www.pvsec-30.com

KPVS
Korea Photovoltaic Society

PVSEC-30 & GPVC 2020

The 30th International Photovoltaic Science and Engineering Conference (PVSEC-30) & Global Photovoltaic Conference 2020 (GPVC 2020)

Hybrid Conference On-site & On-line

November 8 -13, 2020

ICC JEJU, Jeju, Republic of Korea

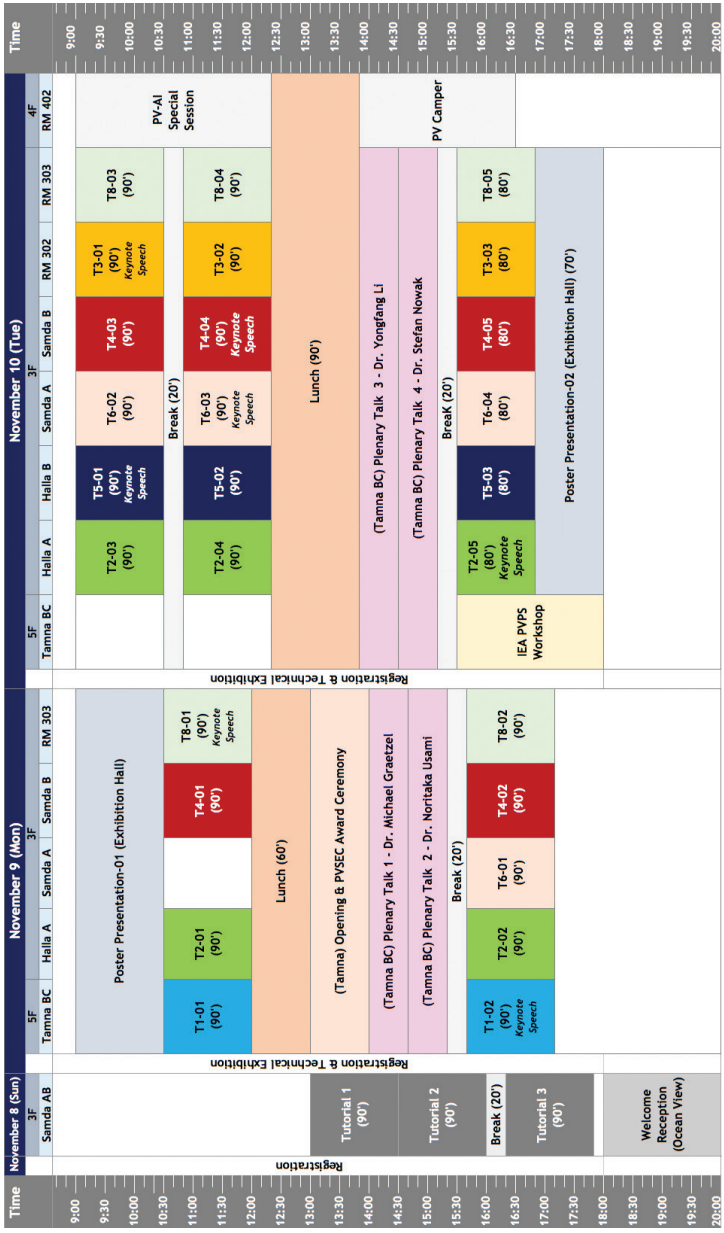
Hosted by
Korea Photovoltaic Society (KPVS)

Supported by
Jeju Special Self-Governing Province

Organized by
PVSEC-30 & GPVC 2020 Organizing Committee

Co-organized by
Graduate School of Integrated Energy-AI, Jeonbuk National Univ.
Hydrogen Education & Research Consortium, Yeungnam Univ.
GIST Research Institute for Solar and Sustainable Energies
Clean Energy Priority Research Center, Yeungnam Univ.
Korea Research Institute of Chemical Technology (KRICT)
Photovoltaics Laboratory, Korea Institute of Energy Research (KIER)
College of Information and Communication Engineering, Sungkyunkwan Univ.
KU-KIST Graduate School of Energy and Environment (GREEN SCHOOL)
Research Center for Photoenergy Harvesting & Conversion Technology, Dongguk Univ.
Yeungnam University Institute of Solar Energy Research
Optoelectronics Convergence Research Center at Chonnam National Univ.
Research Institute for Clean Energy (RICE), Sungkyunkwan Univ.

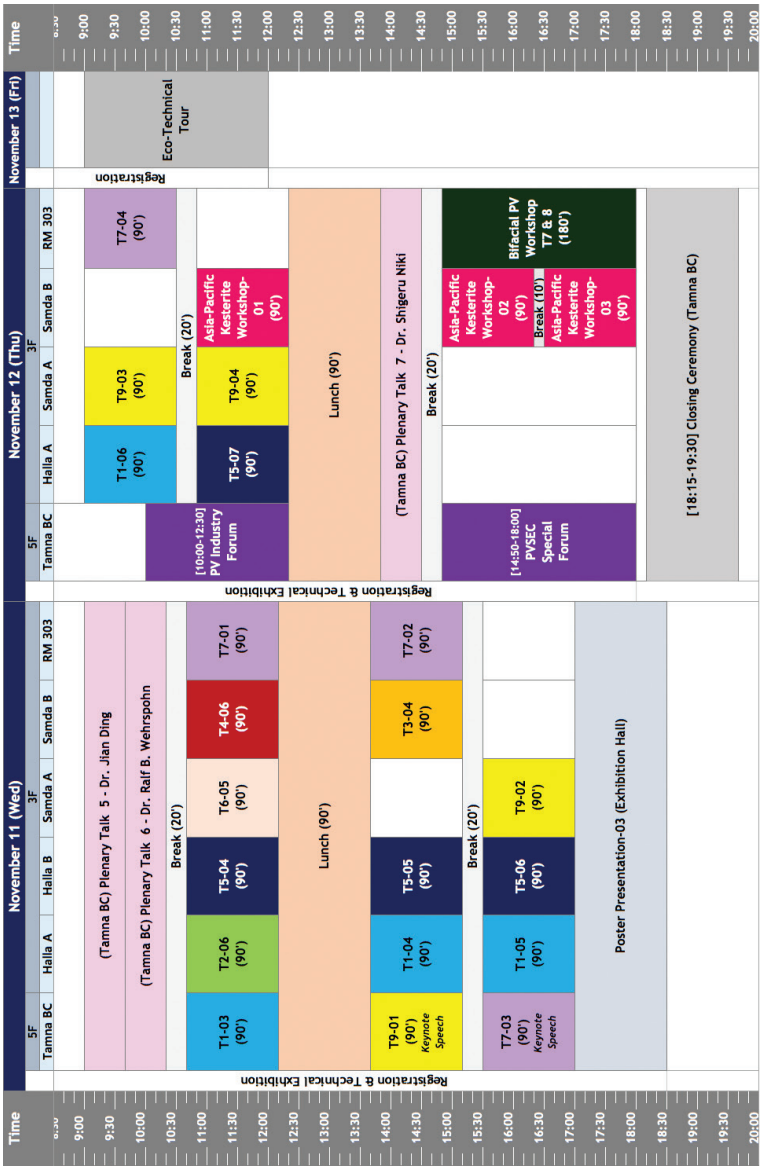
PVSEC-30 & GPVC 2020 Program at a Glance



Technical Area

T1: Crystalline and thin film silicon PV (c-Si)
T2: Chalcogenide thin film PV
T3: Compound semiconductor, concentrator and space PV
T4: Organic and dye-sensitized solar cells (OSC)
T5: Perovskite solar cells (PRV)

*This program is subject to change.



T6: Advanced concepts and new emerging materials for future PV & PV energy storage, solar fuels and novel applications
T7: Weather and grid connection performance, reliability and standardization
T8: Systems including BOS components and integrations
T9: PV deployment: Industry, market, policy and financing

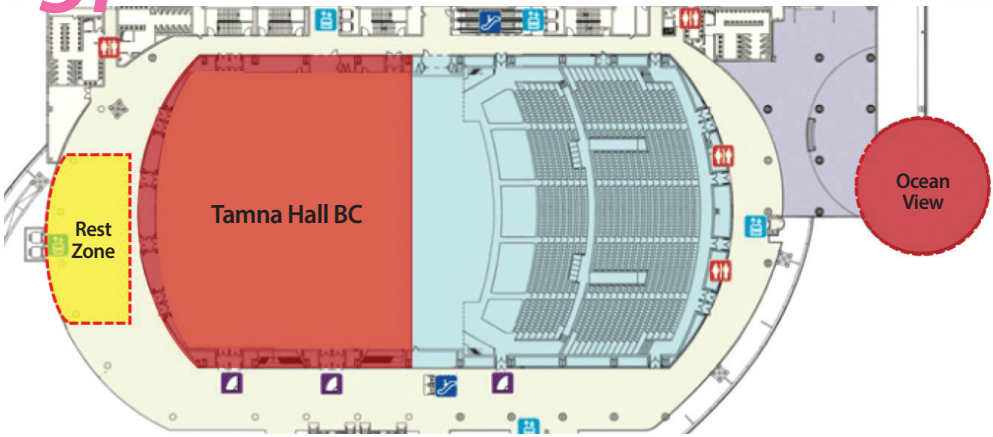
Venue & Floor Plan

	Dates	Program
Halla A	Nov. 9 (Mon) - 12 (Thu)	Parallel Sessions (T1, T2, T5)
Halla B	Nov. 10 (The) - 11 (Wed)	Parallel Sessions (T5)
Samda A	Nov. 8 (Sun)	Tutorial Session 1-3
	Nov. 9 (Mon) - 12(Thu)	Parallel Sessions (T6, T9)
Samda B	Nov. 9 (Mon) - 11 (Wed)	Parallel Sessions (T3, T4)
	Nov. 12 (Thu)	Asia-Pacific Kesterite Workshop
RM 302	Nov. 10 (The)	Parallel Sessions (T3)
RM 303	Nov. 9 (Mon) - 12 (Thu)	Parallel Sessions (T7, T8)
	Nov. 12 (Thu)	Satellite Program - Bifacial PV Workshop (T7 & T8)
RM 300	Nov. 9 (Mon) - 12 (Thu)	Preview Room
RM 301	Nov. 9 (Mon) - 12 (Thu)	VIP Room
Business Center	Nov. 8 (Sun) - 12 (Thu)	Secretariat
Lobby	Nov. 9 (Mon) - 12 (Thu)	Exhibition Booth, Poster Presentation, Rest Zone
	Nov. 8 (Sun) - 12 (Thu)	Registration Desk

4F

	Dates	Program
Room 402	Nov. 10 (Tue)	Satellite Program - PV-AI Special Session - PV Camper

5F



	Dates	Program
Tamna Hall BC	Nov. 9 (Mon)	Opening & PVSEC Award Ceremony
	Nov. 9 (Mon) - 12(Thu)	Plenary Talk (1-7) Keynote Talk
	Nov. 10 (Tue)	IEA PVPS Workshop
	Nov. 9 (Mon), 11 (Wed)	Parallel Sessions (T1, T7, T9)
	Nov. 12 (Thu)	Satellite Program -PV Industry Forum -PVSEC Special Forum Closing Ceremony
Ocean View	Nov. 8 (Sun)	Welcome Reception

CONTENTS

Conference Overview

Title	**The 30th International Photovoltaic Science and Engineering Conference (PVSEC-30) & Global Photovoltaic Conference 2020 (GPVC 2020)**
Date	November 8 (Sun) – 13 (Fri), 2020
Venue	ICC JEJU, Jeju, Republic of Korea
Hosted by	Korea Photovoltaic Society (KPVS)
Supported by	Jeju Special Self-Governing Province
Organized by	PVSEC-30 & GPVC 2020 Organizing Committee
Co-organized by	• Graduate School of Integrated Energy-AI, Jeonbuk National Univ. • Hydrogen Education & Research Consortium, Yeungnam Univ. • GIST Research Institute for Solar and Sustainable Energies • Clean Energy Priority Research Center, Yeungnam Univ. • Korea Research Institute of Chemical Technology (KRICT) • Photovoltaics Laboratory, Korea Institute of Energy Research (KIER) • College of Information and Communication Engineering, Sungkyunkwan Univ. • KU-KIST Graduate School of Energy and Environment (GREEN SCHOOL) • Research Center for Photoenergy Harvesting & Conversion Technology, Dongguk Univ. • Yeungnam University Institute of Solar Energy Research • Optoelectronics Convergence Research Center at Chonnam National Univ. • Research Institute for Clean Energy (RICE), Sungkyunkwan Univ.
Web-site	www.pvsec-30.com
Operation	On-site & On-line (Hybrid)

World's Top 3 Photovoltaic Energy Conferences

Established in 1984, International Photovoltaic Conference based on Asia-Pacific (the Annual Circle)

- **PVSEC (Asia-Pacific)**
- **IEEE PVSC (North America)**
- **EU PVSEC (Europe)**

Co-organizers of PVSEC-30 & GPVC 2020

Graduate School of Integrated Energy-AI, Jeonbuk National Univ.

Hydrogen Education & Research Consortium, Yeungnam Univ.

GIST Research Institute for Solar and Sustainable Energies

Clean Energy Priority Research Center, Yeungnam Univ.

Korea Research Institute of Chemical Technology (KRICT)

Photovoltaics Laboratory, Korea Institute of Energy Research (KIER)

College of Information and Communication Engineering, Sungkyunkwan Univ.

KU-KIST Graduate School of Energy and Environment (GREEN SCHOOL)

Research Center for Photoenergy Harvesting & Conversion Technology, Dongguk Univ.

Clean Energy Priority Research Center, Yeungnam Univ.

Optoelectronics Convergence Research Center at Chonnam National Univ.

Research Institute for Clean Energy (RICE), Sungkyunkwan Univ.

Sponsors for PVSEC-30 & GPVC 2020

Jeju Special Self-Governing Province

Jeju Convention & Visitors Bureau

Korean Tourism Organization

Korean Federation of Science and Technology Societies

Corporate Sponsorship for PVSEC-30 & GPVC 2020

Hyundai Energy Solutions

Hanwha Q Cells

SHINSUNG E&G

ON-TEST

KOREA ENERGY AGENCY
New & Renewable Energy Center

LG Elec. Inc. / Solar Biz Division

OCI Company Ltd.

E-Chem Technology

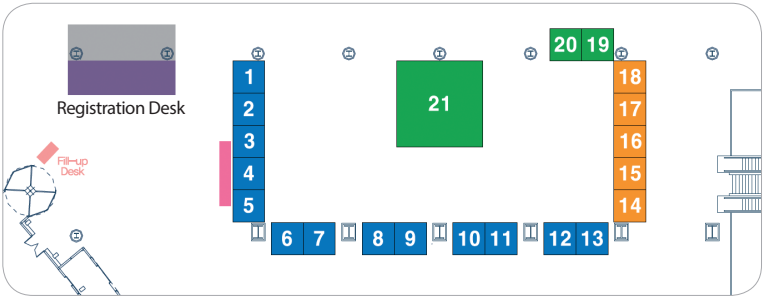
DAEJOO ELECTRONIC MATERIALS CO.,LTD.

Exhibition at PVSEC-30 & GPVC 2020

- **Date** : November 9(Mon) - 12(Thu), 2020
- **Time** : 09:00 - 18:00
- **Place** : Exhibition Hall (3F), ICC JEJU

Booth no.		Name
Enterprise Exhibition	1	ONTEST
	2	SNM
	3	McScience Inc.
	4	SJ INNO TECH
	5	STECO Co., Ltd.
	6	JEONNAM TECHNOPARK
	7	TNE Tech Co.,Ltd
	8	KOPTI AI Photonic Energy Center
	9	ITMAN Co.,Ltd.
	10	Wp Co., Ltd
	11	POWERCONS
	12	Core-Facility Center of Photochemistry and Nanomaterials
	13	Korea Aviation Light Co.,Ltd.

Booth no.		Name
University Business Group & Research Institute	14	Graduate School of Integrated Energy-AI, Jeonbuk National Univ.
	15	Hydrogen Education & Research Consortium, Yeungnam Univ.
	16	Clean Energy Priority Research Center, Yeungnam Univ.
	17	Graduate School of Energy and Environment(KU-KIST GREEN SCHOOL)
	18	Research Institute for Clean Energy (RICE), Sungkyunkwan Univ.
Public Corporation	19	KOREA ENERGY AGENCY New & Renewable Energy Center
	20	K-water
	21	Jeju Special Self-Governing Province



Partners of PVSEC-30 & GPVC 2020

Asian Photovoltaic Industry Association

Crystals – Open Access Journal

Message from General Chair

On behalf of the organizing committee, it is my great honor and pleasure to invite you to the 30th International Photovoltaic Science and Engineering Conference (PVSEC-30) & Global Photovoltaic Conference 2020 (GPVC 2020). The PVSEC-30 & GPVC 2020 is organized and hosted by the Korea Photovoltaic Society, which will be held at the International Convention Center Jeju (ICC JEJU) in Jeju, Korea from November 8 (Sun) to 13 (Fri), 2020.

Jeju island is a UNESCO World Natural Heritage site and announced as one of the winners of the 'New 7 Wonders of Nature.' Not only does the island offer world-class conference facilities, but it also offers a variety of natural and cultural attractions.

This is the fourth time that Korea has been given the privilege to host this prestigious event since it organized the PVSEC-12 in 2001 in Jeju. At PVSEC-30 & GPVC 2020, a large number of eminent experts and delegates will share their valuable academic researches, remarkable achievements, and most recent findings. The PVSEC-30 & GPVC 2020 scientific program will propose high-quality scientific sessions that will provide deeper knowledge and new perspectives on the field of the photovoltaics. The PVSEC-30 & GPVC 2020 will also provide platforms for PV industry forum, PV value-chain company exhibitions, and PV related international body workshops.

The Organizing Committee has devoted its utmost efforts to prepare the most meaningful and enjoyable online/offline hybrid conference even during the period of COVID-19 pandemic, and I strongly believe that PVSEC-30 & GPVC 2020 will be a memorable international gathering and bring together hundreds of professionals, scientists, and trainees to discuss the latest advances of photovoltaic science and technology. I look forward to welcoming you all at PVSEC-30 & GPVC 2020 in Jeju, Korea!

Sincerely yours,

Prof. Chinho Park
General Chair of PVSEC-30 & GPVC 2020

Message from KPVS President

I am honored to serve as a part the 30th International Photovoltaic Science and Engineering Conference (PVSEC-30) & Global Photovoltaic Conference 2020 (GPVC 2020) which will be held in Jeju, Korea from November 8th to 13th 2020. Because of COVID-19 pandemic situation all over the world, we offers PVSEC-30 & GPVC 2020 participation option for on-site and on-line presentation for global participants.

All participants are very much welcomed to this informative conference which covers various kind of issues concerning solar power generation. Specifically, solar cell materials, fabrication processes, photovoltaic modules, peripheral devices, photovoltaic systems as well as measures for solar power related policies.

PVSEC has been an important platform for researchers, professionals, PV industries and students around the world in exchanging their latest research results and ideas. Technical programs including oral and poster sessions would provide the newest topics in our field to participants during the six-day conference. I am most certain that PVSEC-30 & GPVC 2020 will be a forum to share up-to-date technology around the globe.

Furthermore, the PVSEC-30 & GPVC 2020 will take place in Jeju where you can enjoy the wonders of nature and Korean cultural heritages. Jeju is one of the most popular and trendy tourist spots in Asia and you will surely find this island attractive. I hope you to take part in both onsite and offsite presentation of the conference to broaden your horizon. We warmly welcome you to PVSEC-30 & GPVC 2020. Thank you for your continuing interest and support, and we look forward to seeing you in PVSEC-30 & GPVC 2020, Jeju!

Thank you.

President of KPVS, Junsin Yi

Junsin Yi

Prof. Junshin Yi
President of Korea Photovoltaic Society(KPVS)

Message from Technical Program Chair

I am so pleased to welcome all participants including plenary and invited speakers to the PVSEC-30 & GPVC 2020. On behalf of the technical program committee, I would like to express my sincere thanks for your interests and contribution to this great international PV conference.

This is the fifth time that Republic of Korea has hosted this prestigious event, after the PVSEC-25 in 2015 in Busan. This conference will be used as a good opportunity to showcase various new and renewable projects, including the solar energy business in Jeju.

In this PVSEC-30 & GPVC 2020, about 900 excellent papers from 15 countries were submitted to 9 different topical areas. As a result, a large number of eminent experts and delegates will share their valuable academic researches, remarkable achievements and the most recent findings in the field of photovoltaic industry.

Also, we are convinced that the attendees would greatly enjoy the program which offers the latest scientific findings and industrial progress on PV.
You would also be interested in special events such as Korea-Germany Collaboration workshop, Asia-Pacific Kesterite workshop, Industry Forum on Photovoltaics and eco-technical tour.

We hope that this conference would be truly meaningful and fruitful chances for all participants to share their ideas and to obtain new insights on future PV technologies, and to make good friends from all over the world.

I am also looking forward to meeting you soon in JEJU!

Sincerely yours,

Kwanghee Lee

Prof. Kwanghee Lee
Technical Program Chair of PVSEC-30 & GPVC 2020

Organizing Committee of PVSEC-30 & GPVC 2020

General Chair	Chinho Park (Yeungnam University)
Honorary Chair	Junsin Yi (Sungkyunkwan University)
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Co-Chair	Won Suk Shin (Korea Research Institute of Chemical Technology (KRICT))
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Chair	Jae-Joon Lee (Dongguk University)
Co-Chair	Doo-Hyun Ko (Kyung Hee University)
Co-Chair	Yoonmook Kang (Korea University)
Publicity	
Chair	Jin Hyeok Kim (Chonnam National University)
Co-Chair	Dongwook Kim (Ewha Womans University)
Co-Chair	Jung-Yong Lee (Korea Advanced Institute of Science and Technology (KAIST))

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Co-Chair	William Jo (Ewha Womans University)
Co-Chair	Donghwan Wang (Chung-Ang University)

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Co-Chair	Kwang-Sup Lee (Hannam University)
Co-Chair	Jae Hyun Kim (Daegu Gyeongbuk Institute of Science & Technology (DGIST))

Tutorial

Chair	Nam-Gyu Park (Sungkyunkwan University)
Co-Chair	Byungha Shin (Korea Advanced Institute of Science and Technology (KAIST))
Co-Chair	Hyunsuk Chung (Sungkyunkwan University)

PV Industry Forum

Chair	Seung Yeop Myong (Korea Institute of Energy Technology Evaluation and Planing)
Co-Chair	Myunghun Shin (Korea Aerospace University)

PVSEC Special Forum

Chair	Jae Chun Song (Sungkyunkwan University)
Co-Chair	Gaëtan Masson (Becquerel Institute & Operating Agent at IEA-PVPS Task 1)

Technical Program Committee of PVSEC-30 & GPVC 2020

PVSEC-30 & GPVC 2020 Technical Program Committee

Technical Program

Chair	Kwanghee Lee (Gwangju Institute of Science and Technology (GIST))
Co-Chair	Min Jae Ko (Hanyang University)

T1. Crystalline and thin film silicon PV

Chair	Hae-Seok Lee (Korea University)
Co-Chair	Noritaka Usami (Nagoya University)
	N.J. Ekins-Daukes (University of New South Wales)
Committee	Jun-Sik Cho (Korea Institute of Energy Research (KIER))
	Jeong Eui Hong (Hanwha Q CELLS)
	Hwa Nyeon Kim (LG Electronics)

T2. Chalcogenide thin film PV

Chair	Jihye Gwak (Korea Institute of Energy Research (KIER))
Co-Chairs	Ayodhya N. Tiwari (Empa - Swiss Federal Laboratories for Material Science and Technology)
	Hitoshi Tampo (National Institute of Advanced Industrial Science and Technology)
	William Shafarman (University of Delaware)
	Yi Zhang (Nankai University)

T3. Compound semiconductor, concentrator and space PV

Chair	Ho Kwan Kang (Korea Advanced Nano-Fab Center)
Co-Chair	Masakazu Sugiyama (University of Tokyo)
	Jae-Hyung Jang (Gwangju Institute of Science and Technology (GIST))
Committee	Sang Hyun Jung (Korea Advanced Nano-Fab Center)
	Kwang Seong Choi (Electronics and Telecommunications Research Institute)
	Yong-hyung Kim (Korea Photonics Technology Institute)

T4. Organic and dye-sensitized solar cells

Chair	Youngu Lee (Daegu Gyeongbuk Institute of Science & Technology (DGIST))
Co-Chair	Wei You (The University of North Carolina at Chapel Hill)
	Tae-Hyuk Kwon (Ulsan National Institute of Science and Technology)
Committee	Jung-Yong Lee (Korea Advanced Institute of Science and Technology)
	Sang Kyu Lee (Korea Research Institute of Chemical Technology (KRICT))
	Bong Soo Kim (Ulsan National Institute of Science and Technology)

T5. Perovskite solar cells

Chair	Sang Hyuk Im (Korea University)
Co-Chair	Kai Zhu (National Renewable Energy Laboratory)
	Jangwon Seo (Korea Research Institute of Chemical Technology (KRICT))
Committee	Hyunsuk Chung (Sungkyunkwan University)
	Jun Hong Noh (Korea University)
	Donghwan Wang (Chung-Ang University)
	Kyung Soo Kim (Korea Institute of Energy Research (KIER))

T6. Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair	Jae Hyun Kim (Daegu Gyeongbuk Institute of Science & Technology (DGIST))
	Hyung Koun Cho (Sungkyunkwan University)
Co-Chair	Christian Hagendorf (Fraunhofer)
	Yoshitaro Nose (Kyoto University)
	Baoquan Sun (Suzhou University)
	Kazunari Domen (University of Tokyo)
Committee	Ho Won Jang (Seoul National University)
	Jong Hyeok Park (Yonsei University)
	Yun Jeong Hwang (Korea Institute of Science and Technology (KAIST))

T7. Weather and grid connection performance, reliability and standardization

Chair	Jae Hak Jung (Yeungnam University)
Co-Chair	Soo-Young Oh (Yeungnam University)
	Kyung Soo Kim (Korea Institute of Energy Research (KIER))

T8. Systems including BOS components and integrations

Chair	Nochang Park (Korea Electronics Technology Institute)
	Suk Whan Ko (Korea Institute of Energy Research (KIER))
Co-Chair	Yuzuru Ueda (University of Tokyo)
	Kyungsoo Lee (Korea Polytechnic University)
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	Hyung-Jun Song (Seoul National University of Science and Technology)
	Jose Bilbao (University of New South Wales)
	Angèle Reinders (University of Twente)

T9. PV deployment: Industry, market, policy and financing

Chair	Eun-Chel Cho (Sungkyunkwan University)
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	Sunghoon Kim (Korea Energy Agency)
	Jaechun Song (Sungkyunkwan University)
	Arnulf Jäger-Waldau (Joint Reserach Center, EC)
	Richard Corkish (University of New South Wales)
	Wang Sicheng (China Renewable Energy Society)

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	Suk Ki Min (Korea Institute of Science and Technology (KIST))
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PVSEC Award

The PVSEC Award is presented for outstanding contributions to the development of photovoltaic science and technology.

The PVSEC Award 2020 is presented to

Prof. Byung Tae Ahn
Korea Advanced Institute of Science and Technology (KAIST)

Prof. Ahn is one of the pioneers in Korea PV history. He conducted Si solar cell research form 1979 to 1982 while he was a research engineer at ETRI. After joining KAIST in 1992, he initiated research on CIGS thin-film solar cells. He is one of the Korean PV specialists who devoted himself to promote the Scientific level of Korean PV research. He achieved above 18% cell efficiency in 2006 and the film technology was transferred to a Korean company (LG Micron). With the company's participation, the research activity in CIGS thin film was exploded. It was an important moment to Korean PV Society because the population of PV researchers was also greatly increased. This is his big contribution to boost Korean PV Society.

He served as an International Advisory Committee (IAC) member of PVSEC from 2004 to 2020. He served as the General Secretary in PVSEC-12, the Program Committee Chair in PVSEC-19, and the Organizing General Chair in PVSEC-25. With this long time service to PVSEC, he helped to raise a big seed money for PV Society foundation and for sound operation of the newborn KPVS. This is his second big contribution to boost Korean PV Society.

He spent a lot of time to launch and keep the pace of CPVR publication in eary four years. With hid effort, the CPVR is in good track. This is his third big contribution to boot Korean PV Society. He invited Dr. Sang Jin Moon who led the OPV community as a candidate of 3rd KPVS president ship in order to unify the independent OPV community. It is also one of his achievements the KPVS Society.

He supported more than 10 members to keep continue their research through an ERC program "High-efficiency Thin-Film Solar Cells" from KRF. Some of the members became now key members in PV Society.

PVSEC Award

The PVSEC Award is presented for outstanding contributions to the development of photovoltaic science and technology.

The PVSEC Award 2020 is presented to

Dr. Sewang Yoon
Korea Photovoltaic Society (KPVS)

Dr. Yoon has been contributing to the CPV Photovoltaics field beginning with his silicon CPV solar cell R&D work which he started in 1981 for SANDIA National Laboratory, in USA. He reported a successful development of 20% efficient silicon CPV solar cell under 100X concentration of sun light in 1984.
He continued R&D of silicon CPV solar cell utilizing silicon Back Junction cell (BJC) structure for high concentration application. At that time, Dr. Yoon thought Interdigitated Back Junction Cell (IBC) could be a good candidate for HCPV application.
Starting in March 1989, after one year of preparation for setting up a IBC cell manufacturing foundry in Silicon Valley, he started working on silicon IBC 250X HCPV system development and commercialization by co-founding Amonix in Torrance CA USA together with Dr. Vahan Garboushian.
He started a whole new career in bio-pharmaceutical and functional food area at TS corporation until his retirement in 2014. He successfully developed Erythropoietin and obtained KFDA permit as red blood cell replenishing bio similar drug for end stage renal disease (ESRD) patients.
As a second TS project, in June 2007, Dr. Yoon opened a new TS Solar Cell fab on the Central R&D center ground after one year of preparation for building a clean room and setting up equipment for a silicon solar cell processing line for silicon solar cell R&D and potentially future clean energy business. There was a considerable amount of cooperative R&D with other institutions such as Korea University (2 Ph.D. Theses) and Seoul National University (one Ph.D. Thesis).
Dr. Yoon was a founding team member of the GPVC annual conference series starting with GPVC11 in 2011, which grew to be GPVC20, currently being held together with PVSEC30 in Jeju. Also, Dr. Yoon was a founding member of Korean Photovoltaic Society (KPVS) established in 2012. He served as President of KPVS in 2015 for one year, after serving as vice president in prior 3 years.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion.

The PVSEC Special Award 2020 is presented to

Dr. Hwa Nyeon Kim
LG Electronics

Research Fellow Dr. Hwa Nyeon Kim is working at the Central Rsearch Center at LG Electronics, and was awarded Intersolar award and the Silver Prize of Korea Technology Awards for the "n-type high-power solar cell module" at the 2013. He was conducting research and development of silicon heterojunction, and succeeded in for the first time commercializing n-type TOPCon solar cells in the world in 2016, contributing to the worldwide spreading of high-efficiency silicon solar cells. Research Fellow Dr. Hwa Nyeon Kim is contributing to R&D and commercialization of products as a director of the Korea Solar Industry Association, vice-chairman of the Silicon Solar Cell Division Committee of the Korean Photovoltaic Society, and vice-chairman of the Korea Building Integrated Photovoltaic Association.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion.

The PVSEC Special Award 2020 is presented to

Dr. Daniel JW Jeong
Hanwha Solution Korea; Hanwha Q Cells GmbH, Germany

Dr. Jeong has contributed all his efforts to make a better solar PV technology and industry for more than 17 years, at both Hanwha and LG Electronics, especially as a global CTO of Hanwha Q-cells he made a leading role for the development of the advanced PERC technology with the higher record module efficiency and further the successful transfer of the technology to the commercial production of GW scale. The technology includes several implements for the reduction of CTM loss by PID and LID, so that it can eventually realize more stable and longer performance of solar PV module during the life time. His outstanding achievements are evidenced with the InterSolar Awards in 2017 and 2018.
As well as his professional contributions, Dr. Jeong has devoted his ideas into the solar PV technology development program supported by government fund, despite his busy schedule to run around the worldwide Hanwha operations. His ideas on the higher efficient solar PV technology have been deployed in the government-supported R&D program for the recent 5 years.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion.

The PVSEC Special Award 2020 is presented to

Dr. Myung Ick Hwang
Hyundai Energy Solutions

Dr. Hwang joined Hyundai Heavy Industries (now Hyundai Energy Solutions) in 2009, contributing to improving the efficiency and output of silicon solar cells and modules, reducing costs, developing new models, and securing industrial competitiveness. In particular, Dr. Hwang carried out R&D and commercialization of high-efficiency p-type PERC cells and modules, high-reliability-environment-friendly floating solar modules, and reliability of solar modules (PID, LID, MLT). In 2020, Dr. Hwang is contributing to secure business competitiveness by mass-production of bifacial PERC solar cells and modules using large-area M6 wafers.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion.

The PVSEC Special Award 2020 is presented to

Dr. Ralf B. Wehrspohn
Fraunhofer Institute

Ralf B. Wehrspohn is a member of the Executive Board of Fraunhofer-Gesellschaft. He leads the board area Technology Marketing and Business Models. Ralf B. Wehrspohn studied physics at the University of Oldenburg and received his doctorate at the École Polytechnique in France. He became a professor at the University of Paderborn. In between he worked in industry at Philips Research in London and habilitated at the Max Planck Institute for Microstructure Physics in Halle.
From 2006 till 2019 he was head of the Fraunhofer Institute for Microstructure of Materials and Systems IMWS in Halle.

Ralf B. Wehrspohn's work focuses on nanotechnology and microstructure elucidation and increasingly on the digitisation of materials. Ralf B. Wehrspohn is the Heinz Maier Leibniz Prize winner of the German Research Foundation, the winner of the DOW Chemical Science Association Prize and the Innovation Prize of the Massachusetts Institute of Technology MIT. The Financial Times Deutschland ranked him among the 101 most innovative minds in Germany in 2004.

HAMAKAWA Award

The Hamakawa Award is to recognize scientists and engineers who have made outstanding contributions to developments of new concepts, new materials, and new devices.

The Hamakawa Award 2020 is presented to

Prof. Hae-Seok Lee
Korea University / Graduate School of Energy&Environment(KU-KIST Green School)

Since 2003, Dr. Lee has been engaged in the development of high efficient solar cell materials and devices. From 2003 to 2006, he has been with Toyota Technological Institute, Japan as a research fellow, where he began to develop the super high efficiency InGaP/InGaAs/Ge multi-junction solar cells and concentrator system (η~38.9%).

Dr. Lee is currently a professor in the Department of Energy System Engineering and the Graduate School of Energy & Environment (KU-KIST Green School) at Korea University. He is the director of high-efficiency silicon solar cell technology research center (SERC), appointed by the Ministry of Knowledge Economy (MKE), South Korea.

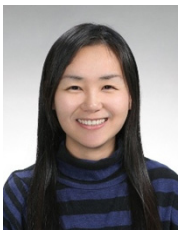
After joining Korea University, he have continued to research on the Si solar cell, such as the contact formation mechanism, surface passivation, and passivated contact to develop high efficiency Si cells with efficiencies over 25%. Recently, based on his experience in silicon and thin-film solar cells, he is developing high efficiency perovskite/silicon tandem solar cells with efficiencies over 30%, and doing the mechanism studies on the degradation of perovskite solar cells to realize their commercialization.

As regard to his activities in academic societies, Dr. Lee has been a committee member for Korea Photovoltaic Society (KPVS) for 2012-Present. He was a general vice chairman of GPVC 2013, and Vice Chairman of technical Program Committee in PVSEC-25&GPVC 2015. In addition, he has been a chair of section committee “silicon solar cells&module” in KPVS for 2018-Present.

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is to recognize young scientists and engineers (50 years old or younger) who have made outstanding research and technological accomplishments, and creativity in the all areas of photovoltaic science and engineering.

The PVSEC Young Scientist Award 2020 is presented to



Dr. Jihye Gwak
Korea Institute of Energy Research (KIER)

Dr. Gwak has been engaged in thin-film solar cell research and development for many years at the Korea Institute of Energy Research (KIER), the national leading institution for research and development of Photovoltaics. She has published SCI(E) papers, and is continuing active R&D activities to contribute to overcoming the PV industry crisis and issues through industry-academia-research cooperation described above.
Dr. Gwak is currently a principal researcher of Photovoltaics Laboratory (PV lab) as well as the director of the New and Renewable Energy Institute at Korea Institute of Energy Research (KIER). After she received her BS and MS degrees in Chemistry from Ewha Womans University, she joined Samsung Advanced Institute of Technology (SAIT). After 2 years working in Materials & Device Laboratory at SAIT, she left to France to get Ph.D. from Université Montpellier II, France in 2003 and worked on Membranes at Institut Européen des Membranes, Montpellier (IEM-UMII, CNRS, ENSCM). She also worked in Eco-materials Center at National Institute for Materials Science (NIMS), Tsukuba in Japan as a JSPS postdoctoral fellow for 2 years, and joined KIER in 2005. She has been working on solar cells since 2009 with her main research interest in compound thin film solar cells based on CIGS thin film absorber materials.
From January 2017 to December 2019, she has served as 'Chief' of PV laboratory at KIER, and deeply involved in various research topics including solar energy area as well as other renewables, mainly working on thin film solar cells for BIPV applications. She has been serving as 'Director' of New & Renewable Energy Research Department at KIER. She co-authored more than 100 SCI(E) papers as well as obtained over 100 international and national patents in solar cells research field.

