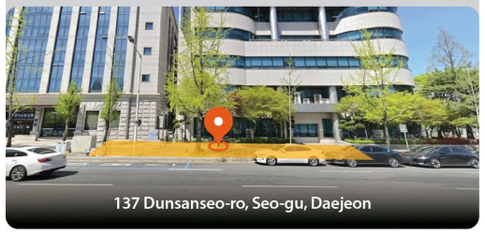
Hotel Graytone Dunsan



Government Complex Daejeon - Drop-off Point



Government Complex Daejeon - Boarding Point



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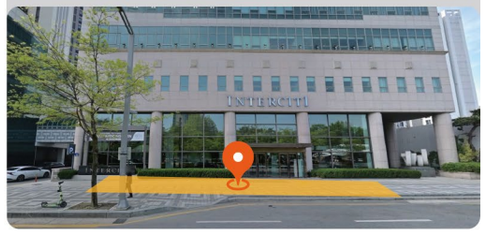
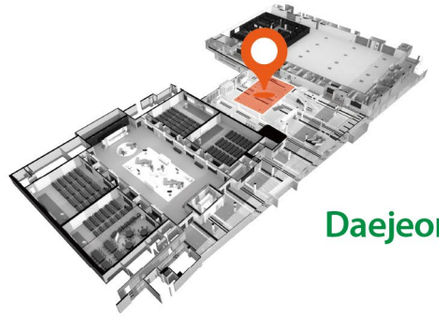


Mannyeon-dong



Tour Information desk



1F Lobby,
Daejeon Convention Center (DCC) – DCC1

Operating Hours | Nov 15–19, 07:30–17:00

Complimentary Tour

Nov 18 (Wed) & 19 (Thu), 14:00–18:00

Course 1 Experience Daejeon's culture and cuisine.

Course 2 Explore Daejeon's art and nature.

Technical Tour

Nov 18 (Wed), 14:00–18:30

Course 1 CAST at KIER **Course 2** SG Energy & SJ AM **Course 3** KRICT

See silicon and tandem solar cell production lines, BIPV and colored-glass manufacturing, and perovskite module fabrication laboratory.

Daejeon,
the Heart of Korea

Where science and tradition meet in harmony.
Home to Korea's largest R&D cluster, with 30 research institutes, 19 universities,
and 400+ corporate R&D centers, including KAIST.
Easy access within 2 hours from anywhere in Korea.

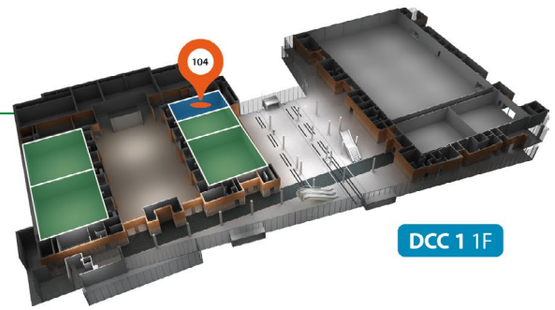




Conference A to Z

Useful Information

Preview Room (Speakers' Lounge)



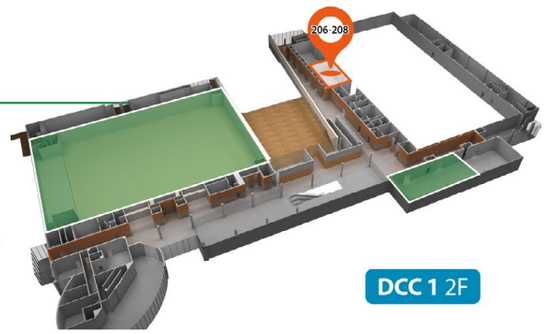
Location: DCC 1, 1F Room 104

Operating Hours:

- November 15 (Sun) - November 19 (Thu), 7:30 - 19:00 (KST)
- November 20 (Fri), 7:30 - 10:00 (KST)

- All speakers are required to check in at the Preview Room before their presentations.
- You may review your presentation file in the Preview Room before it is uploaded to the presentation room computer.
- During the review, please check that all fonts and images are displayed correctly and that all audio and video clips play properly. The computers in the presentation rooms will have the same configuration as those in the Preview Room.
- After reviewing your presentation and making any necessary changes, please notify an AV technician. The technician will check your file and upload the final version to the computer in your assigned presentation room.