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is to recognize young scientists and engineers (50 years old or younger) who have made outstanding research and technological accomplishments, and creativity in the all areas of photovoltaic science and engineering.

The PVSEC Young Scientist Award 2020 is presented to

Prof. Hyun Suk Jung
Sungkyunkwan University

Prof. Jung has been active as a board member of the Korea Photovoltaic Society since 2017, and served as the vice chairman of the GPVC 2017 program. Also, he served as an organizing member of various spring-autumn academic KPVS conferences. He is one of the young scientists who is leading the role for the development of Korea photovoltaic society.
In particular, as a leader in the field of next-generation solar cells, he has made a great contribution to revitalizing the academic activities of the KPVS society. Also, he has served as an organizer of many international photovoltaic conferences such as MRS meetings and ENGE.
Based on his research on the synthesis and basic theory of photovoltaic materials in the field of nanoenergy, he has been constantly striving to study the design and manufacturing process of solar cells. Over the past five years, he has published more than 50 papers within the top 10% of JCR, including 24 papers with the top 5% of JCR, and achieved h-index of 49 which exhibits his potential for growing into a great researcher. Prof. Jung has contributed to commercialization of perovskite solar cells by developing large scale manufacturing process as well as recycling technology of the perovskite solar cells. As a result of constant efforts for good research, he won the various prizes including 2012 "50 Excellent Research Results for Basic Research", 2013 "Science and Technology Minister's Award", 2013 "KIST Excellent Researcher Award", 2017 "Young Ceramist Award" , and 2019 "SKKU Young Fellow Award".

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is to recognize young scientists and engineers (50 years old or younger) who have made outstanding research and technological accomplishments, and creativity in the all areas of photovoltaic science and engineering.

The PVSEC Young Scientist Award 2020 is presented to

Dr. Keun Kee Hong
SHINSUNG E&G Co., Ltd.

He received his doctorate from the University of Seoul in 2008. Since then, the Inter-University Semiconductor Research Center has conducted research on semiconductor devices and silicon solar cells until 2011. It had developed high-efficiency solar cell technology with precision of semiconductor process with domestic companies. He worked at Hanwha Chemical Company (Now Hanwha Solution) from 2012 to 2014. Since 2014, he has been working at SHINSUNG E&G Co., Ltd. and is conducting research and development on high-efficiency silicon solar cells, modules and system technologies.
He has been trying to develop technologies for industrialization of high-efficiency solar cells. Since 2014, PERC solar cells have been studied for industrialization, and efforts have been made to produce them in SHINSUNG E&G Co., Ltd.
With the support of the MOTIE(Ministry of Trade, Industry and Energy), He is conducting research on high efficiency crystalline silicon solar cell, high power module technology, and Si/Perovskite tandem solar cell.
In order to expand the industry of solar energy technology, he is working to help expand the industry by participating in the development of system technology applied to VPP technology, EV charger, etc.

DAEJOO Award

The DAEJOO Award is provided by Daejoo Electronic Materials Co., Ltd. and upto three persons who have contributed greatly in photovoltaic field and technology are selected and awarded with a prize money.

The DAEJOO Award 2020 is presented to

Prof. Min Jae KO
Hanyang University

Prof. Ko has contributed to the development of the next generation solar cells including dye-sensitized, quantum-dot and perovskite solar cells since he joined Korea Institute of Science and Technology (KIST) as a senior research scientist in 2008. He has also worked as a key player at the Korean Photovoltaic Society, the Korean Society of Photoscience, the Korean Electrochemical Society, the Korean Polymer Society, and the Korean Organic Solar Cell Research Society, which are related to domestic solar energy societies. He has endeavored to advance the academic development and expand the base of the next-generation solar cells.

Prof. Ko is currently a professor in the Department of Chemical Engineering at Hanyang University since 2017. Over the last ten years, he has published more than 160 SCI(E) papers as well as obtained over 50 registered patents in the solar cell research field. He was selected as "Scientists who will lead 100 key technologies of Korea in 2020" by the National Academy of Engineering of Korea (2008), and KIST Young Fellow (2013). And Prof. Ko received awards including GPVC Young Scientist Award (2018) and Young Scientist Award by Korea Research Council of Fundamental Science and Technology (2012). He is acting as an associate editor of "Nano Convergence" and "Macromolecular Research" as well as editor of "Current Photovoltaic Research"

Prof. Ko's current interests are focused on the basic and applied research on the materials and processes for the flexible perovskite module. In addition to the solar cell research, he has expanded research fields into smart nanomaterials and energy-storage devices such as supercapacitors and batteries.

DAEJOO Award

The DAEJOO Award is provided by Daejoo Electronic Materials Co., Ltd. and upto three persons who have contributed greatly in photovoltaic field and technology are selected and awarded with a prize money.

The DAEJOO Award 2020 is presented to

Prof. Eun-Chel Cho
Sungkyunkwan University

Prof. Cho has accumulated various R&D and commercialization experiences in the fields of photovoltaic devices, modules, and systems from 1994 to the present. Since 1994, he have conducted to achieve progressive technological innovation achievements through Samsung Advanced Institute of Technology, Samsung SDI, and UNSW, Hyundai Heavy Industries, and Sungkyunkwan University.
From 2008 to 2017, he acted as the head of the research center at Green Energy business division of Hyundai Heavy Industries, where he participated the solar industry, as a solar technology development executive and established a research and development organization and an R&D center to study world-class solar cells, modules, and reliability. He served as both the research center and the cell production executive, and the production line was normalized by improving cell efficiency, productivity, and yield, and the technology was commercialized by implanting the PERC solar cell developed by the research center into the production line.
Currently, as a research professor at Sungkyunkwan University, he is researching PERC solar cells, CSC (carrier selective contact) solar cells, and TOPcon solar cells, and is conducting research and development of next-generation solar power such as module products and systems for various applications. More than 80 SCI papers have been published, and more than 40 domestic and overseas patents have been registered, and the total number of citations reaches 3561 times.

DAEJOO Award

The DAEJOO Award is provided by Daejoo Electronic Materials Co., Ltd. and upto three persons who have contributed greatly in photovoltaic field and technology are selected and awarded with a prize money.

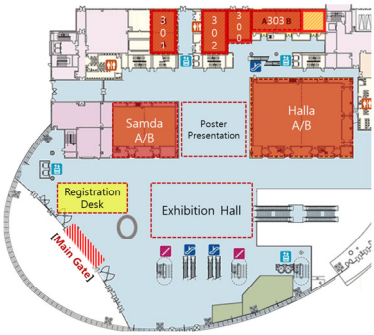
The DAEJOO Award 2020 is presented to

Prof. Gaëtan Masson
EA-PVPS & Becquerel Institute, Belgium

Dr. Gaëtan Masson is Director and co-founder of the Becquerel Institute. After more than 10 years in the financial and IT sectors, he moved to the PV industry and developed the Business Intelligence of EPIA, the European PV Industry Association (now SolarPower Europe). Since 2013, he is the Operating Agent of the Task 1 of the PV programme of the International Energy Agency (IEA PVPS). He is vice-chairman of the European PV technology Platform and participates to the Scientific Committee of EU-PVSEC and Intersolar Europe. Since 2016, he manages the strategy and content of SolarUNITED, the global PV Industry Technology Association.

General Information

Registration Desk
In front of main gate (3F), ICC JEJU



- **Operating Hours**

Nov. 8 (Sun)	12:00 ~ 20:00
Nov. 9 (Mon)	08:00 ~ 18:00
Nov. 10 (Tue)	08:00 ~ 18:00
Nov. 11 (Wed)	08:00 ~ 18:00
Nov. 12 (Thu)	08:00 ~ 18:00

Registration Fee

	On-site Registration Fee		Virtual Registration Fee (Overseas participants only)
Category	Early Bird	Regular	Regular
Delegates	USD 700	USD 800	USD 350
	KRW 700,000	KRW 800,000	-
Students	USD 250	USD 300	USD 150
	KRW 250,000	KRW 300,000	-
One-day (Nov 12)	USD 270	USD 320	-
	KRW 270,000	KRW 320,000	-
Tutorial (Optional) *	USD 100 / KRW 100,000		USD 50

Name Badge
A name badge is provided at the 'Registration Desk' If you were registered, visit 'Pre-Registration Desk', so that you could receive your name badge. If you were not registered, visit 'On-site Registration Desk'. so that you could register right way.

Official Language
English is the official language of PVSEC-30 & GPVC 2020.

ENG

Secretariat of PVSEC-30 & GPVC 2020

Business Center (3F), ICC JEJU
Operation Time: November 8(Sun) - 12(Thu), 08:00-18:00

Preview Room

Room # 300 (3F), ICC JEJU
Please check the presentation material is properly working.
Presentation materials may be edited in the preview room.
Operation Hours : November 9(Mon) - 11(Wed), 08:00-18:00
November 12(Thu), 08:00-15:00

Wi-Fi (Wireless Internet)

Wireless internet service is available in all conference venue.
Please select the "**Jeju Free Wifi**".

Emergency Call

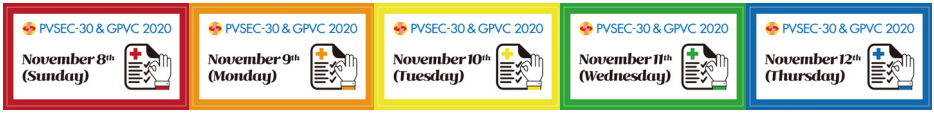
1339 : Medical Emergency Call
129 : First Aid Services
119 : Emergency Call for Fire, Rescuing & Hospital Services
112 : Police Services
604-740-6000 : Jeju Travel Hot Line

Weather in Jeju Island

As Jeju Island is located to the east of Eurasia, its continental and oceanic climates are clearly distinguishable depending on the weather. In the early winter, the northwest monsoon can result in severe temperature differences. Average temperature in November is around 13-14℃ and sunny and windy. It features a large daily temperature.

COVID-19 Visitor Questionnaire & Putting Daily Sticker

All participants of PVSEC-30 & GPVC 2020 should complete COVID-19 Visitor Questionnaire once a day. After scanning your QR Code at the main entrance, please put daily sticker on your outfit all day long. Participants with the daily stickers are only allowed to the conference rooms, otherwise you will need to rewrite the COVID-19 Visitor Questionnaire.



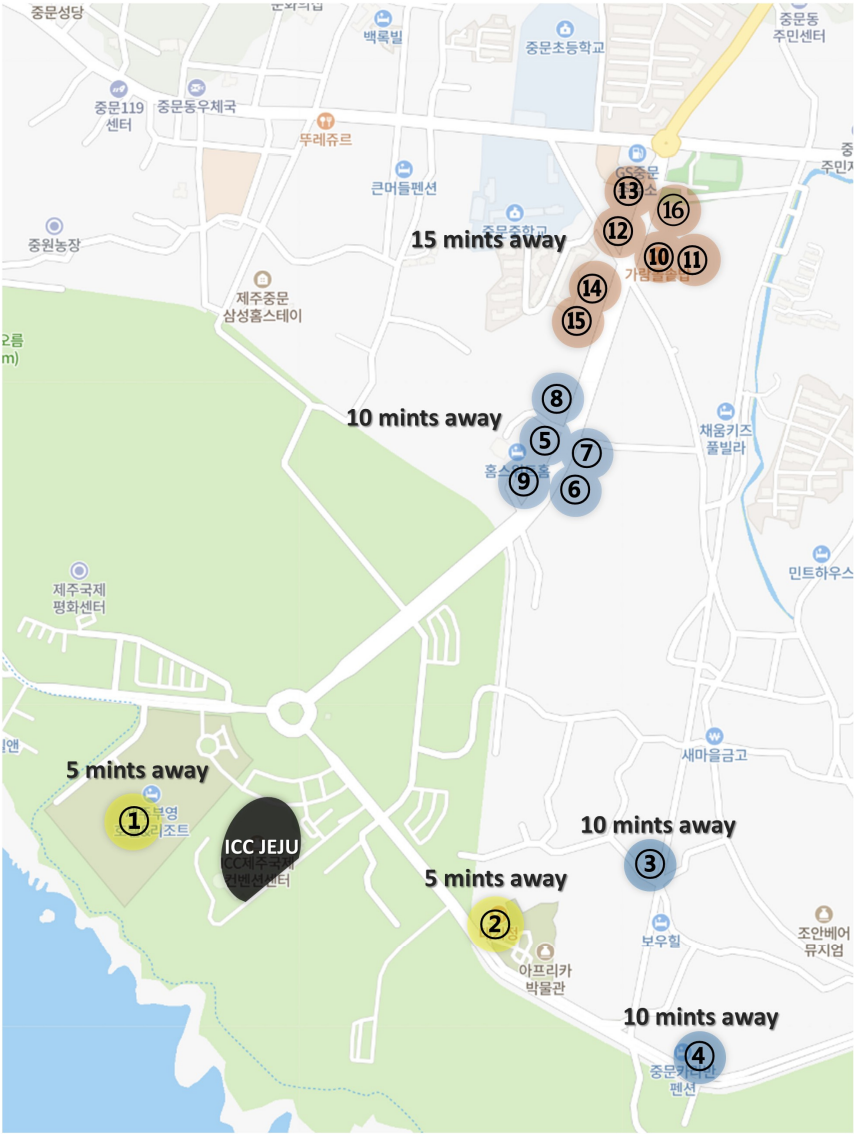
Restaurant Information for Participants' lunch

Lunch for participants is not provided but, please refer to the following restaurant information around ICC JEJU.
※ Participants can use the Delizia discount coupon (KRW 5,000) once during the PVSEC-30 & GPVC 2020.

- Restaurant list around ICC JEJU

Location		Restaurant Name	Menu	Price (KRW)	Contact Num.
In ICC JEJU		Restaurant Delizia, 3F	Lunch buffet menu	21,7800	064-738-7741
		Dunkin' Donuts, 1F	Donuts & Coffee	1,300 – 10,000	064-738-6400
		Convenience store (7-ELEVEN), 3F	Gimbab (riceroll), Sandwich, Lunch box, Snacks, etc.	1,000 -	
East side of ICC JEJU					
①	5 mins	Dining Wonang In Jeju Booyoung Hotel&Resort	Korean Food (돈부리, 보쌈, 고등어 구이 등)	18,000 - 43,000	064-731-5730
②	5 mins	대기정 Dae-gi Jung	Korean Food (성게비빔밥, 갈치돌솥밥 등)	15,000 - 20,000	064-739-1041
③	10 mins	함쉐프키친 Ham Chef's Kitchen	Pork cutlet, Salad, Spaghetti, fried rice	18,000 - 25,000	064-739-1142
④	10 mins	중문솥뚜껑 Jung-mun Sot-Ttu-Kyung	Korean Food (보말미역국, 성게미역국, 고사리흑돼지볶음)	12,000 - 15,000	064-738-8131
Northeast side of ICC JEJU					
⑤	10 mins	정든부대찌개 Jungdon-Sausage Stew	Korean Food (부대찌개, 제육볶음, 황태국)	8,000 - 9,000	070-8778-1822
⑥	10 mins	길리추팡 Gilly-Chupang	Chinese Noodle (마라탕면, 수타짜장, 해물짬뽕)	6,000 - 10,000	064-739-7888
⑦	10 mins	베니떼 VENITE	Pasta & Steak	15,000 - 40,000	064-738-2498
⑧	10 mins	그린정 Green-Jung	Korean Food (전복죽, 고등어구이, 성게미역국 등)	13,000 - 26,000	064-739-3070
⑨	10 mins	명호마농갈비 Myeonghomanong-Galbi	Korean Food (한우국밥, 갈치말이국수, 마농커리)	7,000 -	064-738-8985
⑩	15 mins	가람돌솥밥 Garam-Dolsotbap	Korean Food (전복돌솥밥, 전복성게돌솥밥, 전복해물뚝배기)	15,000 - 20,000	064-738-1200
⑪	15 mins	류차이 Liu Chai	Chinese Noodle (냉짬뽕, 해물짬뽕, 가지만두)	8,000 - 10,000	064-739-4149
⑫	15 mins	돌하르방밀면 Dol-Harbang-mill-myeon	Korean Noodle (냉밀면, 톳밀면, 보말칼국수)	7,000 - 10,000	064-739-0023
⑬	15 mins	24시뼈다귀탕 24h Back-bone Stew	Korean Stew (뼈다귀탕, 뼈감자탕)	8,000 - 23,000	064-739-3334
⑭	15 mins	중문생선구이 Jungmun-Grilled fish	Korean Grilled Fish (고등어구이, 모듬생선구이)	15,000 - 30,000	064-738-1474
⑮	15 mins	덕성원 중문동점 Deokseongwon	Chinese Noodle (짜장면, 사천짜장, 삼선해물짬뽕, 꽃게짬뽕)	5,000 - 9,000	064-738-0750
⑯	15 mins	대포칼제비 Daepo-Kaljebi	Korean Noodle (보말칼제비, 비빔국수, 초계국수, 홍초계국수)	7,000 - 9,000	064-739-1666

- Restaurant location around ICC JEJU



COVID-19 Prevention Guidelines

"Together, we stand resolute in the fight against COVID-19"

1. **Maintain two arms' length (2m recommended, 1m minimum)** from other people
2. **Wear a mask** if two arms' length can't be maintained

   Masks are not recommended for:
   toddlers under 2 years of age, those who cannot take off a mask without help from others, and those who face difficulties breathing when wearing a mask
3. **Refrain from visiting places** that lack proper ventilation **while many people are in proximity**
4. **Wash your hands thoroughly with soap and running water for at least 30 seconds**

Official & Social Program

All PVSEC-30 & GPVC 2020 participants are cordially invited to attend Official & Social Programs. Come and join us for those programs which will offer you an opportunity to share a warm welcome and mingle with colleagues in pleasant surroundings!

Welcome Reception

Date	November 8 (Sun), 2020
Time	18:00 – 20:00
Venue	Ocean View Hall (5F), ICC JEJU

* Sandwich box will be provided.
* Join the Lucky Draw Event!

Opening Ceremony & PVSEC AWARD Ceremony

Date	November 9 (Mon), 2020
Time	13:00 – 14:00
Venue	Tamna Hall (5F), ICC JEJU

Closing Ceremony

Date	November 12 (Thu), 2020
Time	18:15 – 19:30
Venue	Tamna Hall (5F), ICC JEJU

* Oral & Poster presentation awards, student awards will be presented.
* Sandwich box will be provided.
* Join the Lucky Draw Event!

Tutorial Program

- **Date:** November 8 (Sun), 2020
- **Time:** 13:00-17:50
- **Place:** Samda AB (3F), ICC JEJU

※ All lectures will be given in English

※ All tutorial registers can replay tutorial sessions again with VOD until November 9 (Mon), 18:00 (GMT+9)

November 8 (Sun)		
Tutorial 1	13:00-14:30	Principles and applications of Si photovoltaics Prof. Stefaan De Wolf (King Abdullah University of Science and Technology, Saudi Arabia) * Virtual presentation - Recorded Video file
Tutorial 2	14:30-16:00	Principles and applications of thin film photovoltaics Dr. Thomas Unold (Helmholtz-Zentrum Berlin, Germany) * Virtual presentation - Recorded Video file
Tutorial 3	16:20-17:50	Halide Perovskites for Photovoltaic Applications Prof. Jin Young Kim (Seoul National University, Republic of Korea) * Live presentation on site

Publications

※ The updated contents of publications can be found on the official website: www.pvsec-30.com

GUIDELINE OF "FULL JOURNAL PAPER" SUBMISSION

By submitting your abstract to PVSEC-30 & GPVC 2020, you will have the opportunity to submit your paper to the following journals

Energies (www.mdpi.com/journal/energies)	**Crystals** (www.mdpi.com/journal/crystals)
Journal of Nanoscience and Nanotechnology (www.aspbs.com/jnn)	**ECS Journal of Solid State Science & Technology** (www.electrochem.org/publications/jss)
Current Photovoltaic Research (CPR) KCI Candidated Journal (www.kpvs.or.kr/cpvr/)	**Electronic Materials Letters (EML)** (www.springer.com/journal/13391)

TOPICS TO BE COVERED IN THIS SPECIAL ISSUE

This special issue includes the invited and innovative papers which have been presented at the 30th International Photovoltaic Science and Engineering Conference (PVSEC-30) & Global Photovoltaic Conference 2020 (GPVC 2020), and covers a whole spectrum of cell technologies from silicon to thin-films and emerging technologies. Sample topics of interest include, but are not limited to:

- Perovskite, organic, quantum dot, and hybrid solar cells;
- Si, chalcogenide thin film, and compound semiconductor;
- Nanotechnology for advanced photovoltaics;
- Analysis and characterization for photovoltaics;
- Design and synthesis of novel compounds for advanced photovoltaics;
- Spectrum conversion for photovoltaic devices;
- Devices and materials for scalable manufacturing, stability and performance;
- Solar fuel, module, system, and reliability;

Manuscript Submission Deadline: The schedule is up to each journal. To find information in more detail, please refer the table below.

Journal	Submission Deadline	Publication Fee
ECS-JSS	Mar. 10, 2021	No fee for non-open access articles; $1025 for open access (ECS members receive 75% discount on open access fees)
JNN	Jan. 20, 2021	USD 550
Crystal	Jan. 20, 2021	1200 CHF (400 CHF reduction out of 1600 CHF)
Energies	Dec. 31, 2020	1800 CHF
EML	Jan. 20, 2021	USD 550
CPR	Jan. 20, 2021	Free of charge

※ EML: N.B. Please select "PVSEC 2020" at Article Type at the submission

Satellite Program

PV-AI Special Session

- Date: November 10 (Tue), 2020
- Time: 09:30-12:00
- Registration: 09:30-10:00, Session: 10:00-12:00
- Place: RM 402 (4F), ICC JEJU

The title of this special session is "Broadening the Horizons in PV via BIG DATA and AI". Jeonbuk National University and Korea University are working together on a project "Graduate School of Integrated PV-AI" with the support of KETEP(Korea Institute of Energy Technology Evaluation and Planning) during 2020-2024. The goal of this project is to train master and doctorate convergence talents who can carry out creative research through convergence education such as PV element technology, process technology, optimal design of solar power plants, AI(Artificial Intelligence), big data, IoT, etc.

This special session consists of a project introduction and four invited presentations. We ask for your attention and participation in this session where we can discuss convergence with AI for future PV innovation.

PV CAMPER

- Date: November 10 (Tue), 2020
- Time: 14:00-16:30
- Place: RM 402 (4F), ICC JEJU

Accelerating solar capacity worldwide requires confidence in 1) the cross-climate performance of emergent, high efficiency PV technologies, 2) the accuracy of irradiance and other sensor measurements needed for yield comparison and simulations and 3) the identification of local environmental contributors to long-term reliability. PV CAMPER aims to meet these challenges.

IEA PVPS WORKSHOP

- Date: November 10 (Tue), 2020
- Time: 15:30-18:10
- Venue: Tamna B (5F), ICC JEJU

The IEA Photovoltaic Power Systems (PVPS) Program is one of the collaborative R&D Agreements established within the IEA and, since its establishment in 1993, the PVPS participants have been conducting a variety of joint projects in the application of photovoltaic conversion of solar energy into electricity. Currently, eight research projects, so-called “tasks,” have been established within the IEA PVPS Program. All the tasks within IEA PVPS will attend the IEA PVPS workshop and present the main activities

of each task. This workshop will offer in-depth discussions on the present and future of the PV from a variety of perspectives.

PV INDUSTRY FORUM

- POST COVID-19 ECONOMIC RECOVERY PACKAGE: GREEN NEW DEAL PROJECTS

- Date: November 12 (Thu), 2020
- Time: 10:00-12:20
- Place: Tamna B (5F), ICC JEJU

The PV Industry Forum will cover prime issues on digitalized green new deal projects to rebuild the economy after COVID-19. Based on the abrupt increase in global demands for advanced technology enabling non-contact life, diversification in the global PV market is highly predicted. Industrial R&D strategies to achieve very highly efficient PV cells and modules will be unveiled. New areas of industry including FPV, BIPV, digital O&M, smart city & digital twin will also be discussed to pave the way toward energy transition

PVSEC SPECIAL FORUM

- PV INDUSTRY IN THE POST-PANDEMIC ERA – CHALLENGES AND SOLUTIONS

- Date: November 12 (Thu), 2020
- Time: 14:50-18:00
- Place: Tamna B (5F), ICC JEJU

The growth of PV development is now challenged by the pandemic effect and the trade disruptions, but to which extent? Managing PV companies in the coming months and years will imply to understand the various dynamics at work: climate change policies, local manufacturing pushes, but also technology differentiation, increased competition and hardly foreseeable market changes will shape the environment in which the PV industry will have to develop. The PVSEC Special Forum will browse a complete picture of market and industry challenges for PV in the coming years

ASIA-PACIFIC KESTERITE WORKSHOP 2020

- Date: November 12 (Thu), 2020
- Time: 10:50-18:10
- Place: Samda B (3F), ICC JEJU

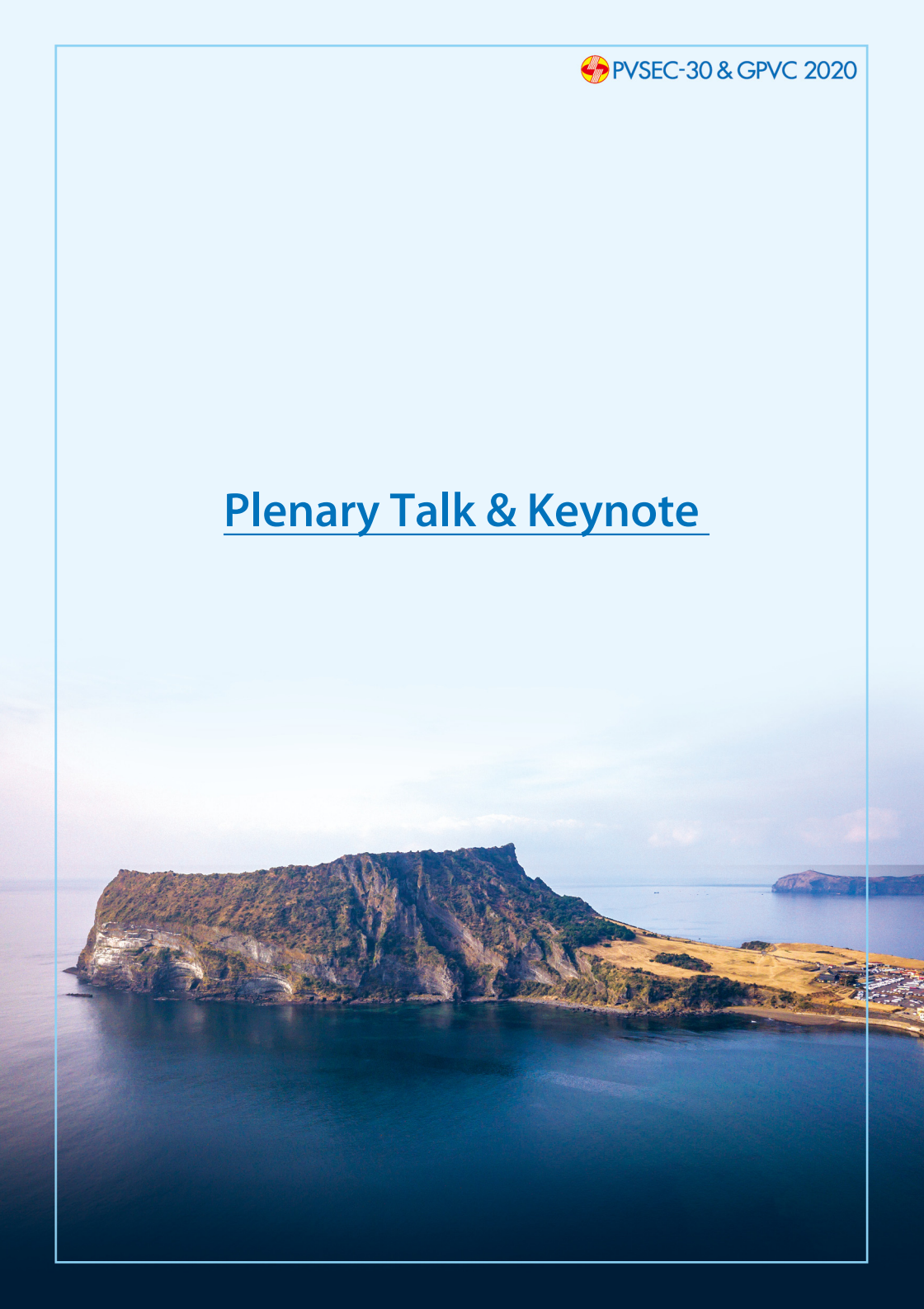
APKW-2020 is the 3rd Workshop since it has started from 2018. The main purpose of this workshop is to create an opportunity for academic exchange, understanding common technical issues, and joint collaboration between scholars who are investigating Kesterite materials and developing Kesterite thin film solar cells.

BIFACIAL PV WORKSHOP

- Date: November 12 (Thu), 2020
- Time: 14:50-18:00
- Venue: Room 303 (3F), ICC JEJU

Bifacial PV is these days a very important technology, as since few years now it became bankable due to better energy yield simulations, implemented standards and results and experience from running large bifacial PV systems. In the MENA (Middle East and North African) region, LCOEs (Levelized Cost Of Energy) below 2USct/kWh are reached in bifacial HSAT (Horizontal Single Axis Tracking) PV systems. We are sure that with this technology we will hit costs below 1USct/kWh from 2021. Not only on utility scale bifacial PV is becoming visible, but also on residential and industrial flat roofs, as well as in special applications for BIPV (Building Integrated Photovoltaics) and PIPV (Product Integrated Photovoltaics).

Plenary Talk & Keynote




PVSEC-30 & GPVC 2020

Nov-9 (Mon), 14:00-14:40 Tamna B&C (5F), ICC JEJU

Plenary Talk 1

Chair(s) Kwanghee Lee (Gwangju Institute of Science and Technology, Republic of Korea), Min Jae Ko (Hanyang University, Republic of Korea)

Plenary Talk 1 (14:00-14:40)

THE GENESIS AND STUNNING RISE OF PEROVSKITE SOLAR CELLS

Michael Graetzel*

École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Dr. Michael Graetzel
École Polytechnique Fédérale de Lausanne

Biography

Michael Graetzel is a Professor at Ecole Polytechnique Fédérale de Lausanne (EPFL) where he directs the laboratory of photonics and interfaces. He received his PhD from the Technical University in Berlin in 1971. After a postdoctoral training at the University of Notre Dame, USA, and his habilitation at the Free University Berlin he joined EPFL since 1977. He pioneered research on energy and electron transfer reactions in mesoscopic systems and their use to generate electricity and fuels from sunlight. He is credited with moving the solar cell field beyond the principle of light absorption via diodes to the molecular level exploiting the sensitization of 3-dimensional networks of semiconductor oxide nanoparticles by dyes, pigments or quantum dots for light energy harvesting. His dye-sensitized solar cells engendered the advent of perovskite solar cells, constituting the most exciting break-through in the recent history of photovoltaics. His many honors and awards include the August Wilhelm von Hofmann Medal, the Global Energy Prize, the RussNano Award, the Zewail Prize for Molecular Science, the Global Energy Prize, the Millennium Technology Grand Prize, the Marcel Benoist Prize, the King Faisal International Science Prize, the Albert Einstein World Award of Science, the Paracelsus Medal of the Swiss Chemical Society, the Paul Karrer Gold Medal and the Balzan Prize. He is an elected member of the Swiss Academy of Technical Sciences, the Leopoldina and other learned societies and holds eleven honorary doctor's degrees from European and Asian Universities. His publications received over 313'000 citations, h = 250 (Web of Science). A recent ranking by Stanford University places Graetzel in the first position on top of a list of 100'000 world-wide leading scientists across all fields.

Nov-9 (Mon), 14:40-15:20 Tamna B&C (5F), ICC JEJU

Plenary Talk 2

Chair(s) Hae-Seok Lee (Korea University, Republic of Korea)

Plenary Talk 2 (14:40-15:20)

MATERIALS AND PROCESS INFORMATICS FOR RESEARCH ON PHOTOVOLTAICS

Noritaka Usami*

Nagoya University, Japan

Dr. Noritaka Usami
Nagoya University

Biography

Professional Career

2013-Present	Professor, Graduate School of Engineering, Nagoya University, Japan
2018-2020	Senior Science and Technology Policy Fellow, Council for Science, Technology, and Innovation, Cabinet Office, Government of Japan, Japan
2000-2013	Associate Professor, Institute for Materials Research, Tohoku University, Japan
1998-1999	Visiting Researcher, Institüt für Angewandte Photophysik, Technische Universität Dresden, Japan
1994-2000	Research Associate, Research Center for Advanced Science and Technology, The University of Tokyo, Japan
1993-1994	Junior Scientist of Japan Society for the Promotion of Science, Japan

Education

1998	D.E.	The University of Tokyo
1993	M.E.	The University of Tokyo
1991	B.E.	The University of Tokyo

Awards

2018	SiliconPV Award
2017	Innovative PV award, JSPS 175th committee
2012	Best poster award, the 38th IEEE PVSC
2009	The best paper award, PVSEC-19
2008	Intelligent Cosmos Award
2000	Ando Incentive Prize for the Study of Electronics
1993	Young Researcher Award of Solid State Devices and Material

Nov-10 (Tue), 13:50-14:30 Tamna B&C (5F) ICC JEJU

Plenary Talk 3

Chair(s) Youngu Lee (Daegu Gyeongbuk Institute of Science & Technology, Republic of Korea)

Plenary Talk 3 (13:50-14:30)

RECENT RESEARCH PROGRESS OF POLYMER SOLAR CELLS

Yongfang Li*

University of Chinese Academy of Sciences, China

Dr. Yongfang Li
University of Chinese Academy of Sciences

Biography

Education

1982 M.D. Chemistry Department, East China University of Science and Technology, Shanghai, China
1986 Ph.D. Chemistry Department, Fudan University, Shanghai, China

Research Career

2012- present	Professor, Soochow University, Suzhou, Jiangsu, China
1988-present	Staff, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China
1993-present	Professor, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China
2013	Elected as a member of Chinese Academy of Sciences
1997-1998	Visiting Scientist, Institute for Polymers and Organic Solids, UCSB, USA
1988-1991	Visiting scholar, Institute for Molecular Science (IMS), Okazaki, Japan
1986.8-1988.8	Postdoctoral fellow in Institute of Chemistry, CAS (ICCAS), Beijing 100190, China

Recent Awards

2018 The Second-Grade National Award of China on Natural Sciences, for the contribution in "Photovoltaic materials of the conjugated polymer donors with conjugated side chains and indene-fullerene bisadduct acceptors"
2012 "Macro2012 Lecture Award" by PMSE of ACS (American Chemical Society).
2005 The First-Grade Award of Beijing City on Science and Technology, for the contribution in "The studies on the electrochemistry of conducting polymers and polymer light-emitting electrochemical cells"

Present research interests

Polymer solar cells and related photovoltaic materials

Nov-10 (Tue), 14:30-15:10 Tamna B&C (5F) ICC JEJU

Plenary Talk 4

Chair(s) Chinho Park (Yeungnam University, General Chair of PVSEC-30, Republic of Korea)

Plenary Talk 4 (14:30-15:10)

PV IN THE FUTURE ENERGY SYSTEM – LATEST RESULTS AND INSIGHTS BY THE IEA PVPS PROGRAMME

Stefan Nowak*

NET Nowak Energy & Technology Ltd., Switzerland

Dr. Stefan Nowak
NET Nowak Energy & Technology Ltd.

Biography

Stefan Nowak is an experimental physicist by training with a PhD from Fribourg University and EPFL, Switzerland. His academic research activities covered thermonuclear fusion, plasma and surface physics as well as thin films. His biography is characterised by a continuous evolution from research to technology management involving aspects of advanced research in different areas of energy, materials and processing. He has a broad technological expertise with complementary experience in communication, technology management and policy. Stefan has been working in renewable energy and energy efficiency for more than 25 years with a particular focus and expertise in photovoltaic (PV) solar electricity. Covering the full PV value chain from research to the market, including policy and communication, he is an expert and advisor to many different national and international organisations. In 1997, he founded NET Nowak Energy & Technology Ltd., a consultancy specialized in renewable energy, energy and resource efficiency. From 1993 to 2018, Stefan served as a programme manager for the Swiss PV RTD programme. He is coordinator of various PV related EU projects with more than 20 EU ministries and agencies (http://www.solar-era.net) and serves as chairman of the International Energy Agency's photovoltaic technology cooperation programme (IEA PVPS TCP, http://www.iea-pvps.org), one of the largest of its kind within the IEA. The responsibility for this programme since 2001 has led to a large network, numerous contacts, experiences and travels related to PV technology and deployment in all 5 continents.