Press Center



Location: DCC 1, 2F Room 206-208

Operating Hours

- November 16 (Mon) - November 19 (Thu), 9:00 - 18:00 (KST)
- November 20 (Fri), 9:00 - 12:00 (KST)

Weather in Daejeon

November 15-20, 2026

1°C ~ 14°C

What to Wear:
Warm outerwear such as a heavy jacket, coat, or light padding is essential, especially for outdoor activities in the morning and evening.

Currency

The official currency of Korea is the Korean Won (KRW).
Banknotes are available in 1,000, 5,000, 10,000, and 50,000 won denominations, while coins come in 10, 50, 100, and 500 won.

Electricity

Korea uses 220V at 60 Hz, with power outlets that have two round holes. But please check the power supply before use, because some hotels provide 110V outlets for the convenience of their customers.

Banks / ATM (Automated Teller Machines)

Banks are open Monday through Friday from 9 am to 4 pm. ATM service is typically available until 10 pm, although some ATMs offer service after 10 pm with additional fees.

Emergency Service

- Police 112
- Fire Department 119
- Medical Emergencies 119
- Infectious Disease Emergencies 1339

Korea Travel Hotline

1330 Korea Travel Hotline

Tel **+82-2-1330** (Available in Korean, English, Japanese, Chinese, Russian, Vietnamese, Thai, and Indonesian)

Website www.visitkorea.or.kr (Available in Korean, English, Japanese, Chinese (Simplified), Chinese (Traditional), French, Spanish, German, and Russian)

Liability and Insurance

The Organizing Committee will take no liability for personal injuries sustained by, or for loss or damage to property belong to meeting participants, either during or as a result of the meeting. It is, therefore, advised that participants arrange their own personal health, accident and travel insurance.

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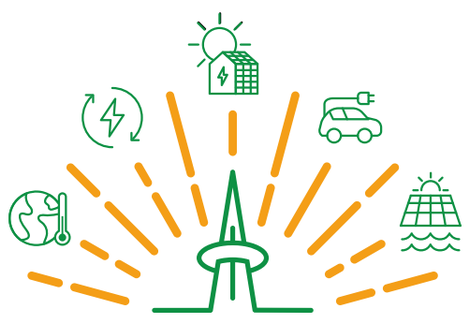

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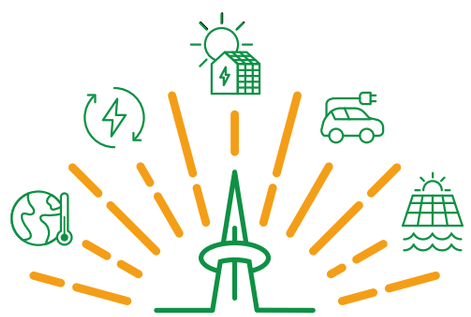

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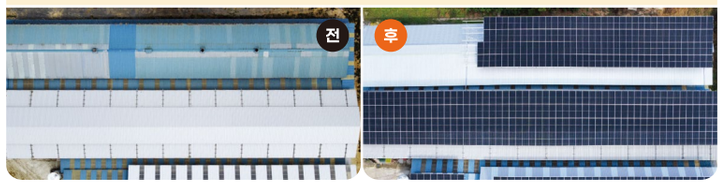
지붕 강판 교체 사례

이레 태양광 충남 당진시 금천리 — 700kW



태양광 발전소 시공 사례

홍상 태양광발전소 (축사 태양광) — 1.1MW



안성 시민참여 태양광발전소 (주차장 태양광) — 307kW



증산 태양광발전소 (토지형 태양광) — 2.1MW



태양유전 태양광발전소 (RE100 시공) — 1.4MW



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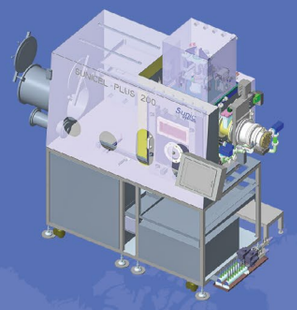
홈페이지 바로가기

Sunic system Perovskite System

Perovskite PRODUCT

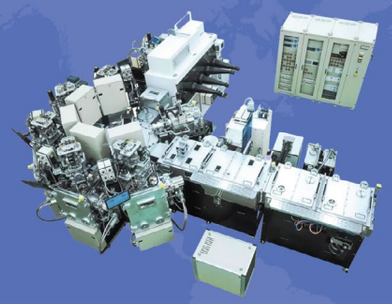
01 Stand Alone Type

- For R&D and Material Development Testing
- Glove-box Integrated Evaporator
- 100mm x 100mm Substrate



02 Cluster Type

- For R&D and Material Development Testing
- Multi-Cluster Type
- Global Standard Equipment
- 300mm Wafer Substrate



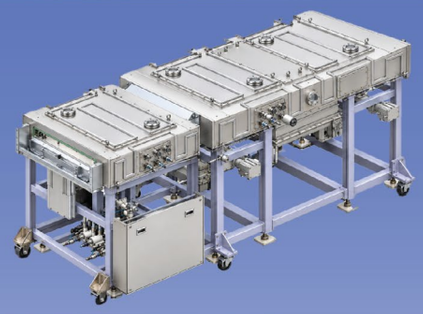
03 In-line Type

- World's First G8H Pilot In-line System
- Pilot & Mass Production System
- High Material Efficiency & High Throughput
- G8H 1,200mm x 2,400mm Substrate



04 Sputter

- For R&D In-line System
- Low-damage Sputtering
- Planar / Rotary Target
- Metal, Oxide (TCO)
- 300mm Substrate



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TECH 01 · ANTI-GLARE COLOR

눈부심 방지 기술이 접목된 무광(Matte) 컬러유리

빛을 여러 방향으로 분산시켜 반사광에 의한 눈부심을 줄이고, 건축 외관과 조화를 이루는 컬러를 구현합니다.

	당사 무광 Matte Color	당사 유광 Glossy Color
흐림도 Haze (%)	**≥ 60**	≤ 20
광택도 Gloss (Gu)	**≤ 50**	≥ 80

TECH 02 · REAR GLASS

모듈 설계에 맞춘 타공 · 블랙 후면유리

투명 · 블랙 후면유리 및 정션박스 타공 가공, 2T 박판 가공 및 반강화까지 대응합니다.



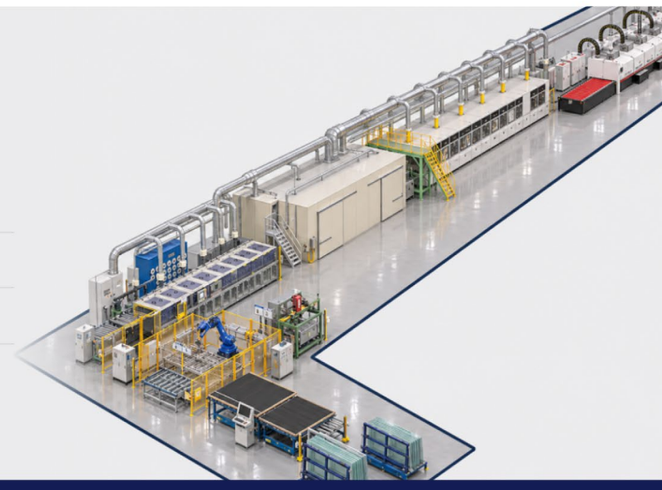
MANUFACTURE

원판 가공부터 강화까지, 로봇 기반 인라인 생산 체계

01 원판 입고 → 가공 → 코팅 → 강화 원스톱 인라인

02 전면 컬러 / 커버유리 + 후면 타공 / 블랙유리

03 2T 가공 및 반강화 가능



VISIT OUR BOOTH
W-56

컬러 태양광 유리와 G2G 전·후면 유리, 부스에서 직접 확인하세요.
SJ ADVANCED MATERIALS · DAEJEON, KOREA

KIMS 한국재료연구원

한국재료연구원 KIMS는 과학기술분야 정부출연연구기관 등의 설립·운영 및 육성에 관한 법률에 따라 설립된 정부출연연구기관으로, 소재 분야의 연구개발, 시험·평가, 기술지원 및 성과확산을 수행하고 있습니다.
차세대 태양광, 에너지 소재 및 첨단 기능성 소재 분야의 핵심 기술 개발을 통해국가 소재산업의 경쟁력 향상과 탄소중립 사회 구현에 기여하고 있습니다.