Nov-11 (Wed), 09:00-09:40 Tamna B&C (5F), ICC JEJU

Plenary Talk 5

Chair(s) Jihye Gwak (Korea Institute of Energy Research, Republic of Korea)

Plenary Talk 5 (09:00-09:40)

ADVANCED THIN FILM PV TECHNOLOGIES AND APPLICATIONS

Jian Ding*

(Former) Hanergy Thin Film Power Group Limited, USA

Dr. Jian Ding
(Former) Hanergy Thin Film Power Group Limited

Biography

Jian has more thirty years of experience in the fields of semiconductor manufacturing equipment, process technology, and advanced solar technologies. He was a Senior Vice President of Hanergy Thin Film Power Group, his responsibilities include the head of Hanergy PV technical committee, and CEO of Alta Devices Inc., in Sunnyvale, California. Prior to joining Hanergy, he was the Senior Vice President and Chief Operating Officer of Astronergy, a solar manufacturing company, as well as the general manager of thin-film business unit. Before that, Jian was the Vice President of Global Technology and Applications for MKS Instruments. MKS is a global provider of instruments, subsystems and process control solutions that measure, control, power, monitor, and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity.

Jian also served as the Vice President for three years at North Microelectronics Company, and a total of fifteen years at Applied Materials in a variety of technical and business management roles culminating as a general manager with P&L responsibility. Jian Ding received a B.S. degree in Electrical Engineering from Harbin Institute of Technology, China, and M.S. and Ph.D. degrees in Materials Science and Engineering from the University of California at Berkeley.

Nov-11 (Wed), 09:40-10:20 Tamna B&C (5F), ICC JEJU

Plenary Talk 6

Chair(s) Jung-Ho Lee (Hanyang University, Republic of Korea)

Plenary Talk 6 (09:40-10:20)

TOWARDS A GLOBAL HYDROGEN ECONOMY

Ralf B. Wehrspohn*

Fraunhofer, Germany

Dr. Ralf B. Wehrspohn
Fraunhofer Institute

Biography

Professional Career

2019-Present	Executive Vice President, Fraunhofer-Gesellschaft e.V., Technology Marketing and Business Models, Germany
2006-Present	W3 professor for experimental physics, the Martin-Luther-University of Halle-Wittenberg, chair of Microstructure-based Materials Design, Germany
2018–2019	Head of Fraunhofer Group for Materials and Components – MATERIALS, Germany
2006–2019	Institute director of the Fraunhofer Institute for Microstructure of Materials and Systems, Halle, Germany
2003–2006	C4 professor for experimental physics, the University of Paderborn, chair of Nanophotonic Materials, Germany
1999–2003	Leader of a junior research group, the Max Planck Institute of Microstructure Physics, Halle in the field of the application of porous materials, Germany
1998–1999	Research assistant at the Philips Research Laboratories, Redhill, England. Research in the field of thin film technologies, i.a. flat panel displays, Germany
1995–1997	Doctoral candidate at the Carl von Ossietzky University of Oldenburg and at the École Polytechnique, Palaiseau, France
1990–1995	Studies of physics at the Carl von Ossietzky University of Oldenburg and the École Polytechnique, Palaiseau, France

Awards/Honors

2004	One of the 101 most important minds in Germany awarded by Financial Times Deutschland
2003	TR100 young innovators award of the Massachusetts Institute of Technology
2003	Heinz Maier Leibnitz Prize of the German Science Foundation (DFG)
2002	Innovations award of Dow Chemical Deutschland

Nov-12 (Thu), 13:50-14:30 Tamna B&C (5F), ICC JEJU

Plenary Talk 7

Chair(s) Dae-Hwan Kim (Daegu Gyeongbuk Institute of Science & Tehcnology, Republic of Korea)

Plenary Talk 7 (13:50-14:30)

FUTURE PROSPECTS OF NEXT-GENERATION PV TECHNOLOGY

Shigeru Niki*

New Energy and Industrial Technology Development Organization, Japan

Dr. Shigeru Niki
New Energy and Industrial Technology Development Organization

Biography

Education

1991 Ph. D, Electrical Engineering (Applied Physics) University of California, San Diego, USA

Professional Career

2019-Present	Director General, Renewable Energy Unit, Technology Strategy Center, New Energy and Industrial Technology Development Organization (NEDO), Japan
2017- 2019	Assistant Director General, Department of Energy and Environment, AIST, Japan
2015- 2017	Director, Renewable Energy Research Center, Japan
2013- 2015	Director, Research Center for Photovoltaic Technologies, Japan
2011- 2013	Deputy Director, Research Center for Photovoltaic Technologies, Research Center for Photovoltaic Technologies, Japan
2004-2011	Deputy Director, Research Center for Photovoltaics, Research Center for Photovoltaics, Japan
2001	AIS Team Leader, Electrotechnical Laboratory, Photonics Research Institute, Japan
1991	Joined Electrotechnical Laboratory, Japan

Major Research Topics

Photovoltaics (CIGS, CZTS, c-Si, etc.), wind power, geothermal, marine energy, shallow geothermal and hydrogeology, hydrogen energy carrier, bio-jet fuel, energy network, etc.

Nov-9 (Mon), 10:30-12:00 RM 303 (3F), ICC JEJU

Keynote Speech
T8-Systems including BOS components and integrations

Chair(s) Kyungsoo Lee (Korea Polytechnic University, Republic of Korea)

Parallel Session T8-01

Keynote Speech (10:30-10:55)

ADVANCEMENT OF SOLAR IN CALIFORNIA

Sarah Kurtz*

University of California Merced, United States

Dr. Sarah Kurtz
University of California Merced

Biography

Previous Responsibilities at the National Renewable Energy Laboratory (NREL), USA

2014 – Current	Research Fellow
2015 – 2017	PV Program Manager
2015 – 2017	NCPV Co-Director
2007 – 2017	Group Manager of the Reliability and Test Evaluation Group,
1999 – 2007	Group Manager of III-V Group
1986 – 1999	Staff, Senior, and Career Scientist (III-V research)
1985 – 1986	Post-doc (amorphous silicon research)

Education

1985	Ph.D. Chemical Physics, Harvard University, USA
1979	B.A. Chemistry and Physics, Manchester College, UK

Selected Recognitions and Awards

C3E Lifetime Achievement Award, 2016. *Annual national award recognizes a lifetime of work in solar energy. Other recipients include Mildred Dresselhaus (2012) and Mary Nichols (2015).*
Hubbard Award (NREL), 2014. *NREL's highest technical award.*
Cherry Award, 2012. *Annual international award recognizes outstanding contributions to photovoltaic research.*
Dan David Prize (shared with Jerry Olson and James Hanson), Future category "Energy," 2007. *Recognized development of GaInP solar cell – an unusual case of a technology developed at a single lab becoming the industry standard. Other recipients include Gordon Moore (2010) and Paul Alivasatos (2016).*

Nov-9 (Mon), 15:40-17:40 Tamna B&C (5F), ICC JEJU

Keynote Speech
T1-Crystalline and thin film silicon PV

Chair(s) Hae-Seok Lee (Korea University, Republic of Korea)

Parallel Session T1-02

Keynote Speech (17:10-17:40)

APPROACHING 24 % SOLAR CELL EFFICIENCY IN MASS PRODUCTION

Jörg W. MÜLLER*

Hanwha Q Cells GmbH, Germany

Dr. Jörg Müller
Hanwha QCELLS GmbH

Biography

Jörg Müller is Senior Vice President R&D Cells at Hanwha Q Cells GmbH, his responsibility include the development and optimization of cost effective, high efficiency silicon solar cells and their implementation in gigawatt scale production. He studied physics in Munich and Edinburgh. In 2000 he joined ISFH working in the field of rear contacted and bifacial sensitive solar cells. He received his Ph.D. degree from Hannover University in 2005. He joined Q-Cells SE in 2004 working in several positions in the technology division. Since 2007 he is leading the crystalline silicon cell development at Q Cells.

Nov-10 (Tue), 09:00-10:30 RM 302 (3F), ICC JEJU

Keynote Speech
T3-Compound semiconductor, concentrator and space PV

Chair(s) Jae-Hyung Jang (Gwangju Institute of Science and Technology, Republic of Korea)

Parallel Session T3-01

Keynote Speech (09:00-09:30)

HIGH SPECIFIC POWER SOLAR SHEETS FOR HALE UAV APPLICATIONS

Noren Pan*
MicroLink Devices, USA

Dr. Noren Pan
Microlink Devices

Biography

Education

1988 Ph.D. EE University of Illinois at Urbana-Champaign, Urbana, IL, USA
1985 MSEE University of Illinois at Urbana-Champaign, Urbana, IL, USA
1982 BSEE with honors University of North Dakota, Grand Forks, ND, USA

Professional Career

2000-Present	Recent President of MicroLink Devices
1995-2000	Chief Scientist – Kopin, Taunton, MA Heterojunction Bipolar Transistor for Cellular phone applications
1988-1995	Senior Scientist – Raytheon Research Division, Lexington, MA High Electron Mobility Transistors, Heterojunction Bipolar Transistor for X-band radar applications

Membership

2007-Present	Senior Member IEEE
1997-2007	Mantech Technical Program Committee Member

Nov-10 (Tue), 09:00-10:30 Halla B (3F), ICC JEJU

Keynote Speech
T5-Perovskite solar cells

Chair(s) Sang Hyuk Im (Korea University, Republic of Korea),
Hyun Suk Jung (Sungkyunkwan University, Republic of Korea)

Parallel Session T5-01

Keynote Speech (09:00-09:30)

EFFICIENT, STABLE AND SCALABLE PEROVSKITE SOLAR CELLS

Jangwon Seo*

Korea Research Institute of Chemical Technology, Republic of Korea

Dr. Jang Won Seo
Korea Research Institute of Chemical Technology (KRICT)

Biography

Jangwon Seo is Director at Department of Convergent Energy Materials and Group Leader of perovskite solar cell team at Korea Research Institute of Chemical Technology (KRICT) in Daejeon, South Korea. He received his B.S., M.S. and Ph.D. degree from Seoul National University in 1998, 2000 and 2006. He worked as postdoctoral researcher at University at Buffalo, the State University of New York, from 2007 to 2012. He joined KRICT in 2013. Then, he has been working as senior/principal scientist of perovskite solar cell team at KRICT. His past research experience includes study on synthesis of organic semiconducting materials, polymers, and inorganic nanomaterials for optoelectronic applications. His primary research interest is developing an efficient perovskite solar cells and modules with high stability. His group achieved world record efficiencies of 22.7%, 24.2% and 25.2% in perovskite solar cells in the past 4 years. His group has published several important papers on efficient and stable perovskite solar cells including Nature Energy (2018), Nature (2019) and Nature Communications (2020).

Nov-10 (Tue), 10:50-12:00 Samda B (3F), ICC JEJU

Keynote Speech
T4-Organic and dye-sensitized solar cells

Chair(s) Jung-Yong Lee (Korea Advanced Institute of Science and Technology, Republic of Korea)

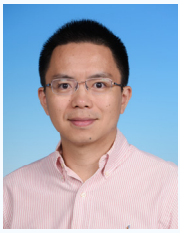
Parallel Session T4-04

Keynote Speech (10:50-11:20)

ACHIEVING NON-FULLERENE ORGANIC SOLAR CELLS WITH NEAR 18% EFFICIENCY

He Yan*

The Hong Kong University of Science and Technology, Hong Kong



Dr. He Yan
The Hong Kong University of Science and Technology

Biography

Dr. He Yan (Henry) obtained his Ph.D. in Chemistry from Northwestern University. After that, Dr. Yan spent most of his research career at Polyera Corporation, a leading company in the Organic Electronics industry. In 2009, Dr. Yan and his team published the first high-mobility n-type semiconducting polymer in Nature and the work was referred to as the "new transistor age" on the cover page of Nature. With the achievement, Dr. Yan was invited to receive the IdTechEx Printed Electronics "Best Organic Material" award in Dresden, Germany in 2010.

After returning to HKUST, Dr. Yan's group achieved world record efficiency organic solar cells multiple times. The latest certified 11.5% single-junction OSC was noted in the renowned "Best Research-Cell Efficiency" chart by NREL, which the first time a Chinese institution appeared on the chart in the last 40 years. Dr. Yan's group has published several important papers on fullerene and non-fullerene OSCs including two papers on Nature Energy and two papers on Nature Comm. in the past two years. The paper Nature Comm, 2014, 5, 5293 has been cited over 2300 times in about 4 years.

Education

2016-Present	Associate Professor, Department of Chemistry, Hong Kong University of Science and Technology, Hong Kong
2012-2016	Assistant Professor, Department of Chemistry, Hong Kong University of Science and Technology, Hong Kong

2004-2005 Post–doctoral Fellow, Northwestern University, USA
2000-2004 Ph. D., Northwestern University, USA.
1996-2000 B. S., Peking University, P. R. China

Professional Career

2009-2012 Vice President of Product Development, Polyera Corporation, USA
2006-2009 Product Development Manager, Polyera Corporation, USA
2005-2006 Senior research scientist, Air Products and Chemicals, USA

Awards

2016 HKUST School of Science Teaching Award
2015 HKUST School of Science Research Award
2011 Flextech Flexi Award for R&D team award
2010 IDTechEx Printed Electronics "Best Organic Materials" Award

Nov-10 (Tue), 10:50-12:20 Samda A (3F), ICC JEJU

Keynote Speech
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Sun Kyung Kim (Kyung Hee University, Republic of Korea)
Uk Sim (Chonnam National University, Republic of Korea)

Parallel Session T6-03

Keynote Speech (10:50-11:10)

SOLAR HYDROGEN PRODUCTION BY PHOTOELECTROCHEMICAL WATER SPLITTING

Jae Sung Lee*
Ulsan National Institute of Science and Technology, Republic of Korea

Dr. Jae Sung Lee
Ulsan National Institute of Science and Technology

Biography

Professional Career

2013- present	Professor, School of Energy and Chemical Engineering, UNIST, Republic of Korea
1986–2013	Assistant, Associate & Full Professor, Department of Chemical Engineering, POSTECH, Republic of Korea
1984–1986	Research Fellow, Catalytic Associates, Inc., Mountain View, California, USA
2006-2007	Visiting Professor, Department of Chemical Engineering, Korea University, Republic of Korea
1993-1994	Visiting Professor, Department of Chemical Engineering, Yale University, USA
1975-1980	Process Engineer, Sam Sung Petrochemical Co. Ulsan, Republic of Korea

Awards

2004 Green Energy Awards (Korean Institute of Energy Engineering)
2010 Yeosan Catalytic Science Awards (KIChE)

Research Interests

- Photocatalytic water splitting for solar hydrogen and fuels
- Materials and electrocatalysis for water electrolysis and fuel cells.
- Catalysis for energy and environment

Nov-10 (Tue), 15:30-16:50 Halla A (3F), ICC JEJU

Keynote Speech
T2-Chalcogenide thin film PV

Chair(s) Jeung-hyun Jeong (Korea Institute of Science and Technology, Republic of Korea)

Parallel Session T2-05

Keynote Speech (15:30-16:10)

REVIEW OF DEVELOPMENTS IN HIGH EFFICIENCY CIGS AND PEROVSKITE/CIGS THIN FILM PHOTOVOLTAICS

Ayodhya N. Tiwari*

Empa - Swiss Federal Laboratories for Material Science and Technology, Switzerland

Dr. Ayodhya N. Tiwari
Empa - Swiss Federal Laboratories for Material Science and Technology

Biography

Ayodhya N. Tiwari is the head of the Laboratory for Thin Films and Photovoltaics, Empa-Swiss Federal Laboratories for Material Science and Technology, and a Professor at ETH (Swiss Federal Institute of technology) Zürich, Switzerland. He is the Chairman and founder of ETH-spinout company Flisom in Zurich to transfer the lab's innovative research excellence in flexible lightweight solar cells to industrial manufacturing. He has been conferred with an honorary doctorate degree by the Hasselt University, Belgium for his contributions in the field of thin film solar cells.

Dr. Tiwari has more than 37 years of R&D experience in various thin film photovoltaic technologies. He is a co-author of more than 280 research publications and about 260 conference presentations including numerous invited papers and talks. He has co-chaired or co-organised several international conferences, co-edited special issues of leading journals on solar cells and thin films, is serving on the editorial boards of journals. He has been advisor to various institutions and expert delegation member of EU and other national agencies. Dr. Tiwari is a co-recipient of several awards and recognitions, his students have won young scientist and other awards (24 in total) at international conferences for innovative research in thin film solar cells.

Important contributions of Tiwari's group include: development of highest record efficiency flexible solar cells : 20.4% efficiency CIGS and 13.8% efficiency CdTe solar cells on polymer films with processes suitable for roll-to-roll manufacturing; monolithic interconnected flexible solar mini-modules with 16.9% efficiency; simple and safe non-vacuum deposition processes for CIGS and Kesterite solar cells; development of highly efficient semi-transparent Perovskite solar cells and CIGS based multi-junction (tandem) solar cells – recently achieved 22.7% perovskite/CIGS tandem solar.

Nov-11 (Wed), 13:40-15:10 Tamna B&C (5F), ICC JEJU

Keynote Speech
T9-PV deployment: Industry, market, policy and financing

Chair(s) Younghyun Cho (Sungkyunkwan University, Republic of Korea)

Parallel Session T9-01

Keynote Speech (13:40-14:10)

EFFECTIVENESS OF PV-POWERED VEHICLES FOR CREATION OF CLEAN ENERGY SOCEITY

Masafumi Yamaguchi*

Toyota Technological Institute, Japan

Dr. Masafumi Yamaguchi
Toyota Technological Institute

Biography

Professional Career

Professor Emeritus, Invited Research Fellow, Toyota Technological Institute, Nagoya, Japan Visiting Professor of the Kyushu University

Chairman, PV-Powered Vehicle Strategy Committee, NEDO (New Energy and Industrial Technology Development Organization

(Former) Project Leader of the PV R&D Project, NEDO

(Former) Research Supervisor, Creative Energy Generation by using Solar Energy, JST (Japan Science and Technology Agency)

Awards

2015	The Science and Technology Award by the Minister of Education, Culture, Sports, Science and Technology
2014	The WCPEC Award
2011	The PVSEC Award
2008	The William Cherry Award from the IEEE
2004	The Becquerel Prize from the European Commission

Nov-11 (Wed), 13:40-15:10 Tamna B&C (5F), ICC JEJU

Keynote Speech
T9-PV deployment: Industry, market, policy and financing

Chair(s) Younghyun Cho (Sungkyunkwan University, Republic of Korea)

Parallel Session T9-01

Keynote Speech (14:10-14:40)

THE SOLAR AGE: THE RISE OF SOLAR PV AND 100% RENEWABLE ENERGY SCENARIOS

Christian Breyer*

Lappeenranta University of Technology, Finland

Dr. Christian Breyer
Lappeenranta University of Technology

Biography

Christian Breyer is Professor for Solar Economy at LUT University, Finland. His major expertise is the integrated research of technological and economic characteristics of renewable energy systems specializing in energy system modeling for 100% renewable energy, on a local but also global scale. His team published the most studies on 100% renewable energy for countries or major regions globally. Energy system transition studies are carried out in full hourly and high geo-spatial resolution. Publications cover integrated sector analyses with power, heat, transport, desalination, industry and negative CO2 emission options. Carbon capture and utilisation as part of comprehensive Power-to-X investigations is a core research field for his team. He published more than 250 scientific papers, thereof more than 100 in scientific journals. He worked previously for Reiner Lemoine Institut, Berlin, and Q-Cells (now: Hanwha Q Cells). He is member of ETIP PV, IEA-PVPS, scientific committee of the EU PVSEC and IRES, scientific advisory board of CO2 Value Europe, chairman for renewable energy at the Energy Watch Group, reviewer for the IPCC and a co-founder of the Desertec Foundation. His academic background is general business, physics and energy systems engineering and a PhD in electrical engineering. He communicates in Twitter @ChristianOnRE.

Nov-11 (Wed), 15:30-17:10 Tamna B&C (5F), ICC JEJU

Keynote Speech
T7-Weather and grid connection performance, reliability and standardization

Chair(s) Jae Hak Jung (Yeungnam University, Republic of Korea)

Parallel Session T7-03

Keynote Speech (16:50-17:10)

QUALITY ASSURANCE IN PV – REDUCING LCOE BY MINIMISING AVOIDABLE FAILURES.

Ralph Gottschalg*
Faunhofer CSP, Germany

Dr. Ralph Gottschalg
Faunhofer CSP Lab

Biography

Education

2001 Ph.D. Viva
1996-200 Ph.D. Loughborough University, Centre for Renewable Energy Systems Technology (CREST), UK
1994-1995 M.S. Loughborough University, Centre for Renewable Energy Systems Technology (CREST), UK
1990-1999 Diplom, University Fridericiana, Karlsruhe, Germany

Professional Career

2018–Present Director Fraunhofer-Center for Silicon Photovoltaics CSP, Department Reliability and Technology for Grid Parity, Germany
Professor of Photovoltaic Energy Systems at Anhalt University of Applied Sciences, Köthen, German
2004-2018 Professor of Applied Photovoltaics at the Centre for Renewable Energy Systems Technology (CREST), Department of Electronic and Electrical Engineering, Loughborough University, UK
2004-2009 Advanced Research Fellow, Engineering and Physical Sciences Research Council EPSRC, UK
2000-2004 Researcher at the Centre for Renewable Energy Systems Technology (CREST), Department of Electronic and Electrical Engineering, Loughborough University, UK
1996-2000 Part Time Researcher at the Centre for Renewable Energy Systems Technology (CREST), Department of Electronic and Electrical Engineering, Loughborough University, UK
1995-1996 Research Engineer, Energy Research Group, Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe, Germany

Oral Sessions


PVSEC-30 & GPVC 2020

Nov-9 (Mon), 10:30-11:55 Tamna B&C (5F)

Parallel Session T1-01
T1-Crystalline and thin film silicon PV

Chair(s) Yoonmook Kang (Korea University, Republic of Korea)

T1-01-IN-1 (10:30-10:55)

NEUTRAL-COLORED TRANSPARENT CRYSTALLINE SILICON PHOTOVOLTAICS

Kangmin Lee, Namwoo Kim, Han-don Um, and Kwanyong Seo*

School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T1-01-OP-2 (10:55-11:10)

OPTIMIZATION OF LASER-PATTERNING PROCESS AND MOMDULE DESIGN FOR TRANSPARENT SILICON THIN-FILM SOLAR MODULE USING THIN OMO BACK ELECTRODE

Soo-Won Choi[1,2]*, Jaeho Park[1], Myunhun Shin[3], and Jung-Dae Kwon[1]**

[1]Materials Center for Energy Convergence, Korea Institute of Materials Science, Changwon, Gyeongnam, Republic of Korea

[2]Department of Material Science and Engineering, Pusan National University, Busan, Republic of Korea

[3]School of Electronics and Information Engineering, Korea Aerospace University, Goyang, Gyeonggi, Republic of Korea

T1-01-OP-3 (11:10-11:25)

ENHANCEMENT OF LIGHT ABSORPTION IN TRANSPARENT CRYSTALLINE SILICON SOLAR CELLS USING LIGHT-HARVESTING FILM

Kangmin Lee*, Jeonghwan Park, Seyeon Lim, and Kwanyong Seo**

Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T1-01-OP-4 (11:25-11:40)

INFLUENCE OF LIGHT IRRADIATION ON POTENTIAL-INDUCED DEGRADATION FOR THIN-FILM SILICON PHOTOVOLTAIC MODULES

Yukiko Hara[1], and Atsushi Masuda[1,2]*

[1]National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

[2]Niigata University, Niigata, Japan

Nov-9 (Mon), 10:30-11:50 Halla A (3F)

Parallel Session T2-01
T2-Chalcogenide thin film PV

Chair(s) SeJin Ahn (Korea Institute of Energy Research, Republic of Korea)

T2-01-IN-1 (10:30-10:50)

SPATIAL ATOMIC LAYER DEPOSITED AL_2O_3 FOR A COST EFFECTIVE FRONT SHEET FOR FLEXIBLE THIN FILM PV MODULES

Pieter Bolt[1]*, Dorrit Roosen[1], Shruti Kulkarni[1], Hans Linden[1], Fieke van den Bruele[2], and Ulfert Ruehle[3]

[1]TNO, Department of Solar Technology and Applications, Eindhoven, The Netherlands

[2]TNO, Holst Centre, Eindhoven, The Netherlands

[3]Flisom AG, Niederhasli, Switzerland

T2-01-IN-2 (10:50-11:10)

ENHANCEMENTS OF PHOTOVOLTAIC PROPERTIES IN FLEXIBLE SEMI-TRANSPARENT CU (IN_{1-X}, GA_X)SE_2 SOLAR CELL ON ULTRA-THIN GLASS SUBSTRATE

Joo Hyung Park[1]*, Dongryeol Kim[1,2], Sang Su Shin[1,3], Sang Min Lee[1], Jun-Sik Cho[1], Jae Ho yun[1], and Ho Seong Lee[2]

[1]Photovoltaics Research Department, Korea Institute of Energy Research, Daejeon, Republic of Korea

[2]School of Materials Science and Engineering, Kyungpook National University, Daegu, Republic of Korea

3Department of Electrical Engineering, Kyungpook National University, Daegu, Republic of Korea

T2-01-OP-3 (11:10-11:20)

SPUTTERED INDIUM-BASED BUFFERS FOR CIGS SOLAR CELLS

Wolfram Witte*, Wolfram Hempel, Stefan Paetel, Richard Menner, and Dimitrios Hariskos

Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg, Stuttgart, Germany

T2-01-OP-4 (11:20-11:30)

FLEXIBLE AND BIFACIAL $Cu(In,Ga)Se_2$ SOLAR CELLS WITH In_2O_3:SnO_2 BACK CONTACT

Abdurashid Mavlonov[1]*, Takahito Nishimura[2], Jakapan Chantana[1,3], Yu Kawano[3], Taizo Masuda[4], and Takashi Minemoto[3]**

[1]Research Organization of Science and Technology, Ritsumeikan University, Shiga, Japan

[2]Ritsumeikan Global Innovation Research Organization, Ritsumeikan University, Shiga, Japan

[3]Department of Electrical and Electronic Engineering, Ritsumeikan University, Shiga, Japan

[4]S-Frontier Division, Toyota Motor Corporation, Shizuoka, Japan

T2-01-OP-5 (11:30-11:40)

INKJET PRINTING OF ZN(O,S) BUFFERS FOR $CU(IN,GA)(S,SE)_2$ THIN FILM SOLAR CELLS

Van Ben Chu[1]*, Daniel Siopa[1], Alice Debot[1], Damilola Adeleye[1], Jérôme Guillot[2], and Phillip J. Dale[1]**

[1]University of Luxembourg, Department of Physics and Materials Science, Belvaux, Luxembourg

[2]Luxembourg Institute of Science and Technology, Materials Research and Technology Department, Belvaux, Luxembourg

T2-01-OP-6 (11:40-11:50)

DEVELOPMENT OF LIFT-OFF PROCESS USING LAYERED-GROWN $MOSE_2$ ATOMIC FILM FOR LIGHTWEIGHT AND FLEXIBLE BIFACIAL CU(IN,GA)SE2 SOLAR CELLS

Takahito Nishimura[1]*, Naoto Hamada[1], Jakapan Chantana[1], Abdurashid Mavlonov[1], Yu Kawano[1], Taizo Masuda[2], and Takashi Minemoto[1]**

[1]Department of Electrical and Electronic Engineering, Ritsumeikan University, Shiga, Japan

[2]S-Frontier Division, Toyota Motor Corporation, Shizuoka, Japan

Nov-9 (Mon), 10:30-12:00 Samda B (3F)

Parallel Session T4-01
T4-Organic and dye-sensitized solar cells

Chair(s) Tae-Hyuk Kwon (Ulsan National Institute of Science and Technology, Republic of Korea)

T4-01-IN-1 (10:30-10:50)

DYE-SENSITIZED SOLAR CELLS STRIKE BACK TO NEXT GENERATION SOLAR CELLS

Jung Min Ji, Hoaran Zhou, Md. Aftabuzzaman, Masud, Kyeong-Min Kim, and Hwan Kyu Kim*

Department of Chemistry, Korea University, Sejong, Republic of Korea

T4-01-IN-2 (10:50-11:10)

EVALUATION OF SOLID-STATE DYE-SENSITIZED SOLAR CELLS UNDER THE LOW LIGHT INTENSITY CONDITION

Satoshi Uchida[1]*, Chie Nishiyama[1], Ludmila Cojocaru[2], and Hiroshi Segawa[1]

[1]Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo, Japan

[2]Molecular Chemistry and Materials (C2M), Institute of Molecular Sciences (Batiment A12), University of Bordeaux, France

T4-01-IN-3 (11:10-11:30)

DEVELOPMENT OF DURABLE DYE-SENSITIZED SOLAR CELLS FOR ENERGY HARVESTING APPLICATIONS

Hiroshi Matsui*, Mami Kitsuda, Naoki Matsumoto, and Kenichi Okada

Electronic Technologies R&D Center, Fujikura Ltd., Japan

T4-01-OP-4 (11:30-11:40)

LOW-TEMPERATURE CHEMICAL SINTERING TECHNIQUE FOR FLEXIBLE DYE-SENSITIZED SOLAR CELLS

Nhat Dang Quang Lung[1]*, Kicheon Yoo[1], Narayan Chandra Deb Nath[1], Md. Mahbubur Rahman[2], and Jae-Joon Lee[1]**

[1]Department of Energy & Materials Engineering and Research Center for Photoenergy Harvesting & Conversion Technology, Dongguk University, Seoul, Republic of Korea

[2]Department of Energy and Materials, Konkuk University, Chungju, Republic of Korea

T4-01-OP-5 (11:40-11:50)

EFFECT OF HIGH DIELECTRIC SRF2 IN TIO2 PHOTOANODE FOR DYE-SENSITIZED SOLAR CELL APPLICATIONS

Ashok Kumar Kaliamurthy*, Lung Nhat Dang Quang, Hyeong Cheol Kang, Kicheon Yoo, and Jae-Joon Lee**

Department of Energy Materials and Engineering, Research Center for Photoenergy Harvesting & Conversion Technology, Dongguk University, Seoul, Republic of Korea

T4-01-OP-6 (11:50-12:00)

SOLUTION-PROCESSED HYBRID TANDEM SOLAR CELLS BASED ON COLLOIDAL QUANTUM DOTS AND ORGANIC BULK HETEROJUNCTIONS

Havid Aqoma*, Imil Fadli Imran, and Sung-Yeon Jang**

School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

Nov-9 (Mon), 10:30-11:45 RM 303 (3F)

Parallel Session T8-01
T8-Systems including BOS components and integrations

Chair(s) Kyungsoo Lee (Korea Polytechnic University, Republic of Korea)

T8-01-KN-1 (10:30-10:55)

[KEYNOTE SPEECH] ADVANCEMENT OF SOLAR IN CALIFORNIA

Sarah Kurtz*

Department of Materials Science and Engineering, University of California Merced, USA

T8-01-IN-2 (10:55-11:15)

RENEWABLE ENERGY AND POWER NETWORK RESEARCH FOR SUSTAINABLE SOCIETY

Masakazu Ito*

Faculty of Engineering, University of Fukui, Fukui, Japan

T8-01-OP-3 (11:15-11:30)

IMPACT OF SOLAR CELL DIMENSIONS ON MODULE POWER, EFFICIENCY AND CELL-TO-MODULE LOSSES

Max Mittag*, Andrea Pfreundt, and Jibran Shahid

Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany

T8-01-OP-4 (11:30-11:45)

CONCEPTS FOR 3D SHAPED CRYSTALLINE SILICON MODULES

Bonna K. Newman*, Nicolas Guillevin, Antonius R. Burgers, and Martin Spath

TNO Energy Transition - Solar Energy, Petten, the Netherlands

Nov-9 (Mon), 15:40-17:40 Tamna B&C (5F)

Parallel Session T1-02
T1-Crystalline and thin film silicon PV

Chair(s) Hae-Seok Lee (Korea University, Republic of Korea)

T1-02-OP-1 (15:40-15:55)

DOPANT COMPENSATION PREVENTS SHUNTING IN POLY-SI PASSIVATED INTERDIGITATED BACK CONTACT SI SOLAR CELLS

Matthew Hartenstein[1,2]*, William Nemeth[2], Caleb Stetson[1,2], Vincenzo LaSalvia[2], Steve Harvey[2], Matthew Page[2], David Young[2], Sumit Agarwal[1], and Paul Stradins[2]

[1]*Department of Chemical Engineering, Colorado School of Mines, Golden, USA*

[2]*National Renewable Energy Lab, Golden, USA*

T1-02-OP-2 (15:55-16:10)

OPTIMIZATION OF DOPING PROFILES IN IBC PIN LAYOUT USING POLY-SI-BASED PASSIVATING CONTACTS

Jan Krügener[1]*, Gustav Wetzel[1], Christina Hollemann[2], Felix Haase[2], Robby Peibst[1,2], and H. Jörg Osten[1,3]

[1]*Institute of Electronic Materials and Devices, Leibniz University Hannover, Hannover, Germany*

[2]*Institute for Solar Energy Research in Hamelin, Emmerthal, Germany*

[3]*Laboratory of Nano and Quantum Engineering, Leibniz University Hannover, Hannover, Germany*

T1-02-OP-3 (16:10-16:25)

DEVELOPMENT OF MASKED PLASMA ION IMMERSION IMPLANTATION TECHNOLOGY FOR TOPCON-IBC SOLAR CELLS

Noboru Yamaguchi[1]*, Jan Benick[2]**, Christian Reichel[2], Naoki Hibino[1] and Masashi Kubo[1]

[1]*ULVAC,inc., Kanagawa, Japan*

[2]*Fraunhofer-Institute for Solar Energy Systems ISE, Freiburg, Germany*

T1-02-OP-4 (16:25-16:40)

CAN A TUNNEL LAYER PASSIVATED CONTACT BEAT A HETEROJUNCTION CONTACT?

P. Wang*, D. Fracasso, R. Tabajonda, J. Epistola, D. Perez, M. Delos Santos, G. De Luna, R. Sridharan, A. Khanna, T. Mueller, and R. Stangl

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

T1-02-OP-5 (16:40-16:55)

NANO-CRYSTALLINE SILICON CARBIDE BASED TRANSPARENT PASSIVATING CONTACT REACHING EFFICIENCY OF 24%

Malte Köhler, Manuel Pomaska, Kaifu Qiu*, Andreas Lambert, Weiyuan Duan, Shenghao Li, Alexander Eberst, Friedhelm Finger, Thomas Kirchartz, Uwe Rau, and Kaining Ding

Forschungszentrum Jülich GmbH, Jülich, Germany

T1-02-OP-6 (16:55-17:10)

ADVANCED OPTO-ELECTRICAL MODEL FOR EFFICIENCY AND ENERGY YIELD OPTIMIZATION OF TANDEM SOLAR CELLS

Carlos Ruiz Tobon, Abdallah Nour El Din, Malte Vogt, Indra Syifai, Manvika Singh, Paul Procel Moya, Rudi Santbergen**, Miro Zeman*, and Olindo Isabella

Photovoltaic Materials and Devices group, Delft University of Technology, Delft, the Netherlands

T1-02-KN-7 (17:10-17:40)

[KEYNOTE SPEECH] APPROACHING 24 % SOLAR CELL EFFICIENCY IN MASS PRODUCTION

Jörg W. Müller*, Martin Schaper, Ingmar Höger, Bernhard Klöter, Alexander To, Enrico Jarzembowski, Fabian Fertig, Matthias Junghänel, Anika Weihrauch, Kyunghun Kim, Maximilian Kauert, Ronny Lantzsch, Kevin Wachsmuth, Ronny Bakowskie, Matthias Köhler, Felix Frühauf, Benjamin G. Lee, Kai Petter, Tabitha Ballmann, Friederike Kersten, René Hönig, Janko Cieslak, Klaus Duncker, Axel Schwadedissen, Michael Schley, Ansgar Mette, Stefan Peters, and Ji Weon Jeong

Global R&D, Hanwha Q Cells GmbH, 06766 Bitterfeld-Wolfen, Germany

Nov-9 (Mon), 15:40-17:10 Halla A (3F)

Parallel Session T2-02
T2-Chalcogenide thin film PV

Chair(s) Byungha Shin (Korea Advanced Institute of Science and Technology, Republic of Korea)

T2-02-IN-1 (15:40-16:00)

BAND GAP ENERGY VARIATIONS IN CHALCOGENIDE COMPOUND SEMICONDUCTORS: INFLUENCE OF OFF-STOICHIOMETRY

Susan Schorr[1,2]*, and Galina gurieva[1]

[1]*Department Structure and Dynamics of Energy Materials, Helmholtz-Zentrum Berlin for Materials and Energy, Berlin, Germany*

[2]*Department of Geosciences, Freie Universitaet Berlin, Berlin, Germany*

T2-02-IN-2 (16:00-16:20)

DETERMINATION OF DEPTH-DIRECTIONAL PROFILES OF ELECTRONIC STRUCTURE OF CIS-BASED CELLS

Norio Terada*, Yusei Takagi, Kota Ishimatsu, Kazuhiro Hirayama, Tatsuo Matsunobe, Takamasa Ohshige, and Chen Guanzhong

Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan

T2-02-IN-3 (16:20-16:40)

REVEALING THE ATOMIC DISTRIBUTION IN CIGS AND CZTS ABSORBER FILMS WITH ATOM PROBE TOMOGRAPHY

Pyuck-Pa Choi*

Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

T2-02-OP-4 (16:40-16:50)

UNDERSTANDING DEVICE PROPERTIES OF CIGS SOLAR CELLS IN THE LIGHT-ACTIVE STATES

Yunae Cho[1]*, Jiseon Hwang[2], Inyoung Jeong[2], Jihye Gwak[2], Jae Ho Yun[2], Kihwan Kim[2]**, and William Jo[1]**

[1]*Department of Physics, Ewha Womans University, Seoul, Republic of Korea*

[2]*Photovoltaics Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea*

T2-02-OP-5 (16:50-17:00)

INTERFACE BAND OFFSET AND BANDGAP GRADING IN CU(IN,GA)SE_2 THIN FILM SOLAR CELLS

Ha Kyung Park[1]*, Yunae Cho[1], Kihwan Kim[2], Inyoung Jeong[2], Jae Ho Yun[2], Jihye Gwak[2], and William Jo[1]**

[1]*Department of Physics, Ewha Womans University, Seoul, Republic of Korea*

[2]*Photovoltaic Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea*

T2-02-OP-6 (17:00-17:10)

A FIRST-PRINCIPLES MODELLING OF AMORPHOUS MAGNESIUM INCORPORATED ZINC OXIDE AND EXPERIMENTAL DEMONSTRATION

Md. Anower Hossain[1]*, Xin Cui [2], Dillon Frost[2], Patrick Burr[2], and Bram Hoex[1]

[1]*School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Sydney, Australia*

[2]*School of Mechanical and Manufacturing Engineering, University of New South Wales, Sydney, Australia*

Nov-9 (Mon), 15:40-17:10 Samda B(3F)

Parallel Session T4-02
T4-Organic and dye-sensitized solar cells

Chair(s) Jae-Joon Lee (Dongguk University, Republic of Korea)

T4-02-IN-1 (15:40-16:00)

POWERFOYLE, A GROUNDBREAKING LIGHT CHARGING MATERIAL

Giovanni Fili*

Exeger, Sweden

T4-02-IN-2 (16:00-16:20)

MOLECULAR DESIGN STRATEGY TOWARD IDEAL ARTIFICIAL PHOTOSYSTEM BY MIMICKING NATURAL PHOTOSYNTHESIS

Tae-Hyuk Kwon*

Department of Chemistry, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T4-02-IN-3 (16:20-16:40)

27 YEARS EXPERIENCE OF DYE-SENSITIZED SOLAR CELLS – FROM EKOLOGISK ENERGI TO DYENAMO

Henrik Petersson*

Dyenamo AB, Stockholm, Sweden

T4-02-OP-4 (16:40-16:50)

MOLECULAR DESIGN STRATEGY TOWARD ROBUST ORGANIC DYES IN THIN-FILM PHOTOANODE

Jun-Hyeok Park*, Un-Young Kim, and Tae-Hyuk Kwon**

Department of Chemistry, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T4-02-OP-5 (16:50-17:00)

INDOOR-LIGHT-ENERGY-HARVESTING DYE-SENSITIZED PHOTO-RECHARGEABLE BATTERY

Byung-Man Kim[1]*, Myeong-Hee Lee[2], and Hyun-Kon Song[2]**, and Tae-Hyuk Kwon[1]**

[1]*Chemistry, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea*

[2]*Chemical Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea*

T4-02-OP-6 (17:00-17:10)

CARRIER COLLECTION IN OPTICALLY RESONANT NANOSTRUCTURES FOR QUANTUM DOT SOLAR CELLS

Stefan Wil Tabernig[1]*, Yijun Gao[2], Zhi Li Teh[2], Andrea Cordaro[1], Andreas Pusch[2], Robert Patterson[2], Shujuan Huang[2], and Albert Polman[1]**

[1]*Center for Nanophotonics, AMOLF, Amsterdam, the Netherlands*

[2]*School of Photovoltaic and Renewable Engineering, University of New South Wales, Sydney, Australia*

Nov-9 (Mon), 15:40-17:05 Samda A (3F)

Parallel Session T6-01

T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Tae-Youl Yang (Chungnam National University, Republic of Korea)

T6-01-IN-1 (15:40-15:55)

TOWARDS 20% SOLAR TO HYDROGEN CONVERSION EFFICIENCY USING PEROVSKITE-SILICON TANDEM ABSORBERS

Fiona J Beck*, Siva Karuturi, Astha Sharma, Doudou Zhang, and Kylie Catchpole

Research School of Electrical, Energy and Materials Engineering, The Australian National University, Canberra, Australia

T6-01-OP-2 (15:55-16:05)

HIERARCHICAL ARCHITECTURES OF MO:$BiVO_4$/GRAPHENE HYBRID COMPOSITES:EFFICIENT SUNLIGHT DRIVEN PHOTOCATALYST

Mohaseen S. Tamboli*, Asiya M. Tamboli, Vasudeva Reddy Minnam Reddy, and Chinho Park**

School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea

T6-01-OP-3 (16:05-16:15)

MEMRISTIVE CUPROUS IODIDE BASED ARTIFICIAL SYNAPSE FOR FLEXIBLE NUROMORPHIC COMPUTING

June-Mo Yang*, So-Yeon Kim, Se-Yong Jeong and Nam-Gyu Park**

School of Chemical Engineering, Sungkyunkwan University, Suwon, Republic of Korea

T6-01-OP-4 (16:15-16:25)

ELUCIDATING THE OPTOELECTRONIC PROPERTIES OF METAL HALIDE PEROVSKITE VIA TRANSIENT PHOTOCONDUCTIVITY

Jongchul Lim*

Graduate School of Energy Science and Technology, Chungnam National University, Republic of Korea

T6-01-OP-5 (16:25-16:35)

ORGANIC-INORGANIC HYBRID TRANSPARENT CONDUCTIVE ELECTRODE FOR FLEXIBLE ELECTRONICS

Minh Nhut Le[1]*, Byung Doo Choi[2], and Myung Gil Kim[1]**

[1]School of Advanced Materials Science and Engineering, Sung Kyun Kwan University, Suwon, Republic of Korea

[2]Department of Chemistry, Chung-Ang University, Seoul, Republic of Korea

T6-01-OP-6 (16:35-16:45)

INFLUENCE OF GA-HALOGEN BOND FORMATION AT NANO-POROUS GAN PHOTOELECTRODE ON ENHANCED PHOTOELECTROCHEMICAL WATER SPLITTING EFFICIENCY

Hoki Son*, Periyayya Uthirakumar, and In-Hwan Lee**

Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea

T6-01-OP-7 (16:45-16:55)

SOLUTION-BASED PROCESSING 2D SEMICONDUCTORS

Jihyun Kim*, and Joohoon Kang**

School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Republic of Korea

T6-01-OP-8 (16:55-17:05)

OPTIMIZED THE STRING FOR IMPROVEMENT IN THE POWER OF SHINGLED-TYPE PHOTOVOLTAIC MODULE

Jinho Song[1,2]*, Taewung Jeong[1], O-Bong Yang[2], and Chaehwang Jeong[1]**

[1]Smart Mobility Materials and Nano Photonics R&D Group, Korea Institute of Industrial Technology, Gwangju, Republic of Korea

[2]Semiconductor and Chemical Engineering & Energy Research Center, Chonbuk National University, Jeonju, Republic of Korea

Nov-9 (Mon), 15:40-17:05 RM 303 (3F)

Parallel Session T8-02
T8-Systems including BOS components and integrations

Chair(s) Wonwook Oh (STECO Co.Ltd, Republic of Korea)

T8-02-IN-1 (15:40-16:00)

DESIGN-DRIVEN RESEARCH ON PHOTOVOLTAIC MOBILITY

Angèle Reinders[1,2]*

[1]*Department of Design, Production and Management, University of Twente, Enschede, Netherlands*
[2]*Energy Technology Group, Eindhoven University of Technology, Eindhoven, Netherlands*

T8-02-IN-2 (16:00-16:20)

MONITORING DATA ANALYSIS WITH SIMULATED I-V CHARACTERISTICS FOR FAILURE DETECTION OF LARGE-SCALE PV SYSTEMS

Yuzuru Ueda*
Department of Electrical Engineering, Tokyo University of Science, Tokyo, Japan

T8-02-OP-3 (16:20-16:35)

A MULTI-LAYER MODELLING FRAMEWORK FOR TECHNO-SOCIO-ECONOMICAL PENETRATION OF PHOTOVOLTAICS

Maarten Verkou, Zameer Ahmad, Hesan Ziar**, Miro Zeman*, and Olindo Isabella
Photovoltaic Materials and Devices group, Delft university of Technology, Delft, the Netherlands

T8-02-OP-4 (16:35-16:50)

OUTPUT ESTIMATION METHOD OF BIFACIAL PV MODULES CONSIDERING CLUSTER AND SIGHT FACTOR AND OPTIMAL PV ARRAY SEPARATION DISTANCE

Yuki Sado*, Ryuto Shigenobu, and Masakazu Ito**
Department of Engineering, University of Fukui, Fukui, Japan

T8-02-OP-5 (16:50-17:05)

GENETIC ALGORITHM AS AN OPTIMIZATION TOOL FOR PV POWER SIMULATION AND DIGITAL TWINNING

Dorian Esteban Guzman Razo*, Björn Müller, and Christof Wittwer
Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany

Nov-10 (Tue), 09:00-10:20 Halla A (3F)

Parallel Session T2-03
T2-Chalcogenide thin film PV

Chair(s) Joo Hyung Park (Korea Institute of Energy Research, Republic of Korea)

T2-03-IN-1 (09:00-09:20)

ALKALI-METAL DOPING EFFECTS ON CIGS THIN FILM SOLAR CELLS: A SYSTEMATIC STUDY FROM LITHIUM TO CESIUM

Shogo Ishizuka*

National Institute of Advanced Industrial Science and Technology, Japan

T2-03-IN-2 (09:20-09:40)

REDUCTIONS OF CARRIER RECOMBINATION RATES OF CU(In,Ga)(S,Se)$_2$ SOLAR CELLS THROUGH ALKALINE TREATMENTS AND DEVELOPMENT OF DEVICE STRUCTURES

Jakapan Chantana[1,2]*, Takahito Nishimura[3], Yu Kawano[1], and Takashi Minemoto[1]**

[1]*Department of Electrical and Electronic Engineering, Ritsumeikan University, Japan*

[2]*Research Organization of Science and Technology, Ritsumeikan University, Japan*

[3]*Ritsumeikan Global Innovation Research Organization, Ritsumeikan University, Japan*

T2-03-IN-3 (09:40-10:00)

STUDY OF RECOMBINATION IN ALKALI-TREATED CHALCOGENIDE BASED SOLAR CELLS

Takeaki Sakurai[1]*, Hamidou Tangara[1], Alban Laphente-Sampietro[1,2], and Muhmmad Monirul Islam[1]

[1]*Department of Applied Physics, Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Japan*

[2]*The Institute for Solid State Physics, The University of Tokyo, Kashiwa, Japan*

T2-03-OP-4 (10:00-10:10)

ALKALI FLUORIDE-TREATMENTS OF CU(In,Ga)(S,Se)$_2$ THIN-FILMS GROWN UNDER ATMOSPHERIC PRESSURE

Pablo Reyes-Figueroa*, Tim Kodalle[1], Tobias Bertram[1], Erik Waack[1], Ralf Haberecht[1], Christian A. Kaufmann[1], Rutger Schlatmann[1,2], and Reiner Klenk[1]

[1]*PVcomB/Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin, Germany*

[2]*Hochschule für Technik und Wirtschaft Berlin, Berlin, Germany*

T2-03-OP-5 (10:10-10:20)

COMPARISON OF DIFFERENT Rb-CONTAINING PDTS ON THE PROPERTIES OF THE CuInGaSe$_2$ SURFACE

Natalia Maticiuc[1]*, Robert Wenisch[1], Jakob Lauche[1], Tobias Bertram[1], Ivona Kafedjiska[1], Hasan A. Yetkin[1,2], Christian A. Kaufmann[1], Rutger Schlatmann[1,3], and Iver Lauermann[1]

[1]*Competence Centre Photovoltaics (PVcomB), Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (HZB), Germany*

[2]*Technische Universität Berlin, Berlin, Germany*

[3]*Faculty 1 - Energy and Information, Hochschule für Technik und Wirtschaft Berlin, Germany*

Nov-10 (Tue), 09:00-10:25 RM 302 (3F)

Parallel Session T3-01
T3-Compound semiconductor, concentrator and space PV

Chair(s) Jae-Hyung Jang (Gwangju Institute of Science and Technology, Republic of Korea)

T3-01-KN-1 (09:00-09:30)

[KEYNOTE SPEECH] HIGH SPECIFIC POWER SOLAR SHEETS FOR HALE UAV APPLICATIONS

Noren Pan*, and R. Chan**

MicroLink Devices, IL, USA

T3-01-IN-2 (09:30-09:50)

III-V/SI TANDEM SOLAR CELLS: STATE OF THE ART AND THE PATHWAY TO >28% EFFICIENCY

Steven A. Ringel[1]*, Daniel L. Lepkowski[1], Jacob T. Boyer[2], and Tyler J. Grassman[1,2]

[1]*Department of Electrical and Comp. Engineering, The Ohio State University, Columbus, OH, USA*

[2]*Department of Materials Science and Engineering, The Ohio State University, Columbus, OH, USA*

T3-01-IN-3 (09:50-10:10)

A HYBRID CPV-PV MODULE PROTOTYPE AND THE VERIFICATION TEST

Won-Kyu Park[1†]*, Young Gwan Kim[2], Dae-Yong Kim[3†], Eddie Chung[4], Woo-Lim Jeong[5,6], Dong-Seon Lee[5,6], Seoyong Shin[7], Jae-Hwan Choi[8], Jae-Hoon Jang[8], and Sewang Yoon[9]

[1]*SKKU Advanced Institute of Nanotechnology, Sungkyunkwan University, Suwon, Gyeonggi-do, Republic of Korea*

[2]*Korea Advanced Nano Fab Center, Suwon, Gyeonggi-do, Republic of Korea*

[3]*APP Co. Ltd., Hwaseong, Gyeonggi-do, Republic of Korea*

[4]*Hanul Solar Energy Co. Ltd., Seoul, Republic of Korea*

[5]*School of Electrical Engineering and Computer Science, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

[6]*Research Institute for Solar and Sustainable Energies, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

[7]*Department of Information and Communication Engineering, Myongji University, Yongin, Gyeonggi-do, Republic of Korea*

[8]*Korea Southern Power Co. Ltd., Busan, Republic of Korea*

[9]*194 Central-ro, Yeonsu-gu, Incheon, Republic of Korea*

T3-01-OP-4 (10:10-10:25)

ENHANCED POWER GENERATION OF MONOLITHIC DOUBLE-JUNCTION III-V SOLAR CELLS ENABLED WITH LUMINESCENT SOLAR CONCENTRATOR

Shin Hyung Lee[1]*, Mun-Jong Kim[1], Hyo Jin Kim[2], and Sung-Min Lee[1]**

[1]*School of Materials Science and Engineering, Kookmin University, Seoul, Republic of Korea*

[2]*Photonic Energy Research Center, Korea Photonics Technology Institute, Gwangju, Republic of Korea*

Nov-10 (Tue), 09:00-10:20 Samda B (3F)

Parallel Session T4-03
T4-Organic and dye-sensitized solar cells

Chair(s) Jae-Joon Lee (Dongguk University, Republic of Korea)

T4-03-IN-1 (09:00-09:20)

HIGH RELIABILITY DYE-SENSITIZED SOLAR CELLS REALIZED AS ENERGY HARVESTER OF IOT DEVICES

Kei Ogiya*, Satoshi Shimizu, Yuki Kyoda, Masayuki Nakano, and Tomohisa Yoshie, and Atsushi Fukui**

Research Division III, Materials & Energy Technology Laboratories, Corporate Research & Development BU, Sharp Corporation, Nara, Japan

T4-03-IN-2 (09:20-09:40)

HIGH PERFORMANCE MATERIALS DEVELOPMENT FOR DYE SENSITIZED CELL

Der-Gun Chou*, and Cheng-Wei Hsu**

Everlight Chemical Industrial Corporation,Taoyuan, Taiwan

T4-03-OP-3 (09:40-09:50)

DEVELOPMENT OF LARGE AREA BIFACIAL DYE-SENSITIZED SOLAR CELLS WITH TRANSPARENCY ABOVE 30 %

Hyeong Cheol Kang*, Kicheon Yoo, Narayan Chandra Deb Nath, Jae Cheon Kim, Jun Yeong Ryu, Jun Hwan Jang and Jae-Joon Lee**

Research Center for Photoenergy Harvesting & Conversion Technology, Dongguk University, Seoul, Republic of Korea

T4-03-OP-4 (09:50-10:00)

BUILDING SOLAR CELLS WITH LEGO®: ENGINEERING PHOTOCATHODES FOR EFFICIENT QUANTUM DOT TANDEM SOLAR CELLS

Heather Flint[1]*, Ankita Kolay[2], Dr Elizabeth Gibson[1], and Melepurath Deepa[2]

[1]*Energy Materials Laboratory, Bedson Building, School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, UK*

[2]*Department of Chemistry, Indian Institute of Technology Hyderabad, Telangana, India*

T4-03-OP-5 (10:00-10:10)

INDOOR ORGANIC PHOTOVOLTAICS – PRACTICALIZATION OF SELF-SUSTAINABLE IOT DEVICES

Muhammad Jahandar[1]*, Soyeon Kim[1], Prasetio Adi[1,2], Souk Yoon Kim[1,2], and Dong Chan Lim[1]**

[1]*Surface Technology Division, Materials Center for Energy Convergence, Korea Institute of Materials Science, Changwon, Republic of Korea*

[2]*Department of Display Engineering, Pukyong National University, Busan, Republic of Korea*

T4-03-OP-6 (10:10-10:20)

MITIGATING THE UNDESIRABLE CHEMICAL REACTION BETWEEN ORGANIC MOLECULES FOR HIGHLY EFFICIENT FLEXIBLE ORGANIC PHOTOVOLTAIC

Adi Prasetio*, Soyeon Kim, Muhammad Jahandar, Souk Yoon Kim, Eun Joo Seo, and Dong Chan Lim**

Surface Technology Division, Korea Institute of Materials Science, Changwon, Republic of Korea

Nov-10 (Tue), 09:00-10:30 Halla B (3F)

Parallel Session T5-01
T5-Perovskite solar cells

Chair(s) Sang Hyuk Im (Korea University, Republic of Korea), Hyun Suk Jung (Sungkyunkwan University, Republic of Korea)

T5-01-KN-1 (09:00-09:30)

[KEYNOTE SPEECH] EFFICIENT, STABLE AND SCALABLE PEROVSKITE SOLAR CELLS

Jangwon Seo*

Division of Advanced Materials, Korea Research Institute of Chemical Technology, Daejeon, Republic of Korea

T5-01-IN-2 (09:30-09:45)

HIGH-EFFICIENCY MONOLITHIC ALL-PEROVSKITE TANDEM SOLAR CELLS

Hairen Tan*

College of Engineering and Applied Sciences, Nanjing University, Nanjing, China

T5-01-IN-3 (09:45-10:00)

SOLAR ENERGY CONVERSION BEYOND THE PEROVSKITE ABSORPTION EDGE

Se-Woong Baek*

Department of Chemical and Biological Engineering, Korea University, Seoul, Republic of Korea

T5-01-OP-4 (10:00-10:10)

SOLVENT ADDITIVES COORDINATION EFFECT ON PbI_2 PRECURSOR AND HIGH-PERFORMANCE PEROVSKITE SOLAR CELLS

Hyungwoo Kim*, and Kwanyong Seo**

Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T5-01-OP-5 (10:10-10:20)

FULLY AIR-PROCESSED ALL-INORGANIC PEROVSKITE SOLAR CELLS: NEW STRATEGIES FOR MAKING CESIUM-LEAD HALIDES

Sawanta S. Mali*, Jyoti V. Patil, and Chang Kook Hong**

Polymer Energy Materials Laboratory, School of Applied Chemical Engineering, Chonnam National University, Gwangju, Republic of Korea

T5-01-OP-6 (10:20-10:30)

TOWARD UPSCALING OF PEROVSKITE SOLAR CELLS : HISTORICAL ANALYSIS OF COMMERCIALIZED SOLAR CELLS

Sang-Won Lee[1]*, Soohyun Bae[2], Jae-Keun Hwang[1], Wonkyu Lee[1], Solhee Lee[1], Seok Hyun Jeong[1], Ji Yeon Hyun[1], Yoonmook Kang[3], Donghwan Kim[1], and Hea-Seok Lee[3]**

[1]Department of Material Science and Engineering, Korea University, Seoul, Republic of Korea

[2]Korea Institute of Science and Technology, Seoul, Republic of Korea

[3] *KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

Nov-10 (Tue), 09:00-10:30 Samda A (3F)

Parallel Session T6-02
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Jongchul Lim (Chungnam National University, Republic of Korea), Dohyung Kang (Yeungnam University, Republic of Korea)

T6-02-IN-1 (09:00-09:15)

KESTERITE INSPIRED ABSORBER FOR SOLAR ENERGY HARVESTING DEVICES

Lydia Helena Wong[1,2]*

[1] *School of Materials Science and Engineering, Nanyang Technological University, Singapore,*

[2] *Campus of Research Excellence and Technological Enterprise, Singapore*

T6-02-IN-2 (09:15-09:30)

INDUSTRIAL-SCALE ROLL-TO-ROLL FABRICATION OF PEROVSKITE PHOTOVOLTAICS USING ECO-FRIENDLY ANTISOLVENT BATHING

Young Yun Kim[1], Tae-Youl Yang[1]*, Riikka Suhonen[3], Antti Kemppainen[3], Kyeongil Hwang[1], and Jangwon Seo[1]**

[1] *Division of Advanced Materials, Korea Research Institute of Chemical Technology, Daejeon, Republic of Korea*

[2] *Department of Materials Science and Engineering, Chungnam National University, Daejeon, Republic of Korea*

[3] *Printed electronics processing, VTT Technical Research Centre of Finland Ltd, Kaitoväylä 1, Oulu, Finland*

T6-02-OP-3 (09:30-09:40)

FIRST OPERATION OF N^+-AZO/P-$BASI_2$ THIN FILM SOLAR CELLS

Yudai Yamashita*, Kaoru Toko, and Takashi Suemasu**

Institute of Applied Physics, University of Tsukuba, Tsukuba, Japan

T6-02-OP-4 (09:40-09:50)

THE ENHANCEMENT OF LIGHT ABSORPTION EFFICIENCY OF SOLAR CELLS USING COMPRESSIVELY-STRAINED SUPERLATTICE WITH STRAIN-BALANCED INTERLAYER

Meita Asmai[1]*, Kentaroh Watanabe[2], Riko Yokota[1], Naoya Miyashita[2], Yoshitaka Okada[2], Yoshiaki Nakano[1], and Masakazu Sugiyama[1,2]

[1] *Dept. of Electrical Engineering and Information Systems, The University of Tokyo, Tokyo, Japan*

[2] *Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo, Japan*

T6-02-OP-5 (09:50-10:00)

CHARACTERIZATION OF ZNSNP2 BULK CRYSTALS BY PHOTOLUMINESCENCE AND DLTS MEASUREMENTS

Taro Kuwano[1]*, Ryoji Katsube[1], Steve Johnston[2], Adele C. Tamboli[2], and Yoshitaro Nose[1]**
[1]*Department of Materials Science and Engineering, Kyoto University, Kyoto, Japan*
[2]*National Renewable Energy Laboratory, Colorado, USA*

T6-02-OP-6 (10:00-10:10)

THREE-TERMINAL SOLAR CELLS WITH EMBEDDED QUANTUM WELLS

Takeshi Noda*, and Takaaki Mano
National Institute for Materials Science, Japan

T6-02-OP-7 (10:10-10:20)

A TRIPLE-FLUID PHOTOVOLTAIC/THERMAL (PV/T) SYSTEM POWERED BY NANO AND PCM TECHNOLOGIES

M. Imtiaz Hussain[1]*, and Jun-Tae Kim[2]**
[1]*Green Energy Technology Research Center, Kongju National University, Gongju-si, Chungcheongnam-do, Republic of Korea*
[2]*Department of Architectural Engineering, Kongju National University, Gongju-si, Chungcheongnam-do, Republic of Korea*

T6-02-OP-8 (10:20-10:30)

SHOCKLEY-QUEISSER LIMIT AND YABLONOVITCH LIMIT FOR ADVANCED SILICON AND PEROVSKITE SOLAR CELLS

Kwangjin Kim[1]*, and Seungwoo Lee[1,2]**
[1]*KU-KIST Graduate School of Converging Science and Technology, Korea University, Seoul, Republic of Korea*
[2]*Department of Integrative Energy Engineering, Department of Biomicrosystem Technology, and KU Photonics Center, Korea University, Seoul, Republic of Korea*

Nov-10 (Tue), 09:00-09:45 RM 303 (3F)

Parallel Session T8-03
T8-Systems including BOS components and integrations

Chair(s) Jincheol Kim (Korea Electronics Technology Institute, Republic of Korea)

T8-03-OP-1 (09:00-09:15)

A CASE STUDY OF NET-ZERO ENERGY HDB RESIDENTIAL FLATS SINGAPORE

Andy W. J. Ang*, and Stephen E. R. Tay**
Department of Building, School of Design and Environment, National University of Singapore, Singapore

T8-03-OP-2 (09:15-09:30)

PERFORMANCE ANALYSIS OF BIFACIAL PV MODULES WITH TRANSPARENT MESH BACKSHEET

Ju Hee Jang[1]*, Andrea Pfreundt[2], Max Mittag[2], and Kyung Soo Lee[1]**
[1]*Energy&Electrical Engineering, Korea Polytechnic University, Siheung, Republic of Korea*
[2]*Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany*

T8-03-OP-3 (09:30-09:45)

A STUDY ON IMPROVEMENT OF PV SYSTEM PERFORMANCE USING UNMANNED SNOW REMOVAL

Seong Dae Jeong**, Jeong Yun Kim, Seung Il Lee, Dong Hwan Kim*, Hyeon Jeong Lee, Choong Yeol Choi, and Ji Hyeon Park

R&D Center, RESET COMPANY CO.,LTD., Seongnam-si, Republic of Korea

Nov-10 (Tue), 09:00-12:00 RM 402 (4F)

PV-AI Special Session

Chair(s) Hae-Seok Lee (Korea University, Republic of Korea)

PVAI-1 (10:00-10:15)

INTRODUCTION TO THE "GRADUATE SCHOOL OF INTEGRATED ENERGY-AI" SUPPORTED FROM THE HUMAN RESOURCE PROGRAM IN ENERGY TECHNOLOGY BY KETEP

O-Bong Yang*

Graduate School of Integrated Energy-AI, School of Semiconductor and Chemical Engineering, Jeonbuk National University, Jeonju, Republic of Korea

PVAI-2 (10:15-10:40)

PERSPECTIVES TOWARD SMART MANUFACTURING AND PRECISE OPERATION OF PV SYSTEMS

Donghwan Kim*

Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea

PVAI-3 (10:40-11:05)

DEVELOPMENT OF THE RESONANCE OPTIMIZATION FRAMEWORK FOR MULTI-MODULE WIRELESS POWER TRANSFER SYSTEMS

Joungha Lee[1], Chul Woo Byeon[2]**, and Seung Beop Lee[3]*, **

[1]Graduate School of Integrated Energy-AI, Jeonbuk National University, Jeonju, Republic of Korea

[2]Department of Electronic Engineering, Wonkwang University, Iksan, Republic of Korea

[3]School of International Engineering and Science, Graduate School of Integrated Energy-AI, Jeonbuk National University, Jeonju, Republic of Korea

PVAI-4 (11:05-11:30)

DESIGN AND FABRICATION OF NEW-GENERATION SOLAR CELLS ASSISTED BY MACHINE LEARNING TECHNIQUE

Min Kim*

School of Chemical Engineering, Graduate School of Integrated Energy-AI, Jeonbuk National Univeristy, Jeonju, Republic of Korea

PVAI-5 (10:30-11:55)

ROLE OF ARTIFICIAL INTELLIGENCE FOR HIGH-PERFORMING PHOTOVOLTAIC SOLAR CELLS

Mobeen Ur Rehman[1]*, and Kil To Chong[1,2]**

[1]*Department of Electronics and Information Engineering, Jeonbuk National University, Jeonju, Republic of Korea*
[2]*Advanced Electronics and Information Research Center, Jeonbuk National University, Jeonju, Republic of Korea*

Nov-10 (Tue), 10:50-12:00 Halla A (3F)

Parallel Session T2-04
T2-Chalcogenide thin film PV

Chair(s) Yong-Duck Chung (Electronics and Telecommunications Reearch Institute, Republic of Korea)

T2-04-IN-1 (10:50-11:10)

EFFICIENCY ENHANCEMENT BY THE CU-DEFFICIENT LAYER ON THE CIGS SURFACE AND ITS FORMATION MECHANISUM

Akira Yamada*
Department of Electrical and Electronic Engineering, Tokyo Institute of Technology, Tokyo, Japan

T2-04-OP-2 (11:10-11:20)

REACTION PATHWAYS OF AG-CU-GA-IN PRECURSOR WITH HIGH AG/I DURING SELENIZATION

Ho Ming Tong[1]*, Sina Soltanmohammad[2], William N. Shafarman[2], and Timothy J. Anderson[1]
[1]*Department of Chemical Engineering, University of Florida, Gainesville, Florida, USA*
[2]*Materials Science & Engineering, University of Delaware, Newark, New Jersey, USA*

T2-04-OP-3 (11:20-11:30)

NOVEL APPROACHES FOR IMPLEMENTING COLORFUL THIN-FILM SOLAR CELLS

Dae-Hyung Cho[1]*, Woo-Jung Lee[1], Sung-Hoon Hong[1], Joo Yeon Kim[1,2], and Yong-Duck Chung[1,2]**
[1]*ICT Creative Research Laboratory, Electronics and Telecommunications Research Institute, Daejeon, Republic of Korea*
[2]*Department of Advanced Device Technology, Korea University of Science and Technology, Daejeon, Republic of Korea*

T2-04-OP-4 (11:30-11:40)

RECONSTRUCTION OF GRAIN BOUNDARY IN CDTE

Ji-Sang Park*
Department of Physics, Kyungpook National University, Daegu, Republic of Korea

T2-04-OP-5 (11:40-11:50)

HIGH-EFFICIENCY CDSETE/CDTE SOLAR CELL PREPARATION BY CLOSE SPACE SUBLIMATION PROCESS

Anhong Hu[1,2]*, Jie Zhou[2], Peng Zhou[2], Xinyuan Qin[2], Penggeng Zhong[2], Yuxia Jiang[2], Mengfei Zhang[2], Xuanzhi Wu[2]**, and Deren Yang[1]**
[1]*State Key Laboratory of Silicon Material and School of Materials Science and Engineering, Zhejiang University, Hangzhou, China*

[2]*Advanced Solar Power (Hangzhou) Inc., Hangzhou, China*

T2-04-OP-6 (11:50-12:00)

FABRICATION OF TIN SULFOSELENIDE SOLAR CELLS

Vasudeva Reddy Minnam Reddy[1]*, Won Gyu Lee[2], Sreedevi Gedi[1], Ramakrishna Reddy K.T.[3], and Chinho Park[1]**

[1]*School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea*

[2]*Division of Chemical Engineering & Bioengineering, Kangwon National University, Republic of Korea*

[3]*Solar Photovoltaic Laboratory, Department of Physics, Sri Venkateswara University, Tirupati, India*

Nov-10 (Tue), 10:50-12:15 RM 302 (3F)

Parallel Session T3-02
T3-Compound semiconductor, concentrator and space PV

Chair(s) Kwang-Seong Choi (Electronics and Telecommunications Research Institute, Republic of Korea)

T3-02-IN-1 (10:50-11:10)

SELF-SUSTAINABLE ENERGY MODULE INTEGRATED WITH III-V SOLAR CELL AND SECONDARY BATTERY

Jeha Kim*

Department of Energy Convergence Engineering, Cheongju University, Cheongju, Republic of Korea

T3-02-OP-2 (11:10-11:30)

LOW DISLOCATION DENSITY III-V ON SI BY LOW TEMPERATURE GROWTH TOWARDS HIGH-EFFICIENCY III-V/SI TANDEM SOLAR CELLS

Yu-Cian Wang[1], Nobuaki Kojima[1], Akio Yamamoto[1,2], Yoshio Ohshita[1], and Masafumi Yamaguchi[1]*

[1]*Toyota Technological Institute, Nagoya, Japan*

[2]*Fukui University, Fukui, Japan*

T3-02-OP-3 (11:30-11:45)

ENHANCED LIGHT HARVESTING IN FLEXIBLE GAAS SOLAR CELL MODULE USING A MICRO PRISM ARRAY REALIZED ON FLEXIBLE POLYMER FILM

Ye-Chan Kim[1]*, Sung-Tae Kim[1], Ho-Jung Jeong[2], Ji-Seon Yoo[1], Min-Ho Choi[1], and Jae-Hyung Jang[1,3]**

[1]*School of Electrical Engineering and Computer Science, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

[2]*Lighting materials and components research center, Korea Photonics Technology Institute, Gwangju, Republic of Korea*

[3]*Research Institute for Solar and Sustainable Energies, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

T3-02-OP-4 (11:45-12:00)

FRANZ-KELDYSH EFFECT IN THE INGAP/GAAS SOLAR CELLS

Sanam Saeid Nahaei[1]*, Hyun Jun Jo[1], Jong Su Kim[1]**, Sang Jun Lee[2], and Yeongho Kim[2]

[1]*Department of Physics, Yeungnam University, Gyeongsan, Republic of Korea*
[2]*Korea Research Institute of Standard and Science, Daejeon, Republic of Korea*

T3-02-OP-5 (12:00-12:15)

HIGH-EFFICIENCY INGAAS CELL WITH ENHANCED EXTERNAL RADIATIVE EFFICIENCY

Riko Yokota[1]*, Kentaroh Watanabe[2], Hassanet Sodabanlu[2], Hao Xu[2], Meita Asami[1], Yoshiaki Nakano[1], and Masakazu Sugiyama[1,2]
[1]*Dept. of Electrical Engineering and Information Systems, The University of Tokyo, Tokyo, Japan*
[2]*Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo, Japan*

Nov-10 (Tue), 10:50-12:00 Samda B (3F)

Parallel Session T4-04
T4-Organic and dye-sensitized solar cells

Chair(s) Jung-Yong Lee (Korea Advanced Institute of Science and Technology, Republic of Korea)

T4-04-KN-1 (10:50-11:20)

[KEYNOTE SPEECH] ACHIEVING NON-FULLERENE ORGANIC SOLAR CELLS WITH NEAR 18% EFFICIENCY

He Yan*
Department of Chemistry, Hong Kong University of Science and Technology, Hong Kong

T4-04-IN-2 (11:20-11:40)

SOLUTION-PROCESSED TOP AND BOTTOM ELECTRODES FOR HIGHLY PERFORMED ORGANIC SOLAR CELLS

Wallace C.H. Choy*
Department of Electrical and Electronic Engineering, The University of Hong Kong, Hong Kong

T4-04-IN-3 (11:40-12:00)

17% NON-FULLERENE ORGANIC SOLAR CELLS WITH ANNEALING-FREE AQUEOUS MOOX

Hong Nhan Tran[1], Sujung Park[1], Febrian Tri Adhi Wibowo[2], Narra Vamsi Krishna[2], Sung-Yeon Jang[2], and Shinuk Cho[1]*
[1]*Department of Physics and Energy Harvest Storage Research Center, University of Ulsan, Ulsan, Republic of Korea*
[2]*School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea*

Nov-10 (Tue), 10:50-12:05 Halla B (3F)

Parallel Session T5-02
T5-Perovskite solar cells

Chair(s) Ki-Ha Hong (Hanbat National University, Republic of Korea), Se-Woong Baek (Korea University, Republic of Korea)

T5-02-IN-1 (10:50-11:05)

STRATEGIES TOWARDS MITIGATION OF DEFECTS IN PEROVSKITE SOLAR CELLS

Jin-Wook Lee*

SKKU Advanced Institute of Nanotechnology (SAINT) and Department of Nanoengineering, Sungkyunkwan University, Suwon, Republic of Korea

T5-02-IN-2 (11:05-11:20)

PEROVSKITE SOLAR CELLS INCORPORATING FUNCTIONAL INTERFACE MATERIALS

Jung Hwa Seo*

Department of Materials Physics, Graduate School of Chemical Engineering, Dong-A University, Busan, Republic of Korea

T5-02-IN-3 (11:20-11:35)

MODELING AND IMPLEMENTATION OF TANDEM POLYMER SOLAR CELLS USING WIDE-BANDGAP FRONT CELLS

Seo-Jin Ko[1], Hyosung Choi[2], Quoc Viet Hoang[1,3], Chang Eun Song[1], Pierre-Olivier Morin[4], Jungwoo Heo[5], Mario Leclerc[4], Sung Cheol Yoon[1], Han Young Woo[6], Won Suk Shin[1], Bright Walker[7]*, and Jin Young Kim[5]

[1]Division of Advanced Materials, Korea Research Institute of Chemical Technology, Daejeon, Republic of Korea

[2]Department of Chemistry and Research Institute for Natural Sciences, Hanyang University, Seoul, Republic of Korea

[3]Vietnam Certification Centre, Directorate for Standards, Metrology and Quality, Hanoi, Vietnam

[4]Department of Chemistry, Laval University, Quebec City, Canada

[5]Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

[6]Department of Chemistry, Korea University, Seoul, Republic of Korea

[7]Department of Chemistry, Kyung Hee University, Seoul, Republic of Korea

T5-02-OP-4 (11:35-11:45)

HALIDE-DEPENDENT SPECTRAL ANALYSIS OF SURFACE BAND BENDING IN HYBRID LEAD HALIDE PEROVSKITES

Hye Ri Jung*, Yunae Cho, and William Jo**

Department of Physics, Ewha Womans University, Seoul, Republic of Korea

T5-02-OP-5 (11:45-11:55)

HALIDE SEGREGATION-FREE WIDE BANDGAP PEROVSKITE FOR LIGHT-STABLE PEROVSKITE/SI TANDEM SOLAR CELLS

Su Geun Ji*, Ik Jae Park, You Jin Ahn, Geon Pyo Hong, and JinYoungKim**
Department of Materials Science and Engineering, Seoul National University, Seoul, Republic of Korea

T5-02-OP-6 (11:55-12:05)

MULTIFUNCTIONAL FLUORINATED DIANHYDRIDE LEWIS BASE: A NOVEL PRECURSOR SOLUTION AND A-PHASE STABILIZER FOR OVER 22% EFFICIENT AND STABLE PLANAR PEROVSKITE SOLAR CELL

Jun Zhu[1]*, Hee Jung Kim[2], Won Bin Kim[2], ChangHwun Sohn[2], Tae Kyu Ahn[1]**, and Hyun Suk Jung[2]**
[1]Department of Energy Science, Sungkyunkwan University, Suwon, Republic of Korea
[2]School of Advanced Materials Science & Engineering, Sungkyunkwan University, Suwon, Republic of Korea

Nov-10 (Tue), 10:50-12:15 Samda A (3F)

Parallel Session T6-03
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Sun Kyung Kim (Kyung Hee University, Republic of Korea),
Uk Sim (Chonnam National University, Republic of Korea)

T6-03-KN-1 (10:50-11:10)

[KEYNOTE SPEECH] SOLAR HYDROGEN PRODUCTION BY PHOTOELECTROCHEMICAL WATER SPLITTING

Jae Sung Lee*
School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T6-03-IN-2 (11:10-11:25)

ENHANCING PHOTOELECTROCHEMICAL RESPONSE OF METAL OXIDE PHOTOELECTRODES VIA PLASMON INDUCED ENERGY TRANSFER

Jung Kyu Kim[1]*
School of Chemical Engineering, Sungkyunkwan University, Suwon, Republic of Korea

T6-03-OP-3 (11:25-11:35)

FABRICATION OF NANO-WALL SI HETERO-JUNCTION CELLS

Yukimi Ichikawa*, Masakazu Hirai, Ryousuke Ishikawa, and Makoto Konagai
Advanced Research Labs., Tokyo City University, Tokyo, Japan

T6-03-OP-4 (11:35-11:45)

LASER-CONTROLLED GRAPHENE GROWTH FOR SILICON SCHOTTKY SOLAR CELL USING MICROWAVE PLASMA CVD

Riteshkumar Vishwakarma*, Rucheng Zhu, Ashmi Mewada, and Masayoshi Umeno**
C`s Techno Inc., Co-operative Research Center for Advanced Technology, Nagoya, Japan

T6-03-OP-5 (11:45-11:55)

IMPACT OF O_2 FLOW ON PROPERTIES OF CU_4O_3 THIN FILMS FABRICATED BY RF SPUTTERING

Md Abdul Majed Patwary[1,5]*, Chun Yuen Ho[2], Katsuhiko Saito[1], Qixin Guo[1],

[1]Department of Electrical and Electronic Engineering, Saga University, Saga, Japan

[2]Department of Physics and Materials Science, City University of Hong Kong, Hong Kong

[3]Materials Sciences Division, Lawrence Berkeley National Laboratory, CA, USA

[4]Department of Materials Science and Engineering, University of California, CA, USA

[5]Department of Chemistry, Comilla University, Cumilla, Bangladesh

T6-03-OP-6 (11:55-12:05)

HIGHEST PHOTORESPONSIVITY EVER ACHIEVED FOR UNDOPED $BASI_2$ FILMS FORMED BY RF SPUTTERING

Taira Nemoto[1]*, Ryota Koitabashi[1], Masami Mesuda[2], Kaoru Toko[1], and Takashi Suemasu[1]**

[1]Institute of Applied Physics, University of Tsukuba, Ibaraki, Japan

[2]Osoh Corporation, Advanced Materials Research Laboratory, Kanagawa, Japan

T6-03-OP-7 (12:05-12:15)

REMARKABLE IMPROVEMENT OF THE OPTICAL PROPERTIES OF AS-DOPED N-$BASI_2$ FILMS

Sho Aonuki*, Kaoru Toko, and Takashi Suemasu**

Institute of Applied Physics, University of Tsukuba, Ibaraki, Japan

Nov-10 (Tue), 10:50-12:20

RM 303 (3F)

Parallel Session T8-04
T8-Systems including BOS components and integrations

Chair(s) Jongsung Park (Green Energy Institute, Republic of Korea)

T8-04-OP-1 (10:50-11:05)

PERFORMANCE & ECONOMIC ASSESSMENT OF PORTABLE SOLAR WATER PUMPING SYSTEM AT DIFFERENT HEADS

Richa Parmar*, Chandan Banerjee and Arun K. Tripathi

Department of Solar Photovoltaics, National Institute of Solar Energy, Gurugram, Haryana, India

T8-04-OP-2 (11:05-11:20)

FOR VIPV APPLICATIONS: INVESTIGATION OF TRANSIENT SHADING WITH HIGH TIME RESOLUTION UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

Gustav Wetzel[1]*, Jan Kr gener[1], and Robby Peibst[1,2]

[1]Institute of Electronic Materials and Devices, Leibniz University Hannover, Germany

[2]Institute for Solar Energy Research in Hamelin, Emmerthal, Germany

T8-04-OP-3 (11:20-11:35)

INNOVATIVE FLOATING BIFACIAL PHOTOVOLTAIC SOLUTIONS FOR INLAND WATER AREAS

Hesan Ziar [1]*, Bjorn Prudon[2], Fen-Yu (Vicky) Lin[3], Bart Roeffen[3], Dennis Heijkoop[4], Tim Stark[1], Elias Garcia

Goma[1], Julen Garro Extebarria[1], Ignacio Narvaez Alavez[1], Daniel van Tilborg[4], Hein van Laar[4], Rudi Santbergen[1], and Olindo Isabella[1]

[1]Delft University of Technology, Photovoltaic Materials and Devices group, Delft, the Netherlands

[2]Waterschap Rivierenland, De Blomboogerd 1, Tiel, the Netherlands

[3]Blue21 B.V., Molengraaffsingel 12, Delft, the Netherlands

[4]Hakkers B.V., Oudsas 11, Werkendam, the Netherlands

T8-04-OP-4 (11:35-11:50)

PERFORMANCE RATING: BEYOND PERFORMANCE EVALUATION

Min Su Shin*, and Kyung Soo Lee**

Department of Energy & Electrical Engineering, Korea Polytechnic University, Siheung-si, Gyeonggi-do, Republic of Korea

T8-04-OP-5 (11:50-12:05)

PV ARRAYS DESIGN UNDER CONDITIONS OF COMPLEX TERRAIN FOR A PV PUMP SYSTEM

Zuming Liu[1,2]*, Jiehui Li[2], Yanxiong Li[2], Xun Ma[1], Chengchuan Jin[2], and Jianping Sun[2]

[1]Department of Energy and Environment, Yunnan Normal University, Kunming, China

[2]Y Energy Corporation, Kunmingy, China

T8-04-OP-6 (12:05-12:20)

CELL-TO-MODULE (CTM) ANALYSIS FOR PHOTOVOLTAIC MODULES WITH CELL OVERLAP

Jibran Shahid*, Max Mittag, and Ata Özgün Karabacak

Fraunhofer Institute for Solar Energy Systems, Freiburg, Germany

Nov-10 (Tue), 14:00-16:10 — RM 303 (3F)

PV Camper

Chair(s) Soo-Young Oh (Yeungnam University, Republic of Korea)

PVC-1 (14:00-14:20)

PHOTOVOLTAIC COLLABORATIVE TO ADVANCE MULTI-CLIMATE PERFORMANCE ENERGY RESEARCH (PV CAMPER)

Laurie Burnham*

Department of Photovoltaics and Materials Technologies, Sandia National Laboratories, Albuquerque, New Mexico, USA

PVC-2 (14:20-14:40)

INFLUENCE OF PYRANOMETER UNCERTAINTY ON SOLAR PV YIELD QUALIFICATIONS

Ralph Gottschalg[1,2]*, and Tom Betts[3]**

[1]Fraunhofer-Center for Silicon Photovoltaics CSP, Halle, Germany

[2]Anhalt University of Applied Sciences, Köthen, Germany

[3]Centre for Renewable Energy Systems Technology, Loughborough University, UK

PVC-3 (14:40-14:55)

PV MODULE TEMPERATURE STUDY: A COMPARATIVE ANALYSIS OF MEASUREMENTS AND ESTIMATION METHODS

Aline K. V. De Oliveira[1]*, Marília Braga[1], Laurie Burnham[2], Sebastian Dittmann[3], Ralph Gottschalg[3], Tom Betts[4], Carlos D. Rodr guez-Gallegos[5], Thomas Reindl[5], Soo-Young Oh[6], and Ricardo Rüther[1]

[1]*Universidade Federal de Santa Catarina, Florianópolis, Brazil*

[2]*Sandia National Laboratories, Albuquerque, USA*

[3]*Anhalt University of Applied Sciences, Köthen, Germany*

[4]*Loughborough University, Loughborough, UK*

[5]*Solar Energy Research Institute of Singapore, Singapore, Singapore*

[6]*Yeungnam University, Gyeongsan, Republic of Korea*

PVC-4 (14:55-15:10)

COMPARATIVE ANALYSIS OF ALBEDO MEASUREMENTS AT MULTIPLE SITES WORLDWIDE

Sebastian Dittmann[1,3]*, Laurie Burnham[2], Ralph Gottschalg[1,3], Woo Kyoung Kim[4], Soo-Young Oh[4], Carlos Rodrigue[5], Marília Braga[6], Aline Kirsten Vidal de Oliveira[6], and Ricardo Rüther[6]

[1]*Anhalt University of Applied Sciences, Köthen, Germany*

[2]*Sandia National Laboratories, Albuquerque, USA*

[3]*Fraunhofer-Center for Silicon Photovoltaics CSP, Halle, Germany*

[4]*Yeungnam University, Gyeongsan, Republic of Korea*

[5]*Solar Energy Research Institute of Singapore, Singapore*

[6]*Universidade Federal de Santa Catarina, Florianopolis, Brazil*

PVC-5 (15:10-15:25)

CONDENSATION AND PV SOILING

Benjamin Figgis*

Qatar Environment & Energy Research Institute, Hamad bin Khalifa University, Qatar

PVC-6 (15:25-15:40)

OCCURRENCE AND IMPACTS OF OVER-IRRADIANCE EVENTS ON UTILITY-SCALE PV POWER PLANTS

Marília Braga[1]*, Aline K. V. De Oliveira[1], Laurie Burnham[2], Sebastian Dittmann[3], Tom Betts[4], Carlos D. Rodr guez-Gallegos[5], Thomas Reindl[5], and Ricardo Rüther[1]

[1]*Fotovoltaica-UFSC, Universidade Federal de Santa Catarina, Florianópolis, Brazil*

[2]*Sandia National Laboratories, Albuquerque, USA*

[3]*Anhalt University of Applied Sciences, Köthen, Germany*

[4]*CREST, Loughborough University, Loughborough, UK*

[5]*Solar Energy Research Institute of Singapore, Singapore, Singapore*

PVC-7 (15:40-15:55)

OUTDOOR OPERATING TEMPERATURE MODELING OF PV MODULES INCLUDING TRANSIENT EFFECT

Soo-Young Oh*, and Woo Kyoung Kim
Department of Chemical Engineering, Yeungnam University, Geongsan, Republic of Korea

PVC-PN (15:55-16:30)

PANEL DISCUSSION - MODERATOR: DR. SEBASTAIN DITTMAN

Nov-10 (Tue), 15:30-16:50 Halla A (3F)

Parallel Session T2-05
T2-Chalcogenide thin film PV

Chair(s) Jeung-hyun Jeong (Korea Institute of Science and Technology, Republic of Korea)

T2-05-KN-1 (15:30:16:10)

[KEYNOTE SPEECH] REVIEW OF DEVELOPMENTS IN HIGH EFFICIENCY CIGS AND PEROVSKITE/CIGS THIN FILM PHOTOVOLTAICS

Romain Carron, Shiro Nishiwaki, Ramis Hertwig, Shih-Chi Yang, Thomas Feurer, Mario Ochoa, Radha K. Kothandaraman, Fan Fu, and Ayodhya N. Tiwari*
Laboratory for Thin Films and Photovoltaics, Empa-Swiss Federal Laboratories for Materials Science and Technology, Ueberlandstrasse, Duebendorf, Switzerland

T2-05-IN-2 (16:10-16:30)

HIGHLY EFFICIENT MONOLITHIC 2-TERMINAL CIGSE/PEROVSKITE TANDEM SOLAR CELLS

C.A. Kaufmann[1]*, T. Bertram[1], M. Jošt[2,3], A. Al-Ashouri[2], T. Kodalle[1], A. Ruiz Perona[4], H.A. Yetkin[1], G.A. Farias Basulto[1], R. Wenisch[1], I. Kafedjiska[1], N. Maticiuc[1], J.A. Márquez Prieto[5], P. Reyes Figueroa[1], A. Magomedov[6], T. Malinauskas[6], T.J. Jacobsson[7], D. Koushik[8], A. Creatore[8], V. Getautis[6], T. Unold[5], E. Unger[7], R. Klenk[1], I. Lauermann[1], S. Albrecht[2,9], and R. Schlatmann[1,10]
[1]*Competence Centre Photovoltaics Berlin / HZB, Germany*
[2]*Young Investigator Group Perovskite Tandem Solar Cells / HZB, Germany*
[3]*Faculty of Electrical Engineering, University of Ljubljana, Slovenia*
[4]*Department of Applied Physics, Universidad Autónoma de Madrid, Spain*
[5]*Department of Structure and Dynamics of Energy Materials / HZB, Germany*
[6]*Department of Organic Chemistry, Kaunas University of Technology, Lithuania*
[7]*Young Investigator Group Hybrid Materials Formation and Scaling / HZB, Germany*
[8]*Department of Applied Physics, Eindhoven University of Technology, The Netherlands*
[9]*Faculty IV - Electrical Engineering and Computer Science, Technical University Berlin, Germany*
[10]*Faculty 1 - Energy and Information, Hochschule für Technik und Wirtschaft Berlin, Germany*

T2-05-IN-3 (16:30-16:50)

DEVELOPMENT OF ALL THIN-FILM PEROVSKITE ON CHALCOGENIDE TANDEM PHOTOVOLTAICS: LATEST RESULTS IN THE 'PERCISTAND' PROJECT

Bart Vermang[1,8]*, Jessica de Wild[1], Yinghuan Kuang[1], Tom Aernouts[1], Jonas Hanisch[2], Erik Ahlswede[2],

Ihteaz Hossain[3], Tobias Abzieher[3], Ulrich Paetzold[3], Yan Jiang[4], Romain Carron[4], Fan Fu[4], Maximilian Krause[4], Ayodhya Tiwari[4], Pieter Bolt[5], Marcel Simor[5], Hans Linden[5], Philip Schulz[6], Vincent Dufoulon[6], Cecilia Tel[6], Daniel Lincot[6], Neethi Rajagopalan[7], Steven Claes[7], Carolin Spirinckx[7], Sebastien Lizin[8], Alessandro Martulli[8], Robbe Breugelmans[8], Michaël Daenen[8], Hans-Gerd Boyen[8], Stéphanie Narbey[9], Toby Meyer[9], César Omar Ramírez Quiroz[10], Bernhard Dimmler[10], Heping Shen[11], and Ingrid Repins[12]

[1]*imec – partner in EnergyVille and Solliance, Genk, Belgium*

[2]*Center for Solar Energy and Hydrogen Research (ZSW), Stuttgart, Germany*

[3]*Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany*

[4]*Swiss Federal Laboratories for Materials Science and Technology (Empa), Dübendorf, Switzerland*

[5]*Netherlands Organization for Applied Scientific Research (TNO) – partner in Solliance, Eindhoven, The Netherlands*

[6]*National Centre for Scientific Research (CNRS) – partner in IPVF, Paris, France*

[7]*Flemish Institute for Technological Research (VITO) – partner in EnergyVille, Genk, Belgium*

[8]*Hasselt University (UHasselt) – partner in EnergyVille and Solliance, Genk, Belgium*

[9]*Solaronix S.A., Aubonne, Switzerland*

[10]*NICE Solar Energy GmbH, Schwäbisch Hall, Germany*

[11]*Australian National University (ANU), Canberra, Australia*

[12]*National Renewable Energy Laboratory (NREL), Colorado, USA*

Nov-10 (Tue), 15:30-16:40 RM 302 (3F)

Parallel Session T3-03
T3-Compound semiconductor, concentrator and space PV

Chair(s) Yong Hyun Kim (Korea Photonics Technology Institute, Republic of Korea)

T3-03-IN-1 (15:30-15:50)

DEVELOPMENT OF LUMINESCENT SOLAR CONCENTRATOR BASED ON COMPOUND SEMICONDUCTOR NANOCRYSTAL AND PHOTO VOLTAIC DEVICES.

Chul Jong Han[1]*, Kyoung Won Park[1], Jeong Min Lee[1], Seong Min Park[1], Ho Kwan Kang[2], Sang Hyun Jung[2], and Heesun Yang[3]

[1]*Korea Electronic Technology Institute, Republic of Korea*

[2]*Korea Advanced Nano-Fab Center, Republic of Korea*

[3]*Hongik University, Republic of Korea*

T3-03-IN-2 (15:50-16:10)

DEVELOPMENT OF FLEXIBLE AND THIN GAAS SOLAR MODULE USING LASER-ASSISTED BONDING (LAB) AND HYBRID UNDERRFILL (HU)

Kwang-Seong Choi[1]*, Jiho Joo[1], Gwang-Mun Choi[1], Chanmi Lee[1], Ki-seok Jang[1], Ho-Gyeong Yun[1], Seok Hwan Moon[1], Woo-Jung Lee[1], Yong-Duck Chung[1], Yong-Sung Eom[1], Ho Kwan Kang[2], Hyun-Beom Shin[2], and Sung-Hoon Choa[3]

[1]*ICT Creative Laboratory, Electronics and Telecommunications Research Institute, Daejeon, Republic of Korea*
[2]*Nanodevices Lab. Device Technology Division Korea Advanced Nano-Fab Center, Republic of Korea*
[3]*NID Graduate School, Seoul National University of Science and Technology, Republic of Korea*

T3-03-OP-3 (16:10-16:25)

DEGRADATION PHENOMENA OF NIO/ZNO VISIBLE-LIGHT-TRANSPARENT SOLAR CELLS UNDER SPACE ENVIRONMENT

Naruhide Kato*, and Mutsumi Sugiyama**
Faculty of Science & Technology, Tokyo University of Science, Chiba, Japan

T3-03-OP-4 (16:25-16:40)

GENERALIZED RECIPROCITY RELATION: AN EXPERIMENTAL DEMONSTRATION IN *P-I-N* JUNCTION SOLAR CELLS

Supawan Ngamprapawat[1]*, Kasidit Toprasertpong[1], Hassanet Sodabanlu[2], Riko Yokota[1], Kentaroh Watanabe[2],
Yoshiaki Nakano[1], and Masakazu Sugiyama[1,2]
[1]*Department of Electrical Engineering and Information Systems, the University of Tokyo, Tokyo, Japan*
[2]*Research Center for Advanced Science and Technology, the University of Tokyo, Tokyo, Japan*

Nov-10 (Tue), 15:30-16:40 Samda B (3F)

Parallel Session T4-05
T4-Organic and dye-sensitized solar cells

Chair(s) Shinuk Cho (University of Ulsan, Republic of Korea)

T4-05-IN-1 (15:30-15:50)

RECENT PROGRESS IN SOLAR CELLS EMPLOYING SEMICONDUCTING POLYMERS AND PEROVSKITES

Taiho Park*
Chemical Engineering, Pohang University of Science and Technology, Pohang, Gyeongbuk, Republic of Korea

T4-05-IN-2 (15:50-16:10)

EMERGING ORGANIC PHOTOVOLTAICS FOR PRINTED CIRCUITS

Daniel Corzo[1], Eloise Bihar[1], Joel Troughton[1], Nicola Gasparini[1,2], and Derya Baran[1]*
[1]*King Abdullah University of Science and Technology , KAUST Solar Center, Thuwal, Saudi Arabia*
[2]*Department of Chemistry and Centre for Plastic Electronics, Molecular Sciences Research Hub, Imperial College London, London, UK*

T4-05-OP-3 (16:10-16:20)

HIGH-PERFORMANCE POLYMER SOLAR CELLS COMPOSED OF BENZODITHIOPHENE, BENZODITHIOPHENE-4,8-DIONE AND DIFLUOROBENZOTHIADIAZOLE UNIT PROCESSED WITH NON-HALOGENATED SOLVENT

Hyeonwoo Jung*, Gyeonghwa Yu, and Youngu Lee**
Department of Energy Science & Engineering Daegu Gyeongbuk Institute of Science & Technology, Daegu, Republic of Korea

T4-05-OP-4 (16:20-16:30)

SYNTHESIS AND CHARACTERIZATION OF NON-FULLERENE ACCEPTORS MATERIALS FOR ORGANIC PHOTOVOLTAICS

Min Jae Sung*, and Soon-Ki Kwon**
Department of Materials Engineering and Convergence Technology and ERI, Gyeongsang National University, Jinju, Republic of Korea

T4-05-OP-5 (16:30-16:40)

POLYMER SOLAR CELLS MANIPULATED WITH SELECTIVELY TRANSPARENT ELECTRODES FOR PLASMONIC UPCONVERSION-ASSISTED PHOTOVOLTAICS

Ha-Eun Cho[1]*, Na-Kyung Lee[1], Young Jin Song[1], Seok Ho Cho[2], and Sung-Min Lee[1]**
[1]School of Materials Science and Engineering, Kookmin University, Seoul, Republic of Korea
[2]Department of Clothing and Textiles, Chonnam National University, Gwangju, Republic of Korea

Nov-10 (Tue), 15:30-16:50 Halla B (3F)

Parallel Session T5-03
T5-Perovskite solar cells

Chair(s) Se-Woong Baek (Korea University, Republic of Korea)
Ki-Ha Hong (Hanbat National University, Republic of Korea)

T5-03-IN-1 (15:30-15:45)

UNDERSTANDING OF THE STABILITY AND THE DEGRADATION: TOWARDS ROBUST HALIDE PEROVSKITE SOLAR CELLS

Ki-Ha Hong*
Department of Materials Science and Engineering, Hanbat National University, Daejeon, Republic of Korea

T5-03-IN-2 (15:45-16:00)

HOLE TRANSPORTING MATERIALS WITH STRATEGY OF FLEXIBLE CORE AND TUNABLE CONFORMATION FOR EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS

Aung Ko Ko Kyaw*
Guangdong University Key Laboratory for Advanced Quantum Dot Displays and Lighting, Southern University of Science and Technology, Shenzhen, China

T5-03-OP-3 (16:00-16:10)

ALL-INORGANIC NARROW BANDGAP PEROVSKITE SOLAR CELLS WITH HIGH EFFICIENCY AND DURABILITY

Seojun Lee[1]*, Janghyuk Moon[1], Jun Ryu[1], Bhaskar Parida[1], Saemon Yoon[1], Dong-Gun Lee[1], Shuzi Hayase[2], and Dong-Won Kang[1]**

[1]*School of Energy Systems Engineering, Chung-Ang University, Seoul, Republic of Korea*

[2]*Info-Powered Energy System Research Center, The University of Electro-Communications, Chofu, Tokyo, Japan*

T5-03-OP-4 (16:10-16:20)

NOVEL POST-TREATMENT APPROACH FOR BETTER STABILITY AND EFFICIENCY IN PEROVSKITE SOLAR CELLS

Dong-Ho Kang[1]*, So-Yeon Kim[1], Jin-Wook Lee[2], and Nam-Gyu Park[1]**

[1]*School of Chemical Engineering, Energy Frontier Laboratory, Sungkyunkwan University, Suwon, Republic of Korea*

[2]*SKKU Advanced Institute of Nanotechnology (SAINT) and Department of Nanoengineering, Sungkyunkwan University, Suwon, Republic of Korea*

T5-03-OP-5 (16:20-16:30)

IMPROVED POINT DEFECT OF UV-OZONE TREATMENT AND NH_4CL PASSIVATION OF TIN (IV) OXIDE FOR PEROVSKITE SOLAR CELL APPLICATION

Jihyun Kim*, Yeon Soo Kim, Hye Ri Jung, and William Jo**

Department of Physics, Ewha Womans University, Seoul, Republic of Korea

T5-03-OP-6 (16:30-16:40)

GRAIN BOUNDARY HEALING OF HALIDE PEROVSKITES FOR ENHANCING MOISTURE STABILITY

Do Hyung Chun*, and Jong Hyeok Park**

Department of Chemical and Biomolecular Engineering, Yonsei University, Seoul, Republic of Korea

T5-03-OP-7 (16:40-16:50)

ACHIEVING LONG-TERM STABILITY OF INVERTED METHYLAMMONIUM LEAD TRI-IODIDE PEROVSKITE SOLAR CELLS VIA SURFACE RE-CRYSTALLIZATION

Heejoo Kim[1]*, Hyoungcheol Back[2], Geunjin Kim[3], Chang-Yong Nam[4], Yong Ryun Kim[5], James R. Durrant[6], and Kwanghee Lee[7]

[1]*Institute of Integrated Technology, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

[2]*Hanhwa Solution, Seongnam, Republic of Korea*

[3]*Division of Advanced Materials, Korea Research Institute of Chemical Technology, Daejeon, Republic of Korea*

[4]*Center for Functional Materials, Brookhaven National Laboratory, New York, USA*

[5]*Research Institute for Solar and Sustainable Energies, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

[6]*Department of Chemistry and Centre for Plastic Electronics, Imperial College London, London, UK*

[7]*School of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*

Nov-10 (Tue), 15:30-16:50 Samda A (3F)

Parallel Session T6-04
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Jung Kyu Kim (Sungkyunkwan University, Republic of Korea)
Sang-Wan Ryu (Chonnam National University, Republic of Korea)

T6-04-IN-1 (15:30-15:45)

PHASE STABLE AND LESS-DEFECT PEROVSKITE NANOCRYSTALS: OPTICAL PROPERTY, PHOTO-EXCITED CARRIER DYNAMICS AND APPLICATION TO SOLAR CELLS

Qing Shen[1]*, Feng Liu[1], Chao Ding[1], Yaohong Zhang[1], and Shuzi Hayase[1,2]

[1]Faculty of Informatics and Engineering, The University of Electro-Communications, Tokyo, Japan

[2]Info-Powered Energy System Research Center, The University of Electro-Communications, Tokyo, Japan

T6-04-OP-2 (15:45-15:55)

EFFICIENT ELECTROCHEMICAL REDUCTION OF CO_2 TO ETHYLENE WITH DE-ALLOYED CU-AL CATALYSTS

Miao Zhong*

Department of College of Engineering and Applied Sciences, Nanjing University, China

T6-04-OP-3 (15:55-16:05)

NEXT GENERATION SOLAR MODULES FOR PHOTO-ELECTROCHEMICAL WATER SPLITTING

S. Lange, M. Turek, S. Schindler, K. Ilse, V. Naumann, and C. Hagendorf*

Fraunhofer Center for Silicon Photovoltaics CSP, Halle, Germany

T6-04-OP-4 (16:05-16:15)

LOW TEMPERATURE ACTIVATION OF SMALL ALKANE ON IRO2(110) SURFACE

Minkyu Kim[1]*, Aravind Asthagiri[2]**, and Jason Weaver[3]

[1]Department of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea

[2]William G. Lowrie Chemical & Biomolecular Engineering, The Ohio State University, Columbus, Ohio, USA

[3]Department of Chemical Engineering, University of Florida, Gainesville, FL, USA

T6-04-OP-5 (16:15-16:25)

GRAPHITIC CARBON NITRIDE NANOSTRUCTURES DERIVED FROM HCl TREATED MELAMINE FOR EFFICIENT VISIBLE LIGHT DRIVEN PHOTOCATALYTIC H2 EVOLUTION REACTION

Rama Krishna Chava*,**, Namgyu Son, and Misook Kang

Department of Chemistry, College of Natural Sciences, Yeungnam University, Gyeongbuk, Republic of Korea

T6-04-OP-6 (16:25-16:35)

ULTRASOUND ENERGY HARVESTING USING TRIBOELECTRIC NANOGENERATOR FOR POWERING IMPLANTABLE DEVICES

Young Jun Kim*, Hong-Joon Yoon, and Sang-Woo Kim**

School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Republic of Korea

Nov-10 (Tue), 15:30-16:30 RM 303 (3F)

Parallel Session T8-05
T8-Systems including BOS components and integrations

Chair(s) Hyeogjun Song (Seoul National University of Science And Technology, Republic of Korea)

T8-05-OP-1 (15:30-15:45)

STUDY ON A REGIONAL SOLAR IRRADIANCE FORECAST BY ENSEMBLE APPROACHES BASED ON A SVR WITH MEPS

Takahiro Takamatsu[1]*, Hideaki Ohtake[1], Takashi Oozeki[1], Toshiyuki Nakaegawa[2], and Yuki Honda[3]

[1]Fukushima Renewable Energy Institute, AIST (FREA), Fukushima, Japan

[2]Meteorological Research Institute, Ibaraki, Japan

[3]Japan Meteorological Agency, Tokyo, Japan

T8-05-OP-2 (15:45-16:00)

ACCURACY DEVELOPMENT OF PV POWER GENERATION ESTIMATION MODELS IN THAILAND

Aekkawat Bupi[1]*, Songkiate Kittisontirak[2], Perawut Chinnavornrungsee[2], Kobsak Sriprapha[2], Wisut Titiroongruang[1], and Surasak Niemcharoen[1]**

[1]Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Chalongkrung Rd, Ladkrabang Bangkok, Thailand

[2]National Electronics and Computer Technology Center (NECTEC), National Science and Technology Development Agency (NSTDA), Pathum Thani, Thailand

T8-05-OP-3 (16:00-16:15)

INTRODUCTION OF DERIVING DOWNWELLING SURFACE SHORTWAVE RADIATION FROM NEW GEOSTATIONARY SATELLITE PLATFORM, GK-2A OVER THE KOREAN PENINSULA

Chang K. Kim*, Hyun-Goo Kim**, Yong-Heack Kang, and Chang-Yeol Yun

New and Renewable Energy Resource Map Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

T8-05-OP-4 (16:15-16:30)

SENSITIVITY ANALYSIS OF THE DIRECTION OF PHOTOVOLTAIC PANELS USING TYPICAL METEOROLOGICAL YEAR DATASET OF 22 SITES IN SOUTH KOREA

Myeongchan Oh*, Jin-Young Kim, Boyoung Kim, Changyeol Yun, Chang Ki Kim, Yongheack Kang, and Hyun-Goo Kim**

Korea Institute of Energy Research, Daejeon, Republic of Korea

Nov-10 (Tue), 15:30-18:10 Tamna B&C (5F)

IEA PVPS Workshop
- PV Powering the Energy Transition: A Look at Innovations & Latest trends

Chair(s) Gaëtan Masson (IEA PVPS & Becquerel Institute, Belgium)

SESSION 1: STATUS OF PV TECHNOLOGY AND MARKETS: A PRESENTATION OF THE IEA PVPS TRENDS REPORT

IEA-1 (15:30-15:50)

TRENDSINTHEPVMARKETS

Gaëtan Masson*

EA-PVPS & Becquerel Institute, Belgium

IEA-2 (15:50-16:10)

TRENDS IN THE PV INDUSTRY

Izumi Kaizuka*

RTS-Corporation, Japan

SESSION 2: PV IN BUILDINGS AND TRANSPORT

IEA-3 (16:15-16:30)

TRENDS IN SOLAR HEATING AND COOLING APPLICATIONS FROM PV

Daniel Mugnier*

Tecsol, France

IEA-4 (16:30-16:45)

TRENDSINBIPVDEVELOPMENT,ASUMMARYOFIEA-PVPSTASK15

Johannes Eisenlohr*

Fraunhofer ISE, Germany

IEA-5 (16:45-17:00)

TRENDS IN PV FOR TRANSPORT, A SUMMARY OF IEA PVPS TASK 17

Toshio Hirota*

Waseda University, Japan

SESSION 3: FROM GREEN HYDROGEN TO SOLAR FUELS, HYDROGEN AS THE MISSING LINK IN PV MASS DEVELOPMENT?

IEA-6 (17:10-17:35)

THE ROLE OF GREEN HYDROGEN IN A SOLAR POWERED BUSINESS MODELS

Lionel Perret*

Planair, Switzerland

IEA-7 (17:35-18:05)

THE ROLE OF GREEN HYDROGEN IN A SOLAR POWERED ENERGY TRANSFORMATION

Christian Breyer*

Lappeenranta University of Technology, Finland

IEA-8 (18:05-18:10)

CONCLUDING REMARKS

Chinho Park*
Yeungnam University, General Chair of PVSEC-30, Republic of Korea

Nov-11 (Wed), 10:40-12:15 Tamna B&C (5F)

Parallel Session T1-03
T1-Crystalline and thin film silicon PV

Chair(s) Sang Hee Lee (Korea Institute of Energy Research, Republic of Korea)

T1-03-IN-1 (10:40-11:05)

TOWARDS TRANSPARENT PASSIVATING CONTACTS FOR SILICON SOLAR CELLS: HOLE-SELECTIVE MATERIALS

Takuya Matsui*, and Hitoshi Sai
Global Zero Emission Research Center, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

T1-03-IN-2 (11:05-11:30)

HIGHLY EFFICIENT CRYSTALLINE SILICON SOLAR CELLS USING PASSIVATING CONTACTS

HyunJung Park[1]*, Sang-Won Lee[1], Yujin Jung[1], Chang Hyun Lee[1], Dongjin Choi[1], Hoyoung Song[1], Jinsol Kim[1], MyeongSeob Sim[1], JiRyang Kim[1], Yoonmook Kang[2], Hae-Seok Lee[2], and Donghwan Kim[1]**
[1]*Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea*
[2]*KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

T1-03-OP-3 (11:30-11:45)

EFFECT OF FORMING GAS ANNEALING ON HYDROGEN CONTENT AND SURFACE MORPHOLOGY OF TITANIUM OXIDE-COATED CRYSTALLINE SILICON HETEROCONTACTS

Yuta Nakagawa[1]*, Kazuhiro Gotoh[1], Markus Wilde[2], Shohei Ogura[2], Yasuyoshi Kurokawa[1], Katsuyuki Fukutani[2], and Noritaka Usami[1]**
[1]*Graduate School of Engineering, Nagoya University, Nagoya, Japan*
[2]*Institute of Industrial Science, The University of Tokyo, Tokyo, Japan*

T1-03-OP-4 (11:45-12:00)

CHARACTERIZATION OF THE P-TYPE CUI THIN FILMS FOR CARRIER SELECTIVE CONTACT SOLAR CELL

Kiseok Jeon[1,2]*, Sangwoo Lim[2], and Chaehwan Jeong[1]**
[1]*Smart Energy and Nano Photonics R&D Group, Korea Institute of Industrial Technology, Gwangju, Republic of Korea*
[2]*Department of Chemical and Biomolecular Engineering, Yonsei University, Seoul, Republic of Korea*

T1-03-OP-5 (12:00-12:15)

IMPROVED STABILITY OF SILICON HETEROJUNCTION SOLAR CELLS WITH ZNO/LIF$_X$/AL ELECTRON SELECTIVE CONTACTS

Wenjie Lin[1,2]*, Sihua Zhong[2], Vincent Paratte[2], Luca Antognini[2], Julie Dréon[2], Jean Cattin[2], Jonathan Thomet[2], Mathieu Boccard[2], Hui Shen[1]**, and Christophe Ballif[2]

[1]*Institute for Solar Energy Systems, School of Physics and State Key Laboratory of Optoelectronic Materials and Technologies, Sun Yat-Sen University, Guangzhou, China*

[2]*Photovoltaics and Thin-Film Electronics Laboratory (PV-lab), Institute of Microengineering, Ecole Polytechnique Federale de Lausanne (EPFL), Rue de la Maladière, Neuchâtel, Switzerland*

Nov-11 (Wed), 10:40-12:10 Halla A (3F)

Parallel Session T2-06
T2-Chalcogenide thin film PV

Chair(s) Shi-Joon Sung (Daegu Gyeongbuk Institute of Science and Technology, Republic of Korea)

T2-06-IN-1 (10:40-11:00)

EVALUATION OF OPTOELECTRONIC PROPERTIES OF KESTERITES SOLAR CELLS TAILORED BY NAF LAYER INSERTION

William Jo*

Department of Physics, Ewha Womans University, Seoul, Republic of Korea

T2-06-IN-2 (11:00-11:20)

PREPARATION AND PERFORMANCE OF FLEXIBLE CU_2ZNSNS_4 MONOGRAIN SOLAR CELLS

Tulasi Ramakrishna Reddy Kotte[1]*, Babu Pejjai[1], Gapanovich Mikhail[2], and Novikov Gennady[2]

[1]*Solar Photovoltaic Laboratory, Department of Physics, Sri Venkateswara University, Tirupati, India*

[2]*Laboratory of Photoelectrolysis, Institute of Problems in Chemical Physics RAS, Chernogolovka, Russia*

T2-06-OP-3 (11:20-11:30)

DEFECT CONTROL FOR 12.5% EFFICIENCY CU2ZNSNSE4 KESTERITE THIN-FILM SOLAR CELLS BY ENGINEERING OF LOCAL CHEMICAL ENVIRONMENT

Jianjun Li[1]*, Yaohua Mai[2], Shiyou Chen[3], Fangyang Liu[4], Xiaojing Hao[1], and Martin A. Green[1]

[1]*Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Sydney, Australia*

[2]*Institute of New Energy Technology, College of Information Science and Technology, Jinan University, Guangzhou, China*

[3]*Key Laboratory of Polar Materials and Devices (MOE), East China Normal University, Shanghai, China*

[4]*School of Metallurgy and Environment, Central South University, Changsha, China*

T2-06-OP-4 (11:30-11:40)

CD-MEDIATED CATION REDISTRIBUTION AND DEFECT SUPPRESSION IN 8% EFFICIENT CU_2CDSNS_4 SOLAR CELLS

Shreyash Hadke[1,2]*, and Lydia Helena Wong[1]**

[1]*School of Materials Science and Engineering, Nanyang Technological University, Singapore*

[2]*Energy Research Institute, Interdisciplinary Graduate Programme, Nanyang Technological University, Singapore*

T2-06-OP-5 (11:40-11:50)

FABRICATION OF HIGH EFFICIENT KESTERITE SOLAR CELLS BY USING SPRAY-BASED DEPOSITION

Temujin Enkhbat*, Jiwon Lee, Md Hamim Sharif, Enkhjargal Enkhbayar, Md Salahuddin Mina, and Junho Kim**

Department of Physics, Incheon National University, Incheon, Republic of Korea

T2-06-IN-6 (11:50-12:10)

REDUCTION OF POINT DEFECTS AND CONTROL OF CRYSTALLOGRAPHIC ORIENTATION VIA SE IN SB_2SE_3 THIN FILM SOLAR CELLS

Byungha Shin*

Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

Nov-11 (Wed), 10:40-12:10 Samda B (3F)

Parallel Session T4-06
T4-Organic and dye-sensitized solar cells

Chair(s) Youngu Lee (Daegu Gyeongbuk Institute of Science & Technology, Republic of Korea)

T4-06-IN-1 (10:40-11:00)

DIFFUSION-STABILITY FRAMEWORK FOR POLYMER SOLAR CELLS

Harald Ade*

Department of Physics and Organic and Carbon Electronics Laboratories, North Carolina State University, Raleigh, USA

T4-06-IN-2 (11:00-11:20)

MATERIAL DESIGN FOR MECHANICALLY-ROBUST ALL-POLYMER SOLAR CELLS

Bumjoon J. Kim*

Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

T4-06-IN-3 (11:20-11:40)

ENHANCING NEAR INFRARED RESPONSIVITY OF FULLERENE-FREE ORGANIC SOLAR CELLS VIA BANDGAP TAILORING OF BULK HETEROJUNCTION BLENDS

Jaewon Lee*

Department of Chemical Engineering and Applied Chemistry, Chungnam National University, Daejeon, Republic of Korea

T4-06-OP-4 (11:40-11:50)

MULTIFUNCTIONAL COLOR FILTERS FOR USE IN ORGANIC SOLAR CELLS

Jerome K. Hyun*

Department of Chemistry and Nanoscience, Ewha Womans University, Seoul, Republic of Korea

T4-06-OP-5 (11:50-12:00)

HYBRID ELECTRODE BASED ON PEDOT:PSS/SILVER MESH FOR ITO-FREE AND FLEXIBLE ORGANIC PHOTOVOLTAICS

Eun Joo Seo[1]*, Soyeon Kim[1], and Dong Chan Lim[1]**

Materials Center for Energy Department, Surface Technology Division, Korea Institute of Materials Science, Changwon, Republic of Korea

T4-06-OP-6 (12:00-12:10)

MISCIBILITY CONTROL OF PEDOT:PSS FOR SOLUTION PROCESSED ORGANIC SOLAR CELL

Souk-Yoon Kim[1,2]*, Jahandar Muhammad[1], So-Yeon Kim[1], Young-Hyun Kim[2]**, and Dong-Chan Lim[1]**

[1]Materials Center for Energy Convergence, Surface Technology Division, Korea Institute of Materials Science, Gyeongnam, Republic of Korea

[2]Display Engineering, Pukyong National University, Busan, Republic of Korea

Nov-11 (Wed), 10:40-11:55

Halla B (3F)

Parallel Session T5-04
T5-Perovskite solar cells

Chair(s) Hui-Seon Kim (Inha University, Republic of Korea)

T5-04-IN-1 (10:40-10:55)

OPPORTUNITIES AND CHALLENGES OF PRINTABLE MESOSCOPIC PEROVSKITE SOLAR CELLS

Hongwei Han*

Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, China

T5-04-IN-2 (10:55-11:10)

A ROLL-TO-ROLL PRODUCTION OF FLEXIBLE PEROVSKITE SOLAR CELLS

Young Yun Kim[1]*, Tae-Youl Yang[2], and Jangwon Seo[1]**

[1]Division of Advanced Materials, Korea Research Institute of Chemical Technology, Daejeon, Republic of Korea

[2]Department of Materials Science and Engineering, Chungnam National University, Daejeon, Republic of Korea

T5-04-IN-3 (11:10-11:25)

GRAIN BOUNDARIES IN HALIDE PEROVSKITE SOLAR CELLS

Yuanyuan Zhou*

Department of Physics, Hong Kong Baptist University, Hong Kong

T5-04-OP-4 (11:25-11:35)

HYDROPHILIC PASSIVATION APPROACH FOR MOISTURE-STABLE, 23% EFFICIENT PEROVSKITE SOLAR CELLS

Chunqing Ma*, Sun-Ho Lee, and Nam-Gyu Park**
School of Chemical Engineering, Sungkyunkwan University, Suwon, Republic of Korea

T5-04-OP-5 (11:35-11:45)

INTERFACE ENGINEERING FOR EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS USING P3HT HOLE TRANSPORTING LAYER

Min Ju Jeong*, and Jun Hong Noh**
School of Civil, Environmental and Architectural Engineering, Korea University, Republic of Korea

T5-04-OP-6 (11:45-11:55)

PHENOTHIAZINE FUNCTIONALIZED MULTIFUNCTIONAL A−π−D−π−D−π−A-TYPE HOLE-TRANSPORTING MATERIALS VIA SEQUENTIAL C–H ARYLATION APPROACH FOR EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS

Chunyuan Lu*, and Hwan Kyu Kim**
Global GET-Future Lab, Department of Advanced Materials Chemistry, Korea University, Sejong, Republic of Korea

Nov-11 (Wed), 10:40-12:10 Samda A (3F)

Parallel Session T6-05
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Hyungkoun Cho (Sungkyunkwan University, Republic of Korea), Rama Krishna Chava (Yeungnam University, Republic of Korea)

T6-05-IN-1 (10:40-10:55)

INFLUENCE OF SYNTHESIS PARAMETERS ON STOKES-SHIFT OF FUNCTIONALIZED GRAPHENE QUANTUM DOTS: APPLICATION IN CIGS PHOTOVOLTAICS

Firoz Khan[1]*, and Jae Hyun Kim[2]
[1]*Center of Research Excellence in Renewable Energy, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia*
[2]*Division of Energy Technology, Daegu Gyeongbuk Institute of Science & Technology, Daegu, Republic of Korea*

T6-05-IN-2 (10:55-11:10)

ON-CHIP RADIATIVE COOLERS FOR CONCENTRATED PHOTOVOLTAIC CELLS

Jin-Woo Cho, and Sun-Kyung Kim*
Department of Applied Physics, Kyung Hee University, Gyeonggi-do, Republic of Korea

T6-05-OP-3 (11:10-11:20)

METHANE DECOMPOSITION FOR HYDROGEN AND SEPARABLE CARBON PRODUCTION IN CATALYTIC MOLTEN SALT SYSTEM

Dohyung Kang[1,2]*, and Eunhee Ko[1]

[1]*School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea*
[2]*Department of Chemical Engineering, University of California, Santa Barbara, USA*

T6-05-OP-4 (11:20-11:30)

ZNS/ZNO CORE SHELL-HIERARCHICAL NANOWIRES FOR PHOTOELECTROCHEMICAL WATER SPLITTING

Indrajit V. Bagal*, Mostafa Afifi Hassan, Aadil Waseem, and Sang-Wan Ryu**
Department of Physics, Chonnam National University, Gwangju, Republic of Korea

T6-05-OP-5 (11:30-11:40)

ENHANCED PHOTOELECTROCHEMICAL WATER SPLITTING PERFORMANCE OF AU- NANO-PARTICLES DECORATED GALLIUM NITRIDE PHOTOANODE

Ameer Abdullah*, Aadil Waseem, and Sang-Wan Ryu**
Department of Physics, Chonnam National University, Gwangju, Republic of Korea

T6-05-OP-6 (11:40-11:50)

PHOTOELECTROCHEMICAL GLYCEROL REFORMING USING FE DOPED ZNS/ZNO PHOTOANODE

Seungkyu Kim*, Sehun Seo, and Sanghan Lee**
School of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea

T6-05-OP-7 (11:50-12:00)

PHOTO-ASSISTED CRYSTALLIZATION BEHAVIORS OF AMORPHOUS TITANIUM DIOXIDE FILMS FOR ENERGY CONVERSION APPLICATION

Won-June Lee[1]*, Yong Tae Kim[2], Yeonghun Yun[3], Sang Yun Jeong[1], Yong-Ryun Jo[1], Hyung-Ju Ahn[4], Bong-Joong Kim[1], Sanghan Lee[1], Sangwook Lee[3], Jaeyeong Heo[2], and Myung-Han Yoon[1]**
[1]*School of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea*
[2]*Department of Materials Science and Engineering, Optoelectronics Convergence Research Center, Chonnam National University, Gwangju, Republic of Korea*
[3]*School of Materials Science and Engineering, Kyungpook National University, Daegu, Republic of Korea*
[4]*Department of Industrial Technology Convergence Center, Pohang Accelerator Laboratory, Pohang, Republic of Korea*

T6-05-OP-8 (12:00-12:10)

PHOTOELECTROCHEMICAL CHARACTERISTICS OF CONFORMALY GROWN BISMUTH VANADATE ON SILICON NANOWIRE TEMPLATE BY PULSED LASER DEPOSITION

Hojoong Choi*, Seungkyu Kim, and Sanghan Lee**
School of Materials Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea

Nov-11 (Wed), 10:40-12:00 RM 303 (3F)

Parallel Session T7-01
T7-Weather and grid connection performance, reliability and standardization

Chair(s) Kyungsoo Kim (Korea Institute of Energy Research, Republic of Korea)

T7-01-IN-1 (10:40-11:00)

INFLUENCE OF SOILING ON MODULE POWER GENERATION OF PV SYSTEMS IN DESERT AREAS

Joerg Bagdahn[1]*, and Klemens Ilse [2]

[1]*Anhalt University of Applied Sciences, Germany*

[2]*Fraunhofer Center for Silicon Photovoltaics, Germany*

T7-01-OP-2 (11:00-11:10)

TRAINABLE CURTAILMENT DETECTION FOR THE ENHANCEMENT OF PV POWER FORECASTING

Nicolas Holland[1]*, Xiulan Pang[2], Wiebke Herzberg[1], Jefferson Bor[1], and Elke Lorenz[1]

[1]*Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany*

[2]*SPIC Huanghe Hydropower Development Co., LTD. HHDC, Germany*

T7-01-OP-3 (11:10-11:20)

IV CURVE PREDICTION MODEL OF PHOTOVOLTAIC ARRAY BASED ON ENSEMBLE EMPIRICAL MODE DECOMPOSITION AND EXTREME LEARNING MACHINE

Kun Ding[1]**, Xiang Chen[1]*, Jingwei Zhang[1], and Shuai Weng[2]

[1]*College of Mechanical and Electrical Engineering, Hohai University, Changzhou, China*

[2]*Changzhou Key Laboratory of Photovoltaic System Integration and Production Equipment Technology, Changzhou, China*

T7-01-OP-4 (11:20-11:30)

CURVATURE CORRECTION FOR THE POWER RATING OF CURVED PHOTOVOLTAIC MODULES

Mauro Pravettoni[1]*, Andrea Toto Brocchi[2], Johnson Wong[3], and Giampaolo Manzolini[2]

[1]*SERIS, National University of Singapore, Singapore*

[2]*Departmento di Energia, Politecnico di Milano, Italy*

[3]*Griddlersolar, Canada*

T7-01-OP-5 (11:30-11:40)

BEST PRACTICES GUIDE TO SOLAR RESOURCE ASSESSMENT

Adam R. Jensen[1]*, Philippe Blanc[2], and Yves-Marie Saint-Drenan[2]

[1]*Department of Civil Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark*

[2]*MINES ParisTech, Sophia Antipolis, France*

T7-01-OP-6 (11:40-11:50)

MACHINE LEARNING MODELING OF THE EFFECT OF ATMOSPHERIC CONDITIONS ON PV SOILING AND PV PERFORMANCE RATIO

Luis Mart n-Pomares*, Brahim Aissa, Christos Fountoukis, Adam Skillern, Benjamin Figgis, Mohammed Ayoub, Cedric Broussillou, and Veronica Bermudez

Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University, Qatar Foundation, Doha, Qatar

T7-01-OP-7 (11:50-12:00)

MODULE DEGRADATION VARIABILITY STUDY

Thomas C. Sauer[1]*, and Roger J. Taylor[2]**

[1]Board of Directors, Leader Rating System Project, EXXERGY GmbH, Graefelfing/Frankfurt, Germany

[2]Rating System Team, EXXERGY GmbH, Frankfurt, Germany

Nov-11 (Wed), 13:40-15:05 Halla A (3F)

Parallel Session T1-04
T1-Crystalline and thin film silicon PV

Chair(s) Jun-Sik Cho (Korea Institute of Energy Research, Republic of Korea)

T1-04-IN-1 (13:40-14:05)

SCREEN-PRINTED ALUMINUM PASTES FOR PASSIVATED CONTACT SOLAR CELLS

Marwan Dhamrin*

Toyo Aluminium K.K., Japan

T1-04-OP-2 (14:05-14:20)

HIGH-SPEED VIDEO ANALYSIS OF THE PROCESS DYNAMICS IN SCREEN PRINTED METALLIZATION OF SI-SOLAR CELLS

Sebastian Tepner[1]*, Marius Singler[1], Frederic Siebenhaar[1], Linda Ney[1], Katharina Gensowski[1], Chongfeng Zhang[2], Jiwei Feng[2], Qiayan Xiao[2], Kangkang Guo[2], Tracy (Cuiwen) Guo[2], Andreas Lorenz[1], Maximilian Pospischil[1], and Florian Clement[1]

[1]Fraunhofer Institute for Solar Energy Systems ISE, Freiburg im Breisgau, Germany

[2]Heraeus Photovoltaics HPT, Shanghai, China

T1-04-OP-3 (14:20-14:35)

PERFORMANCE UPGRADE SOLUTIONS FOR LOW COSTN-PERT-RJ SOLAR CELLS BY ADOPTING APCVD SYSTEM

Zih-Wei Peng[1]*, Thomas Buck[1], Adrian[1], Valentin Mihailetchi[1], Alexander Mazurov[2], Sven Seren[2], Christian Buchner[2], and Radovan Kopecek[1]

[1]International Solar Energy Research Center Konstanz e.V., Konstanz, Germany

[2]SCHMID GmbH, Freudenstadt, Germany

T1-04-OP-4 (14:35-14:50)

COMPARISON AND ANALYSIS OF LIGHT-INDUCED DEGRADATION OF INDUSTRIAL MODULES

Moonyong Kim*, Daniel Chen, and Alison Ciesla

School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Sydney, Australia

T1-04-OP-5 (14:50-15:05)

NEW INSIGHTS INTO THE DEGRADATION OF N^+-DOPED POLYSILICON ON OXIDE PASSIVATING FILMS

Daniel Chen*, Moonyong Kim, Chuka Madumelu, Bruno Vicari Stefani, Anastasia Soeriyadi, Ran Chen, Brett Hallam, and Matthew Wright
School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Sydney, Australia

Nov-11 (Wed), 13:40-15:00 Samda B (3F)

Parallel Session T3-04
T3-Compound semiconductor, concentrator and space PV

Chair(s) Sung-Min Lee (Kookmin University, Republic of Korea)

T3-04-IN-1 (13:40-14:00)

FLEXIBLE MULTI-JUNTION THIN FILM III-V SOLAR CELLS WITH HIGH SPECIFIC POWER

Tae Soo Kim[1]*, Hyo Jin Kim[2], Ki Jun Yu[1]**, and Won Jun Choi[3]**
[1]*School of Electrical and Electronic Engineering, Yonsei University, Seoul, Republic of Korea*
[2]*Research center for ICT and Photonics Energy, Korea Photonics Technology Institute, Gwangju, Republic of Korea*
[3]*Center for Opto-Electronic Materials and Devices, Post-Silicon Semiconductor Institute, Korea Institute of Science and Technology, Seoul, Republic of Korea*

T3-04-OP-2 (14:00-14:15)

REDUCTION OF NITROGEN-RELATED SCATTERING CENTER BY INDIUM INCORPORATION IN GAASN

Misaki Hirahara*, Kazushi Toyoda, Nobuaki Kojima**, and Yoshio Ohshita
Semiconductor lab, Toyota Technological Institute, Aichi, Japan

T3-04-OP-3 (14:15-14:30)

GROWTH AND CHARACTERIZATION OF INGAASP/INGAAS DOUBLE-JUNCTION SOLAR CELLS WITH LIGHT ABSORPTION EXTENDED TO 2500 NM

Suho Park[1,2]*, Thuy Thi Nguyen[1,3,4], Yeongho Kim[1], and Sang Jun Lee[3]**
[1]*Division of Industrial Metrolgy, Korea Research Institute of Standards and Science, Daejeon, Republic of Korea*
[2]*Department of Nano Science, University of Science & Technology, Daejeon, Republic of Korea*
[3]*Department of Materials Science and Engineering, Chungnam National University, Daejeon, Republic of Korea*
[4]*Institute of Materials Science, Vietnam Academy of Science and Technology, Hanoi, Vietnam*

T3-04-OP-4 (14:30-14:45)

IN-PLANE ANISOTROPY OF STRAIN RELAXATION IN GAAS/SI GROWTH

Kizuku Kawaguchi*, Yu-Cian Wang, Nobuaki Kojima, and Yoshio Oshita
Toyota Technological Institute, Nagoya, Japan

T3-04-OP-5 (14:45-15:00)

EFFICIENT LIGHT HARVESTING IN PHOTOVOLTAIC DEVICES BASED ON EDGE LOCATED RANDOMLY DISORDERED STRUCTURE

Joo Hwan Ko*, Yeong Jae Kim, Young Jin Yoo, and Young Min Song**
School of Electrical Engineering and Computer Science, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea

Nov-11 (Wed), 13:40-15:00 Halla B (3F)

Parallel Session T5-05
T5-Perovskite solar cells

Chair(s) Jun Hong Noh (Korea University, Republic of Korea), Dong Hoe Kim (Sejong University, Republic of Korea)

T5-05-IN-1 (13:40-13:55)

ADDITIVE EFFECT ON ELECTRON TRANSFER LAYER AND PEROVSKITE FILM OF PEROVSKITE SOLAR CELLS FOR EXCEEDING 25% EFFICIENCY

Dong Suk Kim*
Advanced Center for Energy R&D Research Center, Korea Institute of Energy Research, Ulsan, Republic of Korea

T5-05-IN-2 (13:55-14:10)

OPPORTUNITIES AND CHALLENGES OF PEROVSKITE PHOTOVOLTAICS

Byungha Shin*
Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

T5-05-OP-3 (14:10-14:20)

INFLUENCE OF EPITAXIAL ANATASE AND RUTILE TIO2 THIN FILMS AS ELECTRON TRANSPORT LAYERS FOR PEROVSKITE SOLAR

Yeon Soo Kim*, Hye-jin Jin, Hye Ri Jung, Jihyun Kim, and William Jo**
Department of Physics, Ewha Womans University, Seoul, Republic of Korea

T5-05-OP-4 (14:20-14:30)

THE EFFECT OF THE AMBIENT OXYGEN ON OPERATION OF SPUTTERED NIO_X HOLE TRANSPORT LAYER FOR PLANAR TYPE $MAPBI_3$ PEROVSKITE SOLAR CELLS

Hae-Jun Seok[1]*, Jin-Hyeok Park[1], Ahra Yi[2], Hanbin Lee[2], Hyo Jung Kim[2], and Han-Ki Kim[1]**
[1]*School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon-si, Republic of Korea*
[2]*Department of Organic Material Science and Engineering, Pusan National University, Busan, Republic of Korea*

T5-05-OP-5 (14:30-14:40)

OVERCOMING UNCERTAINTY OF HALL-SIGNAL FOR HALIDE PEROVSKITE IN DC-PHOTO-HALL EFFECT MEASUREMENT

Seungmin Lee[1]*, and Jun Hong Noh[1,2]**
[1]*School of Civil, Environmental and Architectural Engineering, Korea University, Seoul, Republic of Korea*
[2]*KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seou, Republic of Korea*

T5-05-OP-6 (14:40-14:50)

IMPACT OF EXCESS PBI_2 ON CONTROLLING ONE-DIMENSIONAL $MAPBI_3$ PEROVSKITES FOR HIGH CARRIER LIFETIMES

Van Hoang Nguyen[1,2]*, Yasuyoshi Kurokawa[1], and Noritaka Usami[1]
[1]*Graduate School of Engineering, Nagoya University, Nagoya, Japan*
[2]*GaN Advanced Device Open Innovation Laboratory, AIST-Nagoya University, Japan*

T5-05-OP-7 (14:50-15:00)

ONE-STEP HALIDE TREATMENT FOR PBS QUANTUM DOT THIN-FILM SOLAR CELL

Taewan Kim*, Jung Hoon Song, and Sohee Jeong**
Department of Energy Science, Sung Kyun Kwan University, Suwon, Republic of Korea

Nov-11 (Wed), 13:40-15:10 RM 303 (3F)

Parallel Session T7-02
T7-Weather and grid connection performance, reliability and standardization

Chair(s) Pilkyu Kim (Korea Institute of Energy Research, Republic of Korea)

T7-02-IN-1 (13:40-14:00)

A STUDY ON THE DURABILITY EVALUATION METHOD OF PV MODULE BY COLLECTING WEATHER DATA IN KOREA

Kyungsoo Kim*
Photovoltaics Research Department, Korea Institute of Energy Research, Republic of Korea

T7-02-IN-2 (14:00-14:20)

INVESTIGATION FOR PV MODULES MECHANICAL STABILITY

Pilkyu Kim*
Renewable Enegy Technology Cente, Korea Testing Lab, Republic of Korea

T7-02-OP-3 (14:20-14:30)

METEONORM VERSION 8

Jan Remund*, Stefan Müller, Pascal Graf and Michael Schmutz
Meteotest AG, Bern, Switzerland

T7-02-OP-4 (14:30-14:40)

SOLAR RESOURCE HANDBOOK – THE RESULT OF IEA PVPS TASK 16

Jan Remund[1]*, Manajit Sengupta[2], and Aron Habte[2]
[1]*Meteotest AG, Bern, Switzerland*
[2]*NREL, Boulder CO, USA*

T7-02-OP-5 (14:40-14:50)

IEC TC82 STANDARD TREND FOR SOLAR CELLS AND PV MODULES

Kyungsoo Kim*

Photovoltaics Research Department, Korea Institute of Energy Research, Republic of Korea

T7-02-OP-6 (14:50-15:00)

KOREAN STANDARD TRENDS FOR HIGH DURABLE AND EcO-FRIENDLY PV MODULES

Pilkyu Kim*

Renewable Energy Technology Cente, Korea Testing Lab, Republic of Korea

T7-02-OP-7 (15:00-15:10)

CHARACTERIZATION OF BIPV MODULES AND SYSTEMS: DEFINITIONS AND STANDARD DEVELOPMENTS

Fred Edmond Boafo[1]*, Jin-Hee Kim[1], Kil-Seon Lee[2], and Jun-Tae Kim[3]**

[1]*Green Energy Technology Research Center, Kongju National University, Chungcheongnam-do, Republic of Korea*

[2]*Department of Energy Systems Engineering, Kongju National University, Chungcheongnam-do, Republic of Korea*

[3]*Department of Architectural Engineering & Graduate School of Energy Systems Engineering, Kongju National University, Chungcheongnam-do, Republic of Korea*

Nov-11 (Wed), 13:40-15:10 Tamna B&C (5F)

Parallel Session T9-01
T9-PV deployment: Industry, market, policy and financing

Chair(s) Younghyun Cho (Sungkyunkwan University, Republic of Korea),

T9-01-KN-1 (13:40-14:10)

[KEYNOTE SPEECH] EFFECTIVENESS OF PV-POWERED VEHICLES FOR CREATION OF CLEAN ENERGY SOCEITY

Masafumi Yamaguchi[1]*, Taizo Masuda[2], Kenji Araki[1], Kazumi Yamada[3], Yuske Zushi[4], and Mitsuhiro Yamazaki[5]

[1]*Toyota Technological Institute, Nagoya, Japan*

[2]*Toyota Motor Corporation, Susono, Japan*

[3]*Toyota Motor Corporation, Toyota, Japan*

[4]*Nissan Motor Corporation, Yokosuka, Japan*

[5]*New Energy and Industrial Technology Development Organization (NEDO), Kawasaki, Japan*

T9-01-KN-2 (14:10-14:40)

[KEYNOTE SPEECH] THE SOLAR AGE: THE RISE OF SOLAR PV AND 100% RENEWABLE ENERGY SCENARIOS

Christian Breyer*
Lappeenranta University of Technology, Yliopistonkatu, Helsinki, Lappeenranta, Finland

T9-01-OP-3 (14:40-15:00)

INTRODUCTION OF DEMONSTRATION PROJECT FOR OFFSHORE FLOATING SOLAR SYSTEM IN KOREA

Hyeok Jun Koh[1]*, Jae Kyeong Jang[1]**, Jong Po Park[1], and Eung Yong Kim[2]
[1]Plant Engineering Center, Institute for Advanced Engineering, Yongin, Republic of Korea
[2]Techwin Co.,Ltd, Cheongju, Republic of Korea

T9-01-OP-4 (15:00-15:10)

PREDICTION OF IRRADIANCE FORECAST BUSTS BY VARIATION OF WEATHER ELEMENTS OF WRF USING DIFFERENT PHYSICAL SCHEMES

Shota Funami[1]*, Masaki Imanaka[2], Muneaki Kurimoto[2], Shigeyuki Sugimoto[2], Takeyoshi Kato[2]**, and Fumichika Uno[3]
[1]Department of Electrical Engineering, Nagoya University, Nagoya, Japan
[2]Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Japan
[3]Department of Earth and Environmental Sciences, Nihon University, Tokyo, Japan

Nov-11 (Wed), 15:30-16:55 Halla A (3F)

Parallel Session T1-05
T1-Crystalline and thin film silicon PV

Chair(s) Keun-Kee Hong (Shinsung E&G, Republic of Korea)

T1-05-IN-1 (15:30-15:55)

R&D FOR HIGH EFFICIENCY CRYSTALLINE SILICON SOLAR CELLS IN KIER

Hee-Eun Song*, Min Gu Kang, Sungeun Park, Sung Jin Choi, Kwan Hong Min, Myeong Sang Jeong, Sang Hee Lee, and Kyung Taek Jeong
Photovoltaics Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

T1-05-OP-2 (15:55-16:10)

EFFECTIVENESS OF AL_2O_3/A-SI:H(I) PASSIVATION LAYER IN P-TYPE CELL CAPPED WITH MOOX LAYER FOR HIGH EFFICIENCY SOLAR CELL APPROACH

Sanchari Chowdhury*, Pham Duy Phong, Youngkuk Kim, Eun-Chel Cho, Younghyun Cho**, and Junsin Yi**
College of Information and Communication Engineering, Sungkyunkwan University, Suwon, Republic of Korea

T1-05-OP-3 (16:10-16:25)

IMPROVEMENT OF CONVERSION EFFICIENCY IN RIB SI SOLAR CELL

Tsukasa Takamura[1]*, Yukimi Ichikawa[1], Kimihiko Saito[2], and Makoto Konagai[1]**
[1]Advanced Research Laboratories, Tokyo City University, Japan
[2]Faculty of Symbiotic Systems Science, Fukushima University, Japan

T1-05-OP-4 (16:25-16:40)

IMPACT OF HYDROGEN PLASMA TREATMENT ON THE PASSIVATION PERFORMANCE OF TIO_x PREPARED ON CRYSTALLINE SILICON BY ATOMIC LAYER DEPOSITION

Shinsuke Miyagawa[1]*, Kazuhiro Gotoh[1], Markus Wilde[2], Shohei Ogura[2], Yasuyoshi Kurokawa[1], Katsuyuki Fukutani[2], and Noritaka Usami[1]**

[1]*Graduate School of Engineering, Nagoya University, Nagoya, Japan*

[2]*Institute of Industrial Science, The University of Tokyo, Tokyo, Japan*

T1-05-OP-5 (16:40-16:55)

SUPPRESSION OF SAWING DAMAGE ON SILICON WAFER FOR THIN FLEXIBLE SOLAR CELLS

Yutaka Hara[1]*, Tappei Nishihara[1], Ryo Yokogawa[1,2], Kyotaro Nakamura[3], Yoshio Ohshita[3], Tomoyuki Kawatsu[4], Toshiki Nagai[4], Noboru Yamada[5], Yukio Miyashita[5], and Atsushi Ogura[1,2]**

[1]*Meiji University, Kawasaki, Japan*

[2]*Meiji Renewable Energy Lab., Kawasaki, Japan*

[3]*Toyota Technological Institute, Nagoya, Japan*

[4]*Komatsu NTC Ltd., Nanto, Japan*

[5]*Nagaoka University of Technology, Nagaoka, Japan*

Nov-11 (Wed), 15:30-16:50 Halla B (3F)

Parallel Session T5-06
T5-Perovskite solar cells

Chair(s) Dong Hoe Kim (Sejong University, Republic of Korea), Jun Hong Noh (Korea University, Republic of Korea)

T5-06-IN-1 (15:30-15:45)

III-V QUANTUM DOT SOLIDS FOR EFFICIENT PHOTOVOLTAICS

Sohee Jeong*

Department of Energy Science, Sungkyunkwan University, Suwon, Republic of Korea

T5-06-IN-2 (15:45-16:00)

LEAD MANAGEMENT AND RECYCLING FOR SUSTAINABLE PEROVSKITE SOLAR CELLS

Dong Hoe Kim[1]***, So Yeon Park[2], Hyemin Lee[1], and Hyun Suk Jung[2]**

[1]*Department of Nanotechnology and Advanced Materials Engineering, Sejong University, Seoul, Republic of Korea*

[2]*School of Advanced Materials Science & Engineering, Sungkyunkwan University, Suwon , Republic of Korea*

T5-06-OP-3 (16:00-16:10)

LIGHT EFFECTS ON ION TRANSPORT IN MIXED CATION AND HALIDE PEROVSKITES AND ITS SIGNIFICANCE FOR THE PHOTO-DEMIXING EFFECT

Gee Yeong Kim[1,2]*, Alessandro Senocrate[2], Yaru Wang[2], Davide Moia[2], and Joachim Maier[2]

[1]Photo-electronic Hybrids Research Center, Korea Institute of Science and Technology, Seoul, Republic of Korea

[2]Physical Chemistry of Solids, Max Planck Institute for Solid State Research, Stuttgart, Germany

T5-06-OP-4 (16:10-16:20)

THE INFLUENCE OF LIGAND-CAPPED NANOCRYSTALS AT THE INTERFACE BETWEEN PEROVSKITE AND HOLE TRANSPORT LAYER IN PEROVSKITE SOLAR CELLS

Oh Yeong Gong[1]*, Youngsik Kim[2], Jae Myeong Lee[1], Min Kyeong Seo[1], Sangyeop Lee[1], Dong Hoe Kim[3]**, Gill Sang Han[1]**, Sohee Jeong[2]**, and Hyun Suk Jung[1]**

[1]School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Republic of Korea

[2]Department of Energy Science, Center for Artificial Atoms, Sungkyunkwan University, Suwon, Republic of Korea

[3]Department Nanotechnology & Advanced Materials Engineering, Sejong University, Seoul, Republic of Korea

T5-06-OP-5 (16:20-16:30)

IMPACT OF STRAIN RELAXATION ON PERFORMANCE OF α-FORMAMIDINIUM LEAD IODIDE PEROVSKITE SOLAR CELLS

Gwisu Kim[1]*, Hanul Min[1], Kyoung Su Lee[1], Do Yoon Lee[2], So Me Yoon[1], and Sang Il Seok[1]**

[1]Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

[2]Department of Chemistry, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

T5-06-OP-6 (16:30-16:40)

IMPACT OF THE PEROVSKITE CRYSTAL STRUCTURE ON THE TRAP STATES AND PHOTOVOLTAIC PERFORMANCE UNDER INDOOR LIGHTING CONDITIONS

Ranbir Singh*, Mritunjaya Parashar, and Jae-Joon Lee**

Research Center for Photoenergy Harvesting & Conversion Technology, Department of Energy Materials and Engineering, Dongguk University, Seoul, Republic of Korea

T5-06-OP-7 (16:40-16:50)

STUDY ON SOLID-PHASE REACTION OF LEAD HALIDE PEROVSKITE MULTILAYERS FaBRICATED VIA INFRARED LASER MOLECULAR BEAM DEPOSITION

Yuki Iida, Tomomasa Sato, and Nobuyuki Matsuki*

Department of Electrical, Electronics and Information Engineering, Faculty of Engineering, Kanagawa University, Yokohama, Japan

Nov-11 (Wed), 15:30-17:10 Tamna B&C (5F)

Parallel Session T7-03
T7-Weather and grid connection performance, reliability and standardization

Chair(s) Jae Hak Jung (Yeungnam University, Republic of Korea)

T7-03-IN-1 (15:30-15:50)

A STUDY ON RESIN-BASED MEDIA-BIPV MODULE TECHNOLOGY

Se Hyun Lee*

Department of R&D, Ecomaytek, Seoul, Republic of Korea

T7-03-OP-2 (15:50-16:00)

PREDICTION OF OUTDOOR DEGRADATION USING INDOOR TESTING RESULT

Moonyong Kim*, Daniel Chen, Shaoyang Liu, Matthew Wright, Catherine Chan, Alison Ciesla, Malcolm Abbott, and Brett Hallam

School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Sydney, Australia

T7-03-OP-3 (16:00-16:10)

A NOVEL APPROACH FOR THE MEASUREMENT OF THE INCIDENT ANGLE MODIFIER

Hui Ling Soh[1]*, Amelia Ng[1], Min Hsian Saw[2,3], Mauro Pravettoni[2]**, and Stephen Tay[1,2]**

[1]*Department of Building, School of Design and Environment, National University of Singapore, Singapore*

[2]*Solar Energy Research Institute of Singapore (SERIS), National University of Singapore, Singapore*

[3]*Department of Mechanical Engineering, Faculty of Engineering, National University of Singapore, Singapore*

T7-03-OP-4 (16:10-16:20)

QUANTIFYING REFLECTANCE COMPONENTS IN COLOURED PHOTOVOLTAICS WITH DIRECTIONAL METHOD

Amelia Ng[1]*, Hui Ling Soh[1], Min Hsian Saw[2,3], Mauro Pravettoni[2]**, and Stephen Tay[1,2]**

[1]*Department of Building, School of Design and Environment, National University of Singapore, Singapore*

[2]*SERIS, National University of Singapore, Singapore*

[3]*Department of Mechanical Engineering, Faculty of Engineering, National University of Singapore, Singapore*

T7-03-OP-5 (16:20-16:30)

OUTPUT CHARACTERISTICS OF PV MODULE WITH THE DEFECTIVE BYPASS DIODES

Li Feng[1,2]*, Frank U. Hamelmann[1]**, and Nowshad Amin[2]

[1]*Solar Computing Lab, Bielefeld University of Applied Science, Minden, Germany*

[2]*Institute of Sustainable Energy, Universiti Tenaga Nasional, Kajang, Malaysia*

T7-03-OP-6 (16:30-16:40)

RELIABILITY AND DURABILITY RESEARCH ACTIVITIES OF PV MODULES, COMPONENTS AND SYSTEMS IN COST ACTION PEARL PV

Mohammadreza Aghaei[1]*, Jeff Kettle[2], and A.H.M.E. Reinders[1,3]

[1]*Department of Mechanical Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands*
[2]*Department of Computer Science and Electronic Engineering, Bangor University, Bangor, UK*
[3]*Department of Design Production & Management, University of Twente, Enschede, The Netherlands*

T7-03-OP-7 (16:40-16:50)

LIGHT-INDUCED DEGRADATION IN N-TYPE HETEROJUNCTION SOLAR CELLS AT ELEVATED TEMPERATURES

Chukwuka Madumelu*, Brendan Wright, Anastasia Soeriyadi, Matthew Wright, Daniel Chen, Bram Hoex, and Brett Hallam
School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Sydney, Australia

T7-03-KN-8 (16:50-17:10)

[KEYNOTE SPEECH] QUALITY ASSURANCE IN PV – REDUCING LCOE BY MINIMISING AVOIDABLE FAILURES

Ralph Gottschalg[1,2]*, and Bengt Jaeckel[1]
[1]*Fraunhofer Center for Silicon Photovoltaics, Halle, Germany*
[2]*Faculty of Electrical, Mechanical and Economic Engineering, Anhalt University of Applied Sciences, Koethen, Germany*

Nov-11 (Wed), 15:30-16:20 Samda A (3F)

Parallel Session T9-02
T9-PV deployment: Industry, market, policy and financing

Chair(s) Jae Chun Song (Sungkyunkwan University, Republic of Korea)

T9-02-IN-1 (15:30-15:50)

PV CURRENT STATUS AND FUTURE FORECAST IN CHINA

Sicheng Wang*
Energy Research Institute, Development and Reform Commission, Beijing, China

T9-02-OP-2 (15:50-16:05)

BIPV POTENTIAL ESTIMATION FOR URBAN CITY BASED ON THE SOLAR ENERGY MAP OF DAEJEON

Hyun-Goo Kim[1]*, Je-Hyun Lee[2], Chang Ki Kim[1], Chang-Yeol Yun[1], and Bo-Young Kim[1]
[1]*New and Renewable Energy Resource Map Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea*
[2]*Platform Technology Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea*

T9-02-OP-3 (16:05:16:20)

TRENDS IN PV APPLICATIONS 2020

Gaëtan Masson[1]*, Arnulf Jäeger-Waldau[2], Izumi Kaizuka[3], Johan Lindahl[4], José Donoso[5], and Lionel Perret[6]
[1]*IEA PVPS Task 1, Belgium*

[2] *Joint Research Center, European Commission, Belgium*
[3] *RTS Coproration, Japan*
[4] *Becquerel Sweden, Sweden*
[5] *UNEF, Spain 6Planair, Switzerland*

Nov-12 (Thu), 09:00-10:25 Halla A (3F)

Parallel Session T1-06
T1-Crystalline and thin film silicon PV

Chair(s) Eun-Chel Cho (Sungkyunkwan University, Republic of Korea)

T1-06-IN-1 (09:00-09:25)

WIDE BANDGAP TERNARY METAL OXIDES FOR HIGH EFFICIENCY SILICON SOLAR CELLS

Hyunju Lee[1,3]*, Atsushi Ogura[2], and Yoshio Ohshita[3]

[1]Meiji Renewable Energy Laboratory, Meiji University, Kawasaki, Japan

[2]School of Science and Technology, Meiji University, Kawasaki, Japan

[3]Toyota Technological Institute, Nagoya, Japan

T1-06-OP-2 (09:25-09:40)

ANALYSIS DIRECTIONS AND METHOD OF SILICON SOLAR CELLS FOR THE MACHINE LEARNING OF SMART FACTORY

Sang Hee Lee*, Min Gu Kang, Hee-eun Song, Kyung Taek Jeong, and Sungeun Park**

Photovoltaics Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

T1-06-OP-3 (09:40-09:55)

IMPROVING THE DIPPING STEP IN CZOCHRASKI PROCESS USING HAAR-CASCADE ALGORITHM

Le Tran Huu Phuc, Hye Jun Jeon, Nguyen Tam Nguyen Truong, and Jea Hak Jung*

Department of Chemical engineering, Yeungnam University, Gyeongsan, Republic of Korea

T1-06-OP-4 (09:55-10:10)

COPPER ASSISTED TEXTURIZATION TECHNIQUE FOR HIGH EFFICIENCY MONOCRYSTALLINE SILICON SOLAR CELLS

Subbiramaniyan Kubendhiran*, Gavin Sison, Hsiao Ping Hsu, and Chung-Wen Lan**

Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan

T1-06-OP-5 (10:10-10:25)

DOPANT-FREE MICROWIRE CRYSTALLINE SILICON SOLAR CELLS WITH THE FIELD-INDUCED RADIAL JUNCTION

Deokjae Choi*, Myounghyun Lee[1], and Kwanyong Seo**

Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

Nov-12 (Thu), 09:00-10:30 RM 303 (3F)

Parallel SessionT7-04
T7-Weather and grid connection performance, reliability and standardization

Chair(s) Soo-Young Oh (Yeungnam University, Republic of Korea)

T7-04-IN-1 (09:00-09:20)

SOLAR SHARING PV SYSTEM USING 600NM LED TO MAINTAIN THE HARVEST RATE

Soo-Young Oh[1]*, Sang-Gon Suh[1], Taewon Kim[2], and Jae Hak Jung[1]**

[1]Department of Chemical Engineering, Yeungnam University, Geongsan, Republic of Korea

[2]Korea East-West Power Co.,LTD, Ulsan, Republic of Korea

T7-04-OP-2 (09:20-09:30)

CAPTURING THE HOMOGENEITY AND THE BORDER EFFECT OF UNDER ARRAY SUNLIGHT IN AGRIVOLTAICS

Oh Hyun Kwon[1]*, Brendon Bingwa[2], Maximilian Trommsdorff[2], and Kyung Soo Lee[1]**

[1]Energy· Electrical Engineering, Korea Polytechnic University, Siheung-si, Republic of Korea

[2]Photovoltaic Power Plants, Fraunhofer ISE, Freiburg, Germany

T7-04-OP-3 (09:30-09:40)

A AGRO-PHOTOVOLTAIC EMIRICAL RESEARCH AND FUTURE DEVELOPMENT PLAN

Deok Cheol Seo[1]*, Geon-Hyoung An[2], and Kyeong Wan Kang[1]

[1]Korea South-East Power Company, Jinju, Gyeongnam, Republic of Korea

[2]Department of Energy Engineering, Gyeongnam National University of Science and Technology, Jinju, Republic of Korea

T7-04-OP-4 (09:40-09:50)

CASE STUDIES OF AGRIVOLTAIC SYSTEMS IN KOREA

Jae Woo Nam*

Agricultural Corporation Solar Farm Co., Ltd., Republic of Korea

T7-04-OP-5 (09:50-10:00)

A STUDY ON THE ABNORMAL CLIMATE RESPONSE OF HIGH VALUE ADDED CROPS UTILIZING

Wooram Kim, Geun Ho Gim, Deok Sung Kim, and Cheol Hyun Lim*

Solar Energy R&D Dept., Green Energy Institute, Mokpo-si, Jeollanam-do, Republic of Korea

T7-04-OP-6 (10:00-10:10)

MACHINE-LEANING MODEL FOR URBAN ROOFTOP IRRADIATION LOSS BY BUILDING SHADOW

Jehyun Lee[1]*, Chang Ki Kim[2], Chang-Yeol Yun[2], Dae Hyun Song[4], Yong-Heack Kang[3], and Hyun-Goo Kim[3]**

[1]Platform Technology Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

[2]New and Renewable Energy Resource Map Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

[3]NGL Co. Ltd., Goyang, Republic of Korea

T7-04-OP-7 (10:10-10:20)

A STUDY OF FRAME STRUCTURE FOR PHOTOVOLTAIC ON THE FARM

Kyoungho Lee[1], Jongyoun Chea[1], Jongho Lim[1], Giil Do[1], Sooyoung Oh[2], and Jae Hak Jung[2]*

[1]MDS Co., LTD, Gyeongsan-si, Gyeongsangbuk-do, Republic of Korea

[2]School of Chemical engineering, Yeungnam University Gyeongsan-si, Gyeongsangbuk-do, Republic of Korea

T7-04-OP-8 (10:20-10:30)

DEVELOPMENT OF PERFORMANCE EVALUATION AND FAULT DIAGNOSIS SYSTEM FOR PV SYSTEM USING OPENHAB-BASED REMOTE MONITORING

Hee-Won Lim*, and U-Cheul Shin**
Department of Architecture Engineering, Daejeon University, Daejeon, Republic of Korea

Nov-12 (Thu), 09:00-10:25 Samda A (3F)

Parallel Session T9-03
T9-PV deployment: Industry, market, policy and financing

Chair(s) Joondong Kim (Incheon University, Republic of Korea)

T9-03-IN-1 (09:00-09:20)

THE RELEVANCE OF PHOTOVOLTAICS FOR THE EUROPEAN GREEN DEAL AND THE COVID-19 RECOVERY PACKAGE

Arnulf Jä ger-Waldau*, Georgia Kakoulaki, Ioannis Kougias, and Nigel Taylor
European Commission, Joint Research Centre, Ispra, Italy

T9-03-IN-2 (09:20-09:40)

ADVANCES IN CORPORATE RENEWABLE ENERGY PROCUREMENT POLICY IN KOREA

Sangjun Lee*
Climate Policy Research Team, Korea Energy Economics Institute, Ulsan, Repubilc of Korea

T9-03-OP-3 (09:40-09:55)

KOREAN GREEN NEW DEAL AND RENEWABLE ENERGY

Hanwoo Rhee[1]*, and Jin Ho Kim[2]**
[1]*Global Business Department, Korea Energy Agency, Ulsan, Repubilc of Korea*
[2]*Department of Political Science and Diplomacy, Dankook University, Gyeonggi, Repubilc of Korea*

T9-03-OP-4 (09:55-10:10)

BUSINESS MODELS AND POLICIES ON SOLAR PV O&M

Kang Lee[1]*, and Jehoon Yi[2]**
[1]*Sustainable Development Management Institute, Seoul, Repubilc of Korea*
[2]*The Energy, Suwon, Korea*

T9-03-OP-5 (10:10-10:25)

ANALYSIS ON THE TRADE COMPETITIVE STRUCTURE OF THE PHOTOVOLTAIC INDUSTRY: EVIDENCE FROM SOUTH KOREA

Jinwoo Sim*, and Hun Park**
R&D Investment and Planning Center, Korea Institute of Science and Technology Information, Seoul, Republic of Korea

Nov-12 (Thu), 10:00-12:20 Tamna B&C (5F)

PV Industry Forum

Chair(s) Myunghun Shin (Korea Aerospace University, Republic of Korea),
Jongsung Park (Green Energy Institute, Republic of Korea)

PI-IN-1 (10:00-10:20)

INSIGHTS ON THE DESIGN OF ULTRA-HIGH POWER PV MODULES

Dennis She*

LONGi Solar, China

PI-IN-2 (10:20-10:40)

SOLAR PV JOINT-INNOVATION R&D CENTER

Dong Seop Kim*

Shinsung E&G, Republic of Korea

PI-IN-3 (10:40-11:00)

BIPV FOR BUIIDING'S FACADE

Jin Hyung Ahn*, Hyun Il Kim, and Myung Ick Hwang**

PV R&D Center, Hyundai Energy Solutions Co., Ltd., Chungcheongbuk-do, Republic of Korea

PI-IN-4 (11:00-11:20)

GREEN SMART CITY & AUGEMENTATION TECHNOLOGY

Jong-Sung Hwang*

National Information Society Agency, Daegu, Republic of Korea

PI-IN-5 (11:20-11:40)

DESIGN OF FLOATING PV (FPV) PROJECTS – CHALLENGES AND CASE STUDIES

Philip Napier-Moore[1]*, Saitip Tiptara[2], Chunghuan Li[2], Iban Vendrell[2], and Tatsuto Kikuchi[3]

[1]*Mott MacDonald, Thailand*

[2]*Mott MacDonald, Taiwan*

[3]*Mott MacDonald, Japan*

PI-IN-6 (11:40-12:00)

DIGITAL PV, O&M TECHNOLOGY BASED ON AI AND BIG DATA

Holger Schroth*

Solar-Log, Germany

PI-IN-7 (12:00-12:20)

NEW BIPV MODULES FOR FACADES AND WALLS

Akihiko Nakajima*

Kaneka Corporation, Japan

Nov-12 (Thu), 10:50-12:10 Halla A (3F)

Parallel Session T5-07
T5-Perovskite solar cells

Chair(s) Hyun Suk Jung (Sungkyunkwan University, Republic of Korea), Sang Hyuk Im (Korea University, Republic of Korea)

T5-07-IN-1 (10:50-11:05)

A STRATEGY FOR PASSIVATING SURFACE OF HALIDE PEROVSKITE

Hui-Seon Kim*

Department of Chemistry, Inha University, Incheon, Republic of Korea

T5-07-IN-2 (11:05-11:20)

SURFACE ENGINEERING OF LEAD-HALIDE PEROVSKITE COLLOIDAL QUANTUM DOTS FOR MULTI-FUNCTIONAL PHOTOVOLTAICS

Younghoon Kim*

Division of Energy Technology, Daegu Gyeongbuk Institute of Science & Technology, Daegu, Republic of Korea

T5-07-OP-3 (11:20-11:30)

EXPLORING THE EFFECT OF DOUBLE ADDITIVES IN MIXED 2D/3D SN-BASED PEROVSKITE SOLAR CELLS

Sanjay Sandhu*, Ranbir Singh, Kicheon Yoo, Jae-Joon Lee**

Research Center for Photoenergy Harvesting & Conversion Technology, Department of Energy Materials and Engineering, Dongguk University, Seoul, Republic of Korea

T5-07-OP-4 (11:30-11:40)

N-TYPE TIN-LEAD PEROVSKITE SOLAR CELLS TO ACHIEVE HIGH EFFICIENCY

Gaurav Kapil[1]*, Takeru Bessho[2], Qing Shen[1], Hiroshi Segawa[2], and Shuzi Hayase[1]

[1]*University of Electro-communications, Tokyo, Japan*

[2]*University of Tokyo, Tokyo, Japan*

T5-07-OP-5 (11:40-11:50)

KINETICS OF LIGHT-INDUCED DEGRADATION IN SEMI-TRANSPARENT PEROVSKITE SOLAR CELLS

Moonyong Kim[1]*, Jihoo Lim[1], Helen Hejin Park[2], Hyunmin Jung[2], Sean Lim[3], Xiaojing Hao[1], Eunyoung Choi[1], Sangwook Park[1], Minwoo Lee[1], Ziheng Liu[1], Martin A. Green[1], Jangwon Seo[2], Jongsung Park[4], and Jae Sung Yun[1]**

[1]*Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable and Engineering, UNSW Sydney, Sydney, Australia*

[2]*Advanced Materials Division, Korea Research Institute of Chemical Technology, Daejeon, Republic of Korea*

[3]*Electron Microscope Unit, UNSW Sydney, Sydney, Australia*

[4]*Solar Energy R&D department, Green Energy Institute, Mokpo, Chonnam, Republic of Korea*

Nov-12 (Thu), 10:50-12:30 Samda B (3F)

Asia-Pacific Kesterite Workshop-01

Chair(s) Dae-Hwan Kim (Daegu Gyeongbuk Institute of Science & Technology, Republc of Korea)

AKW-01-IN-1 (10:50-11:15)

VOLUME DEFECT FORMATION MECHANISM OF CZTSSE THIN-FILM USING METAL STACKED PRECURSOR

Se-Yun Kim[1]*, Dae-Ho Son[2,3], Kee-Jeong Yang[2,3], Seung-Hyun Kim[2], Young-Ill Kim[2], Dae-Kue Hwang[2,3], Shi-Joon Sung[2,3], Dong-Hwan Jeon[2,3], Si-Nae Park[2], Sammi Kim[2,3], Sang-Ju Lee[2,3], Dae-Hwan Kim[2,3]**, and Jin-Kyu Kang2,3**

[1]Dept. of Nano Materials Science and Engineering, Kyungnam University, Gyeongsangnam-do, Republic of Korea

[2]Research Center for Thin Film Solar Cells, Daegu Gyeongbuk Institute of Science & Technology, Daegu, Republic of Korea

[3]Division of Energy Technology, Daegu Gyeongbuk Institute of Science & Technology, Daegu, Republic of Korea

AKW-01-IN-2 (11:15-11:40)

INDEPENDENT EVALUATION OF CONDUCTION AND VALENCE BAND TAILING OF CZTGSE USING IPES AND UPS MEASUREMENTS

Takehiko Nagai[1]*, Kazuhiro Hirayama[2], Tatsuo Matsunobe[2], Guanzhong Chen[2], Yusei Takagi[2], Hitoshi Tampo[1], Shinho Kim[3], Hajime Shibata[1], Shigeru Niki[1], and Norio Terada[2]

[1]Research Institute for Energy Conservation, National Institute of Advanced Industrial Science and Technology, Ibaraki, Japan

[2]Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan

[3]Institute for Materials Technology, Pusan National University, Busan, Republic of Korea

AKW-01-IN-3 (11:40-12:05)

THE ROLE OF ALKALINE ELEMENTS IN KESTERITE SOLAR CELLS

Xiaojing Hao*, Mingrui He, Heng Sun, Jialiang Huang, Jianjun Li, Kaiwen Sun, Chang Yan, Martin Green

School of Photovoltaic and Renewable Energy Engineering, UNSW Sydney, Sydney, Australia

AKW-01-IN-4 (12:05-12:30)

INSIGHT INTO THE ROLE OF ALKALI CATION ON THE PERFORMANCE OF KESTERITE SOLAR CELLS

Yali Sun, Hongling Guo, Dongxiao Wang, and Yi Zhang*

Institute of Photoelectronic Thin Film Devices and Technology, Nankai University, Tianjin, China

Nov-12 (Thu), 10:50-12:20 Samda A (3F)

Parallel Session T9-04
T9-PV deployment: Industry, market, policy and financing

Chair(s) Hun Park (Korea Institute of Science and Technology Information, Republic of Korea)

T9-04-IN-1 (10:50-11:15)

THE INTER-RELATIONSHIP BETWEEN RE100 AND COST OF RENEWABLE ELECTRIC POWER

Mukund Santhanam*

RE100-Climate Group, Republic of Korea

T9-04-IN-2 (11:15-11:40)

CURRENT ASPECTS OF PV ENERGY POLICIES IN KOREA

Sang Hoon Lee*, and Seok Jai Choi**

New & Renewable Energy Center, Korea Energy Agency, Republic of Korea

T9-04-OP-3 (11:40-11:55)

FACTORS OF HOUSEHOLDS' PV UPTAKE IN SOUTH KOREA

Ilhyun Cho[1]*, Chun Gun Park[2], Sung Jae Lee[3], and Jiyoung Kong[3]

[1]*Korea Energy Economics Institute, Ulsan, Republic of Korea*

[2]*Department of Mathematics, Kyonggi University, Kyonggi, Republic of Korea*

[3]*Korea Energy Economics Institute, Ulsan, Republic of Korea*

T9-04-OP-4 (11:55-12:10)

RESEARCH ON ENERGY CONSUMPTION PATTERNS OF REPRESENTATIVE PRODUCTS OF FARMING, FISHING AND LIVESTOCK

Sangmin Cho[1], Hyun Lee[1], Seungmoon Lee[1], Deok Oh Lim[1], Chang Kyoon Son[2], Research Lim[3], and Jaeseok Lee[1]*

[1]*Korea Energy Economics Institute, Ulsan, Seoul, Republic of Korea*

[2]*Department of Statistics, Dongguk University, Kyungju, Republic of Korea*

[3]*ResearchLim, Seoul, Republic of Korea*

T9-04-OP-5 (12:15-12:10)

IMPLICIT-STORAGE ENABLED FIRM PV POWER FORECASTS: STEP ONE TO OPTIMUM ULTRA-HIGH PV PENETRATION

Richard Perez[1]*, Marc Perez[2], Tom Hoff[2], Marco Pierro[3], Cristina Cornaro[3], James Schlemmer[1], Patrick Keelin[2], Agata Swierc[2], and Skip Dise[2]

[1]*ASRC, The University at Albany, Albany, New York, USA*

[2]*Clean Power Research, Kirkland, Washington, USA*

[3]*University of Rome, Tor Vergata, Rome, Italy*

Nov-12 (Thu), 14:40-16:20 Samda B (3F)

Asia-Pacific Kesterite Workshop-02

Chair(s) Jongsung Park (Green Energy Institute, Republic of Korea)

AKW-02-IN-1 (14:40-15:05)

INVESTIGATION OF LOW INTENSITY LIGHT PERFORMANCE OF KESTRITE CZTS BASED SOLAR CELLS: EFFECT OF CATION SUBSTITUTION AND DIFFERENT BANDGAP

Jongsung Park[1,2]*, Hyesun Yoo[2], Vijay Karade[3], Jaesung Yun[4], Jong H .Kim[5], and Jin Hyeok Kim[2,3]**

[1]*Solar Energy R&D department, Green Energy Institute, Mokpo, Chonnam, Republic of Korea*

[2]*Optoelectronics Convergence Research Center, Chonnam National University, Gwangju, Republic of Korea*

[3]*Department of Materials Science and Engineering, Chonnam National University, Gwangju, Republic of Korea*

[4]*School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Sydney, Australia*

[5]*Department of Molecular Science and Technology, Ajou University, Suwon, Republic of Korea*

AKW-02-IN-2 (15:05-15:30)

DEVICE CHARACTERISTICS AND LOSS MECHANISMS OF OVER 12% EFFICIENCY CU2ZNSNSE4 KESTERITE THIN-FILM SOLAR CELLS

Jianjun Li[1]*, Jialiang Huang[1], Yaohua Mai[2], Martin A. Green[1], Xiaojing Hao[1]

[1]*Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Sydney, Australia*

[2]*Institute of New Energy Technology, College of Information Science and Technology, Jinan University, Guangzhou, China*

AKW-02-IN-3 (15:30-15:55)

SOLUTION-PROCESSED CU2ZNSN(S,SE)$_4$ SOLAR CELLS WITH OVER 12% EFFICIENCY

Fangyang Liu*

School of Metallurgy and Environment, Central South University, Changsha, China

AKW-02-IN-4 (15:55-16:20)

IMPACT ON SELENIUM SUPPLY FOR CU2ZNSNSE4 SOLAR CELLS GRWON BY COEVAPORATION METHD

Hitoshi Tampo[1]*, Takehiko Nagai[1], Shinho Kim[2], Hajime Shibata[1], and Shigeru Niki[2]

[1]*National Institute of Advanced Industrial Science and Technology (AIST), Ibaraki, Japan*

[2]*Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan*

Nov-12 (Thu), 14:50-18:00 Tamna B&C (5F)

PVSEC Special Forum

INTRODUCTION(14:50-14:55)

GaëtanMasson*

EA-PVPS & Becquerel Institute, Belgium

SESSION 1: MARKET, INDUSTRY AND TECHNOLOGY STATUS (14:55-15:55)

Moderator: Gaëtan Masson (EA-PVPS & Becquerel Institute, Belgium)

PSF-S1-1 (14:55-15:15)

CHINA AND ASIA PV MARKET PERSPECTIVES

Frank Haugwitz*

Asia Europe Clean Energy (Solar) Advisory Co. Ltd., China

PSF-S1-2 (15:15-15:35)

PV INDUSTRY STATUS

Izumi Kaizuka*

RTS Corporation, Japan

PSF-S1-3 (15:35-15:55)

BENCHMARK OF FUTURE PV TECHNOLOGIES

Martin Green*

University of New South Wales, Australia

SESSION 2: ENERGY TRANSITION: CONNECTING SOLAR TO MOBILITY AND BUILDINGS (15:55-16:55)

Moderator: Jae Chun Song (Sungkyunkwan University, Republic of Korea)

PSF-S2-1 (15:55-16:10)

POWERING THE FUTURE THROUGH HYDROGEN AND FUEL CELL ELECTRIC VEHICLES

Bo Ki Hong*

Hyundai Motors, Republic of Korea

PSF-S2-2 (16:10-16:25)

PV INTERGRATED SOLAR CARS

Taizo Masuda*

Toyota Motors, Japan

PSF-S2-3 (16:25-16:40)

PV INTERGRATED SOLAR CARS

Mathieu Baudrit*

Sono Motors, Germany

PSF-S2-4 (16:40-16:55)

OPPORTUNITY FOR BIPV DEVELOPMENT

Tom Selten*

Lightyear, the Netherlands

SESSION 3: SOLAR PV ROUND TABLE (16:55-17:55)

Moderator: Pierre Verlinden (Former Chief Scientist of Trina Solar, China)

PSF-S3-P1

HANWHA ENERGY SOLUTION

Daniel JW Jeong*

Hanwha Q-Cells, Germany

PSF-S3-P2

LONGI SOLAR

Zheng Zhi*

Longi Solar, China

PSF-S3-P3

FIRST SOLAR

Sujoy Ghosh*

First Solar Inc., USA

PSF-S3-P4

JOLYWOOD

Chen Jia*

Jolywood, China

CONCLUDING REMARKS (17:55-18:00)

Chinho Park*

Yeungnam University, General Chair PVSEC-30, Republic of Korea

Nov-12 (Thu), 14:50-16:20 RM 303 (3F)

Bifacial PV Workshop-01

Chair(s) Seungkyu Ahn (Korea Institute of Energy Research , Republic of Korea)

BPW-01-IN-1 (14:50-15:15)

BIFACIAL PV: EVOLUTION OF A SMALL PV REVOLUTION

Radovan Kopecek*, and Joris Libal

International Solar Energy Center Konstanz, Konstanz, Germany

BPW-01-OP-2 (15:15-15:35)

THE LEARNING CURVE FOR BIFACIAL_RADIANCE: PERFORMANCE SIMULATION OF BIFACIAL PV IN SINGAPORE

Tian Shen Liang[1,2]*, Carlos Rodriguez-Gallegos[1], Mauro Pravettoni[1], Jai Prakash Singh[1], and Yong Sheng Khoo[1]

[1]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore

[2]Department of Electrical and Computer Engineering, National University of Singapore, Singapore

BPW-01-OP-3 (15:35-15:55)

ENERGY YIELD SIMULATOR FOR BIFACIAL PV (BIFI-SORES)

Soo-Young Oh*, Hyeonwook Park, Jae Hak Jung, and Woo Kyung Kim**

Department of Chemical Engineering, Yeungnam University, Geongsan, Republic of Korea

BPW-01-IN-4 (15:55-16:20)

VALIDATION OF MOBIDIG MODEL FOR ENERGY YIELD PREDICTION OF BIFACIAL PV SYSTEMS

Joris Libal*, Djaber Berrian, Adrian Minde, Andreas Halm, Radovan Kopecek, and Kristian Peter

International Solar Energy Center Konstanz, Konstanz, Germany

Nov-12 (Thu), 16:30-18:00 RM 303 (3F)

Bifacial PV Workshop-02

Chair(s) Soo-Young Oh (Yeungnam University, Republic of Korea)

BPW-02-IN-1 (16:30-16:55)

DEVELOPMENT OF THE OUTDOOR PERFORMANCE MEASUREMENT SYSTEM FOR BIFACIAL PV MODULES USING A BIFACIAL IRRADIATION OF MIRROR-REFLECTED SUN LIGHT

Seung Kyu Ahn*

Photovoltaic Research Department, Korea Institute of Energy Research, Daejeon, Republic of Korea

BPW-02-OP-2 (16:55-17:15)

EXPERIMENTAL VERIFICATION OF SIMULATION MODEL FOR BIFACIAL MODULE ENERGY GENERATION GAIN

Naftali Eisenberg[1]*, Lev Kreinin[1]**, Asher Karsenty[1], and Ygal Eisenberg[2]

[1]*Solaround, Jerusalem, Israel*

[2]*Department of Electro-optics, Jerusalem College of Technology, Jerusalem, Israel*

BPW-02-OP-3 (17:15-17:35)

BIFACIAL SINGLE AXIS TRACKING ACURACY MODELLING

Javier Guerrero-Perez[1]*, Irene Muñoz-Benavente[1], Jose A. Teruel[1], and Mireia Jimenez[2]**

[1]*PV Division, Soltec Innovations, Spain*

[2]*Product Management Department Soltec, Spain*

BPW-02-IN-4 (17:35-18:00)

INDEPENDENT TEST RESULTS: COMPARING AND QUANTIFYING BIFACIAL RELIABILITY AND PERFORMANCE

Jenya Meydbray[1]*, and Tristan Erion-Lorico[2]**

[1]*CEO, PV Evolution Labs, Berkeley, CA, USA*

[2]*PV Evolution Labs, Toronto, ON, Canada*

Nov-12 (Thu), 16:30-18:10 Samda B (3F)

Asia-Pacific Kesterite Workshop-03

Chair(s) Jin Hyeok Kim (Chonnam National University, Republic of Korea)

AKW-03-IN-1 (16:30-16:55)

IMPROVING THE PERFORMANCE OF CZTS THIN FILM SOLAR CELL BY DEVICE POST-ANNEALING

Zhenghua Su*

Shenzhen Key Laboratory of Advanced Thin Films and Applications, College of Physics and Optoelectronic Engineering, Shenzhen University, Shenzhen, China

AKW-03-IN-2 (16:55-17:20)

CAN KESTERITE MATERIAL PROPERTIES BE CONTROLLED? STABILITY, CRYSTALLISATION AND DEFECT ENGINEERING

Jonathan Scragg*

Department of Materials Science and Engineering, Uppsala University, Sweden

AKW-03-IN-3 (17:20-17:45)

THE NEXT FOUR YEARS OF RESEARCH ON KESTERITE IN EUROPE: CUSTOM-ART AND BEYOND

Edgardo Saucedo[1]*, and Alejandro Pererz-Rodriguez[2]

[1]*Electronic Engineering Department, Polytechnic University of Catalonia (UPC), Barcelona, Spain*

[2]*DSolar Energy Materials and Solar Cells Group, Catalonia Institute for Energy Research (IREC), Barcelona, Spain*

AKW-03-IN-4 (17:45-18:10)

ELECTRONIC DEFECTS AND NON-RADIATIVE RECOMBINATION IN KESTERITE-TYPE SOLAR CELLS – STATUS AND PERSPECTIVE

Thomas Unold*

Department Structure and Dynamics of Energy Materials, Helmholtz Zentrum für Materialien und Energie GmbH, Berlin, Germany


PVSEC-30 & GPVC 2020

Poster Sessions


PVSEC-30 & GPVC 2020

Nov-9 (Mon), 09:00-10:30 Lobby (3F)

Poster Presentation-01
T1-Crystalline and thin film silicon PV

Chair(s) HyunJung Park (Korea University, Republic of Korea)
Jinjoo Park (Cheongju University, Republic of Korea)

P1-T1-1 AN ANALYSIS OF SURFACE ROUGHNESS OF SILICON WAFER AFTER PULSED ND: YAG LASER TEXTURING

Nurul Huda Abdul Razak[1]*, Kamaruzzaman Sopian[2], Nowshad Amin[1], and Md. Akhtaruzzaman[2]
[1]Department of Electrical, Electronic and Systems Engineering, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia
[2]Solar Energy Research Institute, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia

P1-T1-2 A COMPARATIVE STUDY OF ZNO AND AG-ZNO AS ANTIREFLECTION LAYER ON CRYSTALLINE SILICON SOLAR CELLS

Deb Kumar Shah[1]*, M. Shaheer Akhtar[1,2]**, O-Bong Yang[1,2], and Chong Yeal Kim[2]**
[1]School of Semiconductor and Chemical Engineering & Solar Energy Research Center, Chonbuk National University, Jeonju, Republic of Korea
[2]New and Renewable Energy Materials Development Center, Chonbuk National University, Jeonbuk, Republic of Korea

P1-T1-3 CONTROLLING THE SPACING OF TAPERED SILICON MICROWIRE ARRAYS VIA MICROSPHERE LITHOGRAPHY

Namwoo Kim*, Deokjae Choi, Hyungwoo Kim, and Kwanyong Seo**
Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

P1-T1-4 INFLUENCE OF ALD-ZNO REAR REFLECTOR FOR IMPROVEMENT OF CURRENT DENSITY IN SHJ SOLAR CELLS

Hyeong Sik Park[1,2]*, Joondong Kim[3], Youngkuk Kim[1], Sangho Kim[3], Jae Chun Song[1], Younghyun Cho[1], Eun-Chel Cho[1], Jaehyeong Lee[1], and Junsin Yi[1]**
[1]College of Information and Communication Engineering, Sungkyunkwan University, Suwon, Republic of Korea
[2]Convergence Research Center for Energy and Environmental Sciences, Sungkyunkwan University, Suwon, Republic of Korea
[3]Department of Electrical Engineering, Incheon National University, Incheon, Republic of Korea

P1-T1-5 BIFACIAL SEXTUPLE-JUNCTION AMORPHOUS SILICON SOLAR CELLS ON GLASS AND POLYIMIDE AND THE OPTIMAZATION OF THEIR I-LAYER THICKNESSES BY OPTICAL SIMULATION

Hiroshi Noge*, Makoto Konagai, and Ryousuke Ishikawa
Advanced Research Laboratories, Tokyo City University, Tokyo, Japan

P1-T1-6 REALIZATION OF CRYSTALLINE SILICON SOLAR CELL ELECTRODE USING SCREEN PRINTING

Jin Sol Lee*, and Hak Jun Chung**

Research Center, Korea Electronics Technology Institute, Jeonju, Korea IT Application, Republic of Korea

P1-T1-7 EFFECT OF BACK PASSIVATION LAYER OF A-SI:H TRANSPARENT SOLAR CELLS ON CELL PERFORMANCES

Jieun Kim[1,2]*, Jung Wook Lim[1,2]**, and Jaehee Lee[1,2]

[1]*Electronics and Telecommunications Research Institute, Daejeon, Republic of Korea*

[2]*Department of Advanced Device Engineering, University of Science and Technology, Daejeon, Republic of Korea*

P1-T1-8 ENHANCING PHOTOVOLTAIC PERFORMANCE OF TRANSPARENT CRYSTALLINE SILICON SOLAR CELLS VIA SURFACE TREATMENT BASED ON WET-CHEMICAL ETCHING

Jeonghwan Park*, Kangmin Lee, and Kwanyong Seo**

Department of Energy Engineering, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

P1-T1-9 OPTICAL DESIGN OF BIFACIALLY LIGHT RECEIVING BY ONE-SIDED LIGHT INCIDENCE FOR MULTI-JUNCTION AMORPHOUS SILICON SOLAR CELLS

Kimihiko Saito[1]*, and Makoto Konagai[2]

[1]*Faculty of Symbiotic Systems Science, Fukushima University, Fukushima, Japan*

[2]*Advanced Research Laboratories, Tokyo City University, Tokyo, Japan*

P1-T1-11 EFFICIENCY IMPROVEMENT FOR REAR EMITTER SILICON HETEROJUNCTION SOLAR CELLS; A REVIEW

Muhammad Quddamah Khokhar*, Donghyun Oh, Duy Phong Pham, Sunhwa Lee, Youngkuk Kim, Eun-Chel Cho**, and Junsin Yi**

College of information Communication Engineering, Sungkyunkwan University, Suwon, Republic of Korea

P1-T1-12 OPTIMAL ITO SPUTTERING STUDY FOR SILICON HETEROJUNCTION SOLAR CELL FROM PLASMA DAMAGE

Sehyeon Kim*, Jaeun Kim, Sunhwa Lee, Youngkuk Kim, and Junsin Yi**

College of Information and Communication Engineering, Sungkyunkwan University, Suwon, Republic of Korea

P1-T1-13 OPTIMIZATION OF HAFNIUM OXIDE PASSIVATION LAYER USING ALD PROCESS

Jaeun Kim*, Sunhwa Lee, Youngkuk Kim, Eun-Chel Cho, and Junsin Yi**

College of Information and Communication Engineering, Sungkyunkwan University, Suwon, Republic of Korea

P1-T1-14 ADVANCED LOW-TEMPERATURE CURING SILVER PASTE FOR HIGH MOBILITY TRANS-PARENT CONDDUCTIVE OXIDE FILM IN SILICON HETEROJUNCTION SOLAR CELL

Tappei Nishihara[1]*, Kazuro Muramatsu[2], Kyotaro Nakamura[3], Yoshio Ohshita[3], and Astushi Ogura[1,4]

[1]Department of Electronics and Bioinformatics, Meiji University, Kawasaki, Japan
[2]NAMICS Corporation, Niigata, Japan
[3]Department of Physics, Toyota Technological Institute, Nagoya, Japan
[4]Meiji Renewable Energy Laboratory, Kawasaki, Japan

P1-T1-15 EVALUATION OF PROCESS DAMAGE INDUCED BY SPUTTERING DEPOSITION OF TRANSPARENT CONDUCTIVE OXIDE FILMS

Hiroki Kanai[1]*, Tappei Nishihara[1], and Atsushi Ogura[1,2]
[1]Meiji University, Higashimita, Tama-ku, Kawasaki-shi, Kanagawa, Japan
[2]Meiji Renewable Energy Laboratory, Higashimita, Tama-ku, Kawasaki-shi, Kanagawa, Japan

P1-T1-16 CHARACTERISTIC OF AZO/SIO2 PASSIVATION LAYER ON NANOTEXTURED SILICON SOLAR CELLS

Sel Gi Ryu[1,2]*, Hyung Yong Ji[1,3], Seungil Park[2], Dongsoo Kim[2], Jong Hyeon Peck[3], and Keunjoo Kim[1]**
[1]Department of Mechanical Engineering and Research Center of Industrial Technology, Chonbuk National University, Jeonju, Republic of Korea
[2]Research Institute, GAIA Energy Co., Ltd. Yongin, Republic of Korea
[3]Solar & Energy Conversion Technology Center, Korea Institute of Industrial Technology, Cheonan, Republic of Korea

P1-T1-17 HIGHLY EFFICIENT COLORED A-SI:H TRANSPARENT SOLAR CELLS UNDER INDOOR ILLUMINATION USING COLOR ADJUSTING LAYERS

Gayoung Kim[1,2]*, Chohyeon Park[1,2], and Jung Wook Lim[1,2]**
[1]Emerging Materials Research Section, Electronics and Telecommunications Research, Daejeon, Republic of Korea
[2]Department of Advanced Device Engineering, ETRI School, University of Science and Technology , Daejeon, Republic of Korea

P1-T1-18 DESIGN OF THE OPTIMAL MAGNETIC GRAPHITE HEATER FOR MINIMIZING THE DEFECT OF SINGLE CRYSTAL SILICON IN THE CZ PROCESS USING THE CRYSTAL GROWTH SIMULATION

Hye Jun Jeon[1]*, Ju Hong Park[2], Vladimir Artemyev[3], and Jae Hak Jung[1]**
[1]Department of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea
[2]Technical Team, Paultec, Seoul, Republic of Korea
[3]STR Group, Inc., St. Petersburg, Russia

P1-T1-19 LASER INDUCED FORWARD TRANSFER FOR LOW TEMPERATURE METALLIZATION IN PEROVSKITE/SILICON TANDEM SOLAR CELLS

Yeeun Woo[1,2]*, Youngseok Lee[1], Jong Keuk Park[1], Won Mok Kim[1], Jeung-hyun Jeong[1], Doh-Kwon Lee[1], Donghwan Kim[2], and Inho Kim[1]**
[1]Electronic Materials Research Center, Korea Institute of Science and Technology, Seoul, Republic of Korea
[2]Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea

P1-T1-20 ENHANCING PHOTOVOLTAIC PERFORMANCE OF GAAS/SI TANDEM SOLAR CELLS: EFFECTS OF WINDOW MATERIALS AND GAAS BASE LAYER

Sunhwa Lee[1]*, Duy Phong Pham[1], Sang Hyun Jung[3], Ho Kwan Kang[3], Youngkuk Kim[1], Eun-Chel Cho[1], Jinjoo Park[2]**, and Junsin Yi[1]**

[1]School of Information and Communication Engineering, Sungkyunkwan University, Suwon, Republic of Korea

[2]Major of energy and applied chemistry, Division of Energy & Optical Technology Convergence, Cheongju University, Cheongju, Republic of Korea

[3]Korea Advanced Nano Fab Center, Suwon, Republic of Korea

P1-T1-21 A STUDY ON OXIDE DISRUPTION UPON HIGH TEMPERATURE ANNEALING OF TUNNEL OXIDE PASSIVATED CONTACT

Sungjin Choi[1]*, Heejun Yang[1,2], Myeong Sang Jeong[1], Kwan Hong Min[1], Min Gu Kang[1], Sang Hee Lee[1], Sungeun Park[1]**, and Hee-eun Song[1]**

[1]Photovoltaics Research Department, Korea Institute of Energy Research, Daejeon, Republic of Korea

[2]Department of Materials Science & Engineering, Yonsei University, Seoul, Republic of Korea

P1-T1-22 ANALYSIS OF METAL-SILICON INTERFACE STRUCTURE IN CRYSTALLINE SILICON SOLAR CELLS

Myeong Sang Jeong*, Sungjin Choi, Kwan Hong Min, Mu-Joong Kim, Min Gu Kang, Sang Hee Lee, Kyung Taek Jeong, Sungeun Park**, and Hee-Eun Song**

Photovoltaics Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

P1-T1-23 RECOMBINATION CURRENT ANALYSIS AND PERFORMANCE PREDICTION METHOD OF C-SI PERC BY USING DOUBLE-DIODE CARRIER LIFETIME MODEL

Kwan Hong Min*, Hee-sun Song, Min Gu Kang, and Sungeun Park**

Photovoltaic Laboratory, Korea Institute of Energy Research , Daejeon, Republic of Korea

P1-T1-24 APPLICATION OF SHINGLED STRUCTURE FOR LARGE AREA OF PV-TEG HYBRID DEVICE AND CALCULATION OF POWER WITH ELECTRICAL PARAMETER CHANGES

Kyu Hyeon Im[1,2]*, Min Gu Kang[2], Kyung Taek Jeong[2], Ka Hyun Kim[1], Hee Eun Song[2]**, and Sungeun Park[2]**

[1]Department of Physics, Chungbuk National University, Republic of Korea

[2]Department of Photovoltaic Research, Korea Institute of Energy Research, Republic of Korea

P1-T1-25 EFFICIENCY IMPROVED BY NOVEL ACIDIC TEXTURING PROCESS FOR SAW-DAMAGE FREE KERFLESS MULTICRYSTALLINE SILICON SOLAR CELLS

Yujin Jung[1]*, Soohyun Bae[1], Yoonmook Kang[2], Hae-Seok Lee[2], and Donghwan Kim[1]**

[1]Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea

[2]KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea

P1-T1-26 PASSIVATED CONTACT OF BORON DOPED POLYSILICON USING SPIN-ON DOPANT

Jinsol Kim[1]*, Dongjin Choi[1], Hyunjung Park[1], Dongkyun Kang[1], Yoonmook Kang[2], Donghwan Kim[1], and Hae-Seok Lee[2]**

[1]Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea

[2]*KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

P1-T1-27 FABRICATION OF OPTICAL FILTERS IMPROVING SHORT WAVELENGTH LIGHT TRAPPING FOR PEROVSKITE/SILICON TANDEM SOLAR CELLS

JiRyang Kim[1]*, Chang Hyun Lee[2], Sang-Won Lee[2], Dongjin Choi[2], Yoonmook Kang[1], Donghwan Kim[2], and Hae-Seok Lee[1]**

[1]*KU-KIST Green School, Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

[2]*Department of Material science and Engineering, Korea University, Seoul, Republic of Korea*

P1-T1-28 ENHANCING HYDROGENATION FOR ANALYSIS OF LETID: EXPLAINING THE HYDROGEN BEHAVIOR ON THE N-TYPE EMITTER

MyeongSeob Sim[1]*, Dongjin Choi[1], Yujin Jung[1], HyunJung Park[1], Yoonmook Kang[2], Donghwan Kim[1], and Hae-Seok Lee[2]**

[1]*Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea*

[2]*KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

P1-T1-29 THE INFLUENCE OF ITO CAPPING ON THE MOLYBDENUM OXIDE STABILITY AS A HOLE-SELECTIVE CONTACTS

Hoyoung Song[1]*, Changhyun Lee[1], Soohyun Bae[2], Yoonmook Kang[3], Hae-Seok Lee[3], and Donghwan Kim[1]**

[1]*Department of Material Science and Engineering, Korea University, Seoul, Republic of Korea*

[2]*National Agenda Research Division, Korea Institute of Science and Technology, Seoul, Republic of Korea*

[3]*KU-KIST Green School, Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

P1-T1-30 ETCHING OF SILICON WAFERS FOR SOLUTION-PROCESSED PEROVSKITE TANDEM SOLAR CELLS

Ha Eun Lee[1]*, Ji Yeon Hyun[1], Hae-Seok Lee[2], Donghwan Kim[1], and Yoonmook Kang[2]**

[1]*Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea*

[2]*KU-KIST Green School Graduate School of Energy and Environment, Korea University, Seoul, Republic of Korea*

P1-T1-31 APPROACHING THE SCREEN-PRINTED CONTACTS FORMATION USING CU-AG CORE-SHELL PASTES IN PERC SOLAR CELLS

Dongjin Choi[1]*, Hyebin Han[1], HyunJung Park[1], Soohyun Bae[1], Yoonmook Kang[2], Donghwan Kim[1], and Hae-Seok Lee[2]**

[1]*Department of Materials Science and Engineering, Korea University, Seoul, Republic of Korea*

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P1-T1-32 COMPARISION BETWEEN VERTICAL TYPE AND CONVENTIONAL SILICON PV MODULE

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P1-T1-33 FILL FACTOR LOSS ANALYSIS DEPENDING ON THE TEMPERATURE FOR THE INDUSTRIAL SILICON SOLAR CELLS

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P1-T1-34 DEVICE SIMULATION OF SILICON HETEROJUNCTION SOLAR CELL WITH INGAN ELECTRON SELECTIVE CONTACT

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P1-T1-35 IMPROVEMENT OF THE SURFACE STRUCTURE FOR THE PASSIVATION OF NANO-STRUCTURED SILICON SOLAR CELL

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P1-T1-36 WIRE EMBEDDED EVA SHEET MODULE WITH CELL/MODULE INTEGRATED TECHNOLOGY

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P1-T1-37 FABRICATION OF OPTICAL FILTERS IMPROVING SHORT WAVELENGTH LIGHT TRAPPING FOR PEROVSKITE/SILICON TANDEM SOLAR CELLS

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P1-T1-38 IMPROVED POWER CONVERSION EFFICIENCY OF PEROVSKITE SOLAR CELLS BY CONTROLLING THE ASPECT RATIO ON MESOPOROUS TiO_2 LAYER

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P1-T1-39 PERFORMANCE CHARACTERISTICS OF BIFACIAL AND SEMITRANSPARENT SINGLE-JUNCTION SILICON THIN-FILM SOLAR CELLS

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P1-T1-40 OPTIMIZATION OF LASER DOPING AND DIFFUSION PROCESSES FOR HIGHLY EFFICIENT SE-PERC SOLAR CELLS

Jae Won Seo*, Kyu Ho Han, Seong Hun Woo, Seong Gil Choi, Tae Jun Kim**, and Hyungnae Lee

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P1-T1-41 FAILURE MODES ON MASS PRODUCING BIFACIAL P-TYPE PERC SOLAR CELL

Soonil Kwon*, Danbi Kim, Seonghoon Woo, Taejun Kim**, and Hyungnae Lee

Hyundai Energy Solution PV R&D Center, Eumseong, Chungbuk, Republic of Korea

P1-T1-42 THE PASSIVATION CHARACTERISTICS OF P-DOPED POLY-SI/THIN SILICON OXIDE/SI SUBSTRATE WITH VARIOUS OXIDATION METHOD UPON THE THERMAL ANNEALING

Sungjin Choi[1]*, Heejun Yang[1,2], Myeong Sang Jeong[1], Kwan Hong Min[1], Min Gu Kang[1], Sang Hee Lee[1], Sungeun Park[1], and Hee-eun Song[1]**

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P1-T1-43 CALCULATION OF SELECTIVITY IN CHANGE OF THICKNESS OF POLYSILICON LAYER AND ANNEALING TEMPERATURE IN TUNNEL OXIDE PASSIVATED CONTACT SILICON SOLAR CELLS

Hee Jun Yang[1,2]*, Sung Jin Choi[1], Hee-eun Song[1], MinGu Kang[1], Kyung Taek Jeong[1], Gi Hwan Kang[1], Jae Min Myoung[2], and Sungeun Park[1]**

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P1-T1-44 GRAPHENE OXIDE FILMS FOR HIGHER OPEN CIRCUIT VOLTAGE SILICON SOLAR CELLS

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P1-T1-45 IMPROVED EFFICIENCY OF DSSCS BASED ON AU NANOPARTICLE EMBEDDED TIO_2 NANOTUBE ARRAYS AND SCATTERING LAYER

Seung-Hee Han[1]*, Ana Chuquer[1], O-Bong Yang[2], and Won-Yeop Rho[1]**

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P1-T1-46 LARGE AREA SINGLE CRYSTAL SI (100) ORIENTED MOS_2 THIN FILMS FOR SILICON SOLAR CELL

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P1-T1-47 DEPENDENCE OF THE OPTIMIZATION OF THE FRONT GRID DESIGN IN PERC SOLAR CELLS

Myeong Sang Jeong*, Sungjin Choi, Kwan Hong Min, Mu-Joong Kim, Min Gu Kang, Sang Hee Lee, Kyung Taek Jeong, Sungeun Park**, and Hee-Eun Song**
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P1-T1-49 CAT-CVD TUNNELING NITRIDE PASSIVATED CONTACT FOR CRYSTALLINE SILICON SOLAR CELLS

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P1-T1-50 EFFECT OF LIGHT IRRADIATION ON THE PID OF N-TYPE FRONT-EMITTER CRYSTALLINE SI PHOTOVOLTAIC MODULES WITH SIN_X WITH DIFFERENT REFRACTIVE INDEXES

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P1-T1-51 PERFORMANCE CHARACTERISTICS OF THE HOLE-SELECTIVE CONTACT SILICON HETERO-JUNCTION SOLAR CELLS WITH IMPROVED INTERFACE PASSIVATION

Ahreum Lee*, Min Jeong Shin, Sejin Ahn, Jinsu Yoo, Joo Hyung Park, Jae Ho Yun, Seongkyu Ahn, Sangmin Lee, and Jun-Sik Cho**
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Nov-9 (Mon), 09:00-10:30 Lobby (3F)

Poster Presentation-01
T2-Chalcogenide thin film PV

Chair(s) Jaeyeong Heo (Chonnam National University, Republic of Korea)

P1-T2-1 FABRICATION OF MONOCLINIC-CU_2SNS_3 THIN-FILM SOLAR CELL AND ITS PHOTOVOLTAIC DEVICE PERFORMANCE

Mohan Reddy Pallavolu[1]*, Ramesh Reddy Nallapureddy[1], Vasudeva Reddy Minnam Reddy[2], Sang Woo Joo[1]**, and Chinho Park[2]
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P1-T2-2 PHOTOLUMINESCENCE PROPERTIES OF Cu_2SnS_3 THIN-FILM SOLAR CELLS DEPENDENT ON CU/SN RATIO

Ayaka Kanai[1,3]*, and Mutsumi Sugiyama[1,2]**

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P1-T2-3 CIGS/MONA/MO THIN FILM FORMATION FROM ELECTROPLATING PROCESS

Eunchong Kim*, Sun Ok Kim, and Hak Jun Chung**

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P1-T2-4 DEVELOPMENT OF TRANSPARENT CONDUCTIVE OXIDE FOR SOLAR CELLS USING RF SPUTTERING

Sun Ok Kim*, Eunchong Kim, and Hak Jun Chung**

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P1-T2-5 BAND BENDING AND SURFACE PHOTOVOLTAGE OF EPITAXIAL CU(IN,GA)SE_2-BASED STRUCTURE

Kazuhiro Hirayama[1]*, Shimon Ajisaka[1], Yusei Takagi[1], Jiro Nishinaga[2], Takehiko Nagai[2], Hitoshi Tampo[2], Shogo Ishizuka[2], and Norio Terada[1]**

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P1-T2-6 INFLUENCE OF MO:NA LAYER ON THE PERFORMANCE OF FLEXIBLE CIGS SOLAR CELLS.

Sung-Tae Kim[1]*, Vishwa Bhatt[2], Ye-Chan Kim[1], Ji-seon Yoo[1], Min-ho Choi[1], Ju-Hyung Yun[2], and Jae-Hyung Jang[1]**

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P1-T2-7 PREPARATION OF CADMIUM FREE SOLAR CELLS USING ENVIRONMENTAL FRIENDLY MATERIALS

G. Phaneendra Reddy*, and K.T. Ramakrishna Reddy**

Solar Energy Laboratory, Department of Physics, Sri Venkateswara University, Tirupati, India

P1-T2-8 HIGH ELECTRON EXTRACTION OF CARBON QUANTUM DOTS INTEGRATED WITH $CUSB(S/SE)_2$ IN INTERLAYER SOLAR CELL

Hasna Azizah Zahra[1]*, Indah Ika Nurcahyani[2], Dimas Nauffal Rayhan[1], and Wisik Adelina[3]**

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[3]*Chemical Engineering, Universitas Islam Indonesia, Yogyakarta, Indonesia*

P1-T2-9 EFFECT OF $MOSE_2$ ON THE CONTACT RESISTANCE OF ZNO/MO JUNCTION FORMED ON CU(IN,GA)SE_2 SOLAR MODULES

Sung Wook Cho*, A Hyun Kim, Gyeong A, and Chan-Wook Jeon**

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P1-T2-10 THE MICROSTRUCTURE OF THE CU(IN,GA)SE_2 ABSORBER LAYER PRODUCED BY CHEMICAL VAPOR DEPOSITION AND THE SOLAR CELL PERFORMANCE CHANGE

GyeongA Lee*, SungWook Cho, Ahyun Kim, and Chan-Wook Jeon**

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P1-T2-11 EFFECTS OF PRE/ POST-TREATMENT ON THE PERFORMANCE OF CU(IN,GA)$(S,SE)_2$, CU(IN,GA)SE_2 ABSORBER LAYER MANUFACTURED IN A TWO-STEP PROCESS

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P1-T2-12 DEEP DEFECT PASSIVATION IN CZTSE THIN FILM SOLAR CELLS BY SODIUM DOPING

Muhammad Rehan[1,2]*, Ara Cho[1,2], Kihwan Kim[1], Jae Ho Yun[1,2], Sun-Sik Cho[1], Joo Hyung Park[1], Awet Mana Amare[1,2], Jihye Gwak[1,2]**, and Donghyeop Shin[1]**

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P1-T2-13 ELECTRICAL PROPERTY OF LEAD SELENIDE PHOTO-CONDUCTIVE THIN FILM FOR QUANTUM DOT SOLAR CELL

Jae-Kyung Kim*, Da-In Jo, and Gye-Choon Park**

Department of Electical Engineering, Mokpo National University, Muan, Republic of Korea

P1-T2-14 STUDY ON OPTICAL PROPERTIES OF SILVER NANOWIRES USING FDTD SIMULATION

Tae Jun Park*, Ju Hwan Kim, Jung-Sub Wi, and Choong-Heui Chung**

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P1-T2-15 PREPARATION AND CHARACTERIZATION OF METAL MESH-METAL NANOWIRE TRANSPARENT CONDUCTING ELECTRODES

Kyung Soo Cho[1]*, Seoin Kang[2], Yong-Jun Oh[2], Deok-Yong Park[2], and Choong-Heui Chung[1,2]**

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P1-T2-16 OPTOELECTRONIC PROPERTIES OF METAL MESH TRANSPARENT ELECTRODES USING SELF-CRACKING TEMPLATES

Seoin Kang[1]*, Kyung Soo Cho[2], Yong-Jun Oh[1], and Choong-Heui Chung[1,2]**

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P1-T2-17 EFFECT OF ANTIMONY METAL PRECURSOR THICKNESS ON THE PROPERTIES OF ANTIMONY SELENIDE THIN FILMS FOR SOLAR CELLS

Chelim Jang*, Sreedevi Gedi, Vasudeva Reddy Minnam Reddy, Salh Alhammadi, Hyeonwook Park, Yeongju Seo, Bogyeong Mun, and Woo Kyoung Kim**
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P1-T2-18 THE EFFECTS OF PREHEATING TEMPERATURE ON CUINGASE$_2$/CDS INTERFACE AND THE DEVICE PERFORMANCES

Chen Wang*, Daming Zhuang**, Ming Zhao, Xunyan Lyu, Guoan Ren, and Yuxian Li
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P1-T2-19 SPUTTERING OF LOW TEMPERATURE GROWN SILVER DOPED THIN SULFIDE THIN FILMS FOR SOLAR CELL APPLICATION

Vinaya Kumar Arepalli*, Yeong Jae Lee, and Jeha Kim**
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P1-T2-20 LASER-TREATED WSE_2 P-N HOMOJUNCTIONS AND ITS OPTOELECTRONIC APPLICATIONS

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P1-T2-21 EFFICIENT LIGHT MANAGEMENT FOR SEMITRANSPARENT AND BIFACIAL ULTRATHIN CU(IN,GA)SE_2 SOLAR CELLS USING TEXTURED PDMS LIGHT-SCATTERING LAYERS

Min Jeong Shin*, Se Jun Park, Ahreum Lee, Ara Cho, Jihye Gwak, Jae Ho Yun, Kihwan Kim, Seung Kyu Ahn, Jinsu Yoo, Joo Hyung Park, Donghyeop Shin, Inyoung Jeong, Sang Min Lee, and Jun-Sik Cho**
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P1-T2-22 CHANGE OF DEVICE CHARACTERISTICS OF THIN FILM SOLAR CELLS DUE TO MECHANICAL BENDING

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P1-T2-23 NACL TREATMENT TO ENHANCE THE PHOTOVOLTAIC DEVICE PERFORMANCE OF THE $CU_2ZNSN(S,SE)_4$ SOLAR CELLS

Jeongeun Song*, Sunkyung Hwang, Jaehyun Park, and Jinyoung Kim**
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P1-T2-24 A STUDY OF POTENTIAL INDUCED DEGRADATION (PID) CHARACTERISTICS IN CIGS SOLAR CELLS

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P1-T2-25 CHARACTERISTICS OF FAZO WITH SIMULTANEOUS CONTROL OF F AND AL CONTENT

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P1-T2-26 IMPACT OF GERMANIUM DOPING ON PERFORMANCE OF KESTERITE CZTSSE THIN FILM SOLAR CELLS

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P1-T2-27 EFFECT OF SUBSTRATE TEMPERATURE ON THE PROPERTIES OF MG AND AL CO-DOPED ZNO THIN FILMS

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P1-T2-28 SEMITRANSPARENT CIGS THIN-FILM SOLAR CELLS USING INDIUM TIN OXIDE BACK ELECTRODES

Se Jun Park[1,2]*, Min Jeong Shin[1], Areum Lee[1], Ara Cho[1], Jihye Gwak[1], Jae Ho Yun[1], Kihwan Kim[1], Seung Kyu Ahn[1], Jin Soo Yoo[1], Joo Hyung Park[1], Dong Hyeop Shin[1], Inyoung Jung[1], Bo-Hun Choi[2]**, and Jun-Sik Cho[1]**
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P1-T2-29 ATOMIC LAYER DEPOSITED ZN(O,S) AS BUFFER LAYER FOR CD-FREE KESTERITE THIN-FILM SOLAR CELLS

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P1-T2-30 STRUCTURAL AND MORPHOLOGICAL STUDY OF SPIN-COATED TIN SULFIDE THIN FILMS FOR SOLAR CELL APPLICATIONS

Pravin S. Pawar*, Krishnarao Eswar Neerugatti, Jae Yu Cho, and Jaeyeong Heo**
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P1-T2-31 THE IMPROVEMENT OF HETEROJUNCTION INTERFACE QUALITY OF SNS/CDS THIN-FILM SOLAR CELLS

Jae Yu Cho*, and Jaeyeong Heo**
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P1-T2-32 CONTROLLING OPEN CIRCUIT VOLTAGE (VOC) DEFICIT CHARACTERISTIC IN CZTSSE BASED THIN FILM SOLAR CELL

Vijay Karade*, and Jin Hyeok Kim**
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P1-T2-33 OPTICAL PROPERTIES AND BAND STRUCTURE EVALUATION OF CUBIC SNS FOR THIN-FILM SOLAR CELL APPLICATION

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P1-T2-34 THE EFFECTS OF ZN(O,S) BUFFER LAYER THICKNESS ON ALL-DRY CD-FREE CUINGASE$_2$ DEVICE PERFORMANCES

Li Yuxian*, Lyu Xunyan, Ren Guoan, Wang Chen, Zhao Ming, and Zhuang Daming**
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P1-T2-35 INVESTIGATING THE EFFECTS OF MOSE$_2$ INTERFACE LAYER AND GRADED BANDGAP ABSORBER IN CIGS THIN FILM SOLAR CELL BY NUMERICAL ANALYSIS

Fazliyana 'Izzati Za'Abar[1]*, Yulisa Yusoff[2], Siti Fazlili Abdullah[3], Nowshad Amin[2], and Ahmad Wafi Mahmood Zuhdi[2]
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[2]Institute of Sustainable Energy, Universiti Tenaga Nasional, Kajang, Selangor, Malaysia
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P1-T2-36 ENVIRONMENTALLY FRIENDLY ZNMGO BUFFER FOR CU(IN$_{1-x}$,GA$_x$)SE$_2$ SOLAR CELL STRUCTURE

Yong Hee Jo[1,2]*, Dong Ryeol Kim[1], Sang Su Shin[1], Ara Cho[1], Inyoung Jeong[1], Donghyeop Shin[1], Young Joo Eo[1], Soomin Song[1], Jun-Sik Cho[1], Jae Ho Yun[1], Tae Wan Kim[2], and Joo Hyung Park[1]**
[1]Photovoltaics Research Department, Korea Institute of Energy Research, Daejeon, Republic of Korea
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P1-T2-37 THICKNESS EFFECT OF ALD-GROWN ZN-BASED BUFFER LAYER ON SEMI-TRANSPARENT ULTRA-THIN CIGS SOLAR CELL

Dongryeol Kim[1,2]*, Sang Su Shin[1], Yonghee Jo[1,3], Kihwan Kim[1], Seung Kyu Ahn[1], Jinsu Yoo[1], Ahreum Lee[1], Sejin Ahn[1], Jun-Sik Cho[1], Jihye Gwak[1], Ho Seong Lee[2], and Joo Hyung Park[1]**
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P1-T2-38 ULTRAFAST PHOTOEXCITED-CARRIER BEHAVIOR INDUCED BY H^+ AND AR^+ ION IRRADIATION OF CIGS THIN FILMS IN THE TERAHERTZ REGION

Woo-Jung Lee[1]*, Dae-Hyung Cho[1], Gyuseok Lee[2], Chul Kang[2], No Soung Myoung[2], Chul-Sik Kee[2], and Yong-Duck Chung[1,3]**
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P1-T2-39 IMPROVED INTERFACIAL PROPERTIES OF CHALCOGENIDE THIN FILM SOLAR CELLS BY A POST-HEAT TREATMENT

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P1-T2-40 EFFECT OF INVERTED ANNEALING ON CZTSSE ABSOBER FILMS AND ITS SOLAR CELL PERFORMANCE

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P1-T2-41 THE SNS_2 FILM SYNTHESIS AND DEPOSITION FOR CD-FREE BUFFER LAYER IN CU(IN,GA) SE_2 THIN FILM SOLAR CELLS

Bo Gyeong Mun*, Salh Alhammadi, Sreedevi Gedi, Chelim Jang, and Woo Kyoung Kim**
School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea

Nov-9 (Mon), 09:00-10:30 Lobby (3F)

Poster Presentation-01
T4-Organic and dye-sensitized solar cells

Chair(s) Tae-Hyuk Kwon (Ulsan National Institute of Science and Technology, Republic of Korea)

P1-T4-1 THE COMPARISON OF ANTHOCYANIN EXTRACT FROM *CORNUS MAS* L. AND *ANTIDESMA BUNIUS* L. AND THEIR PERFORMANCE AS BIOFOTOSENSITIZER OF DYE-SENSITIZED SOLAR CELL

Indah Ika Nurcahyani*, Wisik Adelina, Hasna Azizah Zahra**, and Dimas Nauffal Rayhan
Universitas Islam Indonesia, Yogyakarta, Indonesia

P1-T4-2 ENHANCEMENT OF VACUUM FREE HYBRID SOLAR CELLS BY INCORPORATION OF PLASMONIC PARTICLES AND ZINC OXIDE BUFFER LAYER

Nguyen Tam Nguyen Truong[1]*, Sung Min Cho[2], Nam Le[1], and Chinho Park[1]**
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P1-T4-3 EFFECT OF VARIOUS TYPE OF ZINC OXIDE AS AN INTERFACIAL LAYER IN POLYMER SOLAR CELLS

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P1-T4-4 NAPC-TCNQ COMPLEX BASE FLEXIBLE SOLAR CELLS STUDY

Leon Hamui Balas*
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P1-T4-5 OPTIMIZATION MORPHOLOGICAL PROPERTIES FOR HIGH-PERFORMANCE TERNARY ORGANIC SOLAR CELLS PROCESSED WITH NON-HALOGENATED SOLVENT

Gyeonghwa Yu*, Hyeonwoo Jung, and Youngu Lee**
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P1-T4-6 HIGHLY EFFICIENT SEMITRANSPARENT ORGANIC SOLAR CELL BASED ON OXIDE-METAL-OXIDE ELECTRODES

Inkook Hwang*, Minju Kyeong, and Youngu Lee**
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P1-T4-7 REGIOREGULAR COPOLYMERS BASED ON FLUORINE ORIENTATION-CONTROLLED BENZOTHIADIAZOLE FOR HIGH-PERFORMANCE ORGANIC PHOTOVOLTAICS

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P1-T4-8 INFLUENCE OF II-EXTENDED II-BRIDGE AND ACCEPTOR IN D-II-A STRUCTURED ORGANIC DYES FOR HIGHLY EFFICIENT DYE-SENSITIZED SOLAR CELLS

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P1-T4-9 PORPHYRIN SENSITIZERS WITH ACCEPTOR STRUCTURAL ENGINEERING FOR DYE-SENSITIZED SOLAR CELLS

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P1-T4-10 DESIGN STRATEGY OF WEAK ELECTRONIC COUPLING TOWARD IDEAL ARTIFICIAL PHOTOSYSTEM

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P1-T4-11 PAN-BASED TRIBLOCK COPOLYMERS TAILOR-MADE BY RAFT POLYMERIZATION FOR HIGH PERFORMANCE QUASI-SOLID STATE DYE-SENSITIZED SOLAR CELLS

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P1-T4-12 HIGH-PERFORMANCE REGIOREGULAR TERPOLYMERS CONSISTING OF FLUORINE ATOMS ON BITHIOPHENE UNIT PROCESSED WITH NON-HALOGENATED SOLVENT

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P1-T4-13 2D/1A TERPOLYMERS BASED ON BENZODITHIOPHENE AND DITHIENOSILOLE UNITS OR HIGH-EFFICIENCY ORGANIC SOLAR CELLS

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P1-T4-14 REGIOREGULAR D_1-A-D_2-A TERPOLYMER WITH CONTROLLED THIENO[3,4-B]THIOPHENE ARRANGEMENT AND NON-HALOGENATED PROCESSING SOLVENTS FOR HIGH-PERFORMANCE ORGANIC SOLAR CELLS

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P1-T4-15 MOLECULAR ENGINEERING AND SYNTHESIS OF D-π-A-STRUCTURED ORGANIC SENSITIZERS FOR HIGH-PERFORMANCE DYE-SENSITIZED SOLAR CELLS

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P1-T4-16 DEVELOPMENT OF SEMITRANSPARENCY DYE-SENSITIZED SOLAR CELLS MODULE

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P1-T4-17 A HIGHLY STABLE ORGANIC PHOTOVOLTAICS USING NAFION MODIFIED SOLUTION-PROCESSED MOLYBDENUM OXIDE

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P1-T4-18 POLYMER GEL ELECTROLYTES BASED ON PEG-FUNCTIONALIZED ABA TRIBLOCK COPOLYMERS FOR QUASI-SOLID-STATE DYE-SENSITIZED SOLAR CELLS: MOLECULAR ENGINEERING AND KEY FACTORS

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P1-T4-19 EFFICIENT HYBRID COLLOIDAL QUANTUM DOT/ORGANIC SOLAR CELLS MEDIATED BY NEAR-INFRARED SENSITIZING SMALL MOLECULES

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P1-T4-20 AQUEOUS PROCESSABLE NAPHTHALENE DIIMIDE-BASED POLYMERS FOR HIGH PERFORMANCE ORGANIC ELECTROLYTE-GATED TRANSISTORS

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P1-T4-21 A COMPARATIVE STUDY OF THE ROLES OF POLYMER DONOR AGGREGATION IN TWO DIFFERENT NON-FULLERENE ORGANIC SOLAR CELL SYSTEMS

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P1-T4-22 NOVEL NON-COVALENTLY FUSED RING ACCEPTORS FOR HIGH PERFORMANCE ORGANIC SOLAR CELL WITH DIFFERENT END CAPPING EFFECTS

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P1-T4-23 PERFORMANCE IMPROVEMENT OF ALL-POLYMER SOLAR CELLS USING NON-HALOGENATED SOLVENTS AND ADDITIVES

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P1-T4-24 ENHANCED PHOTOSTABILITY OF ORGANIC PHOTOVOLTAICS USING TITANIUM SUBOXIDE

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P1-T4-25 VIBRATIONAL AND COMPUTATIONAL STUDY OF CHARGE TRANSFER OF DONOR-II-ACCEPTOR ORGANIC PHOTOSENSITIZER

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P1-T4-26 PREVENTING DEGRADATION AND DESORPTION OF PHOTOSENSITIZER IN WATER CONDITION FOR VARIOUS APPLICATIONS TO AQUEOUS SYSTEM

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P1-T4-27 A STUDY ON THE EFFECT OF ELECTROLYTE COMPOSITION ON DYE-SENSITIZED PHOTO-RECHARGEABLE BATTERY

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P1-T4-28 SELF-ASSEMBLED SEMITRANSPARENT LIGHT TRAPPING COLOR FILTERS IN ORGANIC PHOTOVOLTAIC CELLS

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P1-T4-29 SIGMA-HOLE EFFECT FOR HIGH REGENERATION EFFICIENCY IN DYE-SENSITIZED SOLAR CELL

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P1-T4-30 NARROWBAND ORGANIC PHOTODIODES WITH NONINVASIVE OPTICAL FILTER ELECTRODE AND SPECTRAL RESPONSE UP TO NEAR-INFRARED

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P1-T4-31 ENHANCEMENT OF BOTH MECHANICAL ROBUSTNESS AND PHOTOVOLTAIC PERFORMANCES WITH POLYMER ACCEPTOR ADDITIVE

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P1-T4-32 BIFACIAL DYE-SENSITIZED SOLAR CELL EXCEEDING EFFICIENCY OVER 10% WITH RU-DOPED NANOCARBON COUNTER ELECTRODE

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P1-T4-33 OPTOELELCTRONIC PROPERTIES OF NAPHTHALENE DIIMIDE SEMICONDUCTING CORES

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P1-T4-34 MINIMIZING OPTICAL LOSSES IN COLORFUL SEMITRANSPARENT ORGANIC SOLAR CELLS BY USING FABRY-PEROT ETALON ELECTRODE

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P1-T4-35 EFFECTIVE D-II-A TYPE ORGANIC MOLECULE BASED ON DIMETHOXY VINYLBENZENE AS DONOR AND INDANEDIONE AS ACCEPTOR UNIT: PHOTO-PHYSICAL AND PHOTOVOLTAIC CHARACTERIZATIONS

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P1-T4-36 NANOSTRUCTURED LUMINESCENT DOWNSHIFTING MEDIUM FOR ENHANCED PHOTOCURRENT OF POLYMER SOLAR CELLS

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P1-T4-37 HIGHLY EFFICIENT SEQUENTIALLY PREPARED MULTI-COMPONENT BULK HETERO