조직분야 Organizational Field

극한재료 연구소	경량재료 연구본부	재료공정 연구본부	나노재료 연구본부	융·복합재료 연구본부	에너지·환경재료 연구본부	바이오·헬스재료 연구본부	재료데이터·분석 연구본부
원자력안전 연구단	모빌리티금속 연구센터	항공우주재료 실증센터	신기능 분말재료 연구센터		수소전지재료 연구센터		재료분석센터
3D프린팅공정 연구센터					지능형 반도체 재료 연구센터		산업기술 솔루션센터
항공우주재료 연구센터							재료데이터 연구센터

분야별 연구목표 Research Objectives by Field

극한재료연구소	**초고온·극저온** 등 원자력, 우주 / 국방의 **극한환경**에서 구동하고 초고강도·초내열성·초고내식 등 **극한의 물성**을 구현할 수 있는 재료 및 공정 기술 개발
경량재료 연구본부	**첨단 모빌리티·항공우주·미래국방** 등 첨단전략 산업 분야의 국가 아젠다 달성 및 한계 돌파를 위한 고특성 **경량재료** 개발 선도
재료공정 연구본부	**스마트 재료공정** 개발 및 제조 **실증 플랫폼** 구축을 통해 소재·부품의 부가가치를 극대화하고 **항공우주 소재 개발**의 허브 역할 수행
나노재료 연구본부	나노 소재의 높은 표면적·전자기적 특성 발현을 통해 분말 및 세라믹 소재 원천기술 개발을 추진하여 기존 **나노 소재 연구의 한계 극복**
융·복합재료 연구본부	**첨단 융·복합재료**의 기능 및 구조성능 향상과 다기능 융합을 위한 다중-이종소재 기반 설계·제조·평가 전 주기 융·복합재료 기술 **확보**
에너지·환경재료 연구본부	**차세대 에너지·환경**재료 분야 원천기술 선도 및 미래 신산업 창출
바이오·헬스재료 연구본부	다양한 질병의 **진단·치료·모니터링**을 위한 바이오·헬스 분야 소재·공정·장비 신기술 개발
재료데이터·분석 연구본부	재료의 조성 · 공정 · 정밀분석 · 특성 평가를 통해 얻어진 **소재 데이터를 인공지능 기술로 활용**하여 혁신적인 소재 개발 촉진



한국남부발전 |주|

한국남부발전은 깨끗하고 안정적인 전력 공급과 탄소중립 이행에 앞장서는 대한민국 대표 발전 공기업입니다.
친환경 에너지로 미래를 밝히는 글로벌 에너지 리더'를 향해 국민과 함께 성장해 나갑니다.

해외사업 Overseas Business — 설비 용량 3,018MW (미국, 요르단, 칠레 등)





Niles CCPP(IPP)
국가 미국 | 용량 1,035MW
운영기간 2022. 06. ~ 2057. 05.



Trumbull CCPP(IPP)건설중
국가 미국 | 용량 953MW
운영기간 2026. 01. ~ 2056. 01.



Al Qatrana(O&M)
국가 요르단 | 용량 373MW
운영기간 2011. 09. ~ 2036. 07.



Chile Kelar CCPP(IPP, O&M)
국가 칠레 | 용량 517MW
운영기간 2016. 12. ~ 2046. 11.

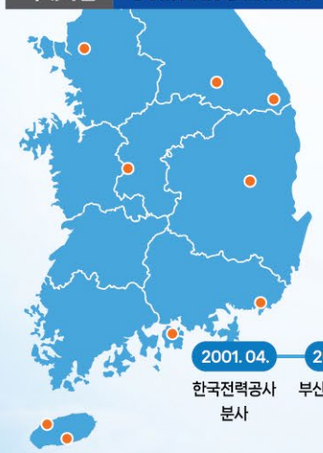


Chile PMGD Solar(IPP)
국가 칠레 | 용량 38MW
운영기간 2018. 01. ~ 2045. 08.



Daehan Wind Power(IPP)
국가 요르단 | 용량 51.75MW
운영기간 2021. 07. ~ 2041. 07.

국내사업 Domestic Business — 설비 용량 11,495 MW (국내 설비 용량의 8%)





신인천빛드림본부 (1997. 07)
설비용량 1,800MW | 사용연료 LNG



남제주빛드림본부 (2007.03/2020.11)
설비용량 200MW | 사용연료 바이오중유
설비용량 146MW | 사용연료 LNG



신세종빛드림본부 (2024.06)
설비용량 [전기] 597MW [열] 340Gcal/h
사용연료 LNG



삼척빛드림본부 (2017.06)
설비용량 2,044MW | 사용연료 유연탄



하동빛드림본부 (2009.05)
설비용량 4,000MW | 사용연료 유연탄



영월빛드림본부 (1997. 07)
설비용량 848MW | 사용연료 LNG



안동빛드림본부 (2014.07)
설비용량 362MW | 사용연료 LNG



부산빛드림본부 (2004.03)
설비용량 1,800MW | 사용연료 LNG



한림빛드림본부 (1997.07)
설비용량 105MW | 사용연료 LNG

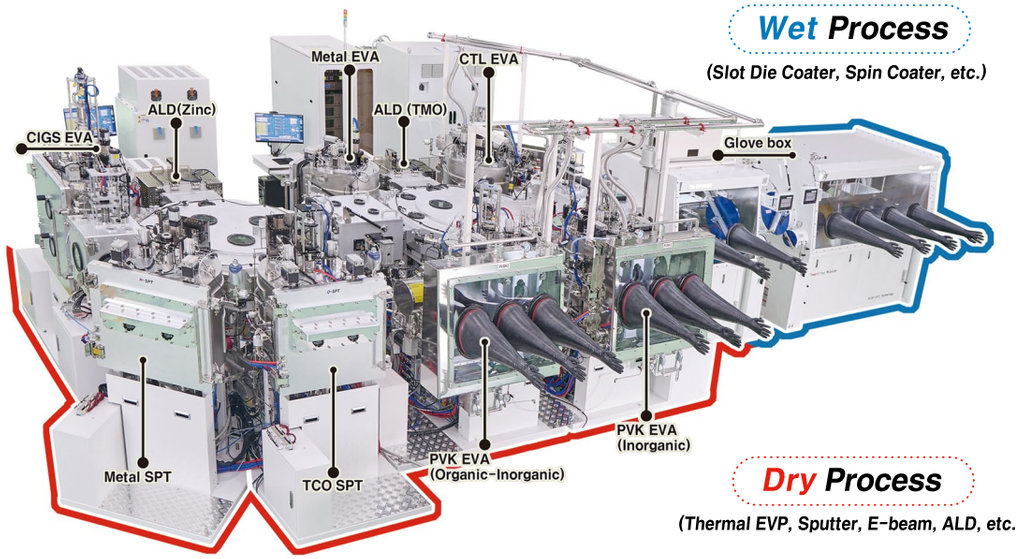
2001. 04. 한국전력공사 분사
2004. 03. 부산빛드림본부 준공
2009. 05. 하동 7, 8호기 준공
2010. 10. 영월빛드림본부 준공
2014. 07. 안동빛드림본부 준공
2017. 06. 삼척빛드림본부 준공
2020. 11. 남제주복합 준공



KOREA KIYON (주)고려기연

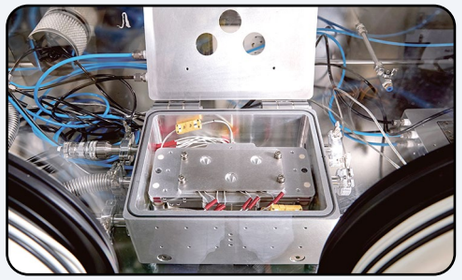
Integrated Process Solutions for Next-Generation Solar Cells

CIGS/Perovskite Tandem Cluster



Wet Process
(Slot Die Coater, Spin Coater, etc.)

Dry Process
(Thermal EVP, Sputter, E-beam, ALD, etc.)



CSS Deposition System

Glovebox-Integrated close-spaced sublimation platform

- **Controlled atmosphere deposition** for sensitive materials
- **High Material Utilization** with rapid thin-film formation via CSS
- **Adjustable source–substrate gap** for process optimization
- **Exceptional Thermal Uniformity** via independent source/substrate control
- **Substrate size: up to 100 × 100 mm**
- **Glovebox-compatible vacuum system**



In-situ PL / AI

Real-time Process Intelligence

- **Real-time Quality Control** Monitors film uniformity and defect evolution during deposition
- **Composition & Bandgap Tracking** Tracks composition and bandgap evolution via in-situ PL
- **Efficiency Prediction** AI-driven analysis correlates PL signals with device performance
- **Closed-Loop Process Optimization** Enables AI-assisted process control for enhanced reproducibility

Korea Kiyon Co., Ltd.
http://koreakiyon.co.kr | sales@koreakiyon.com

CIGS/Perovskite Tandem Cluster
CSS Deposition System
In-situ PL / AI

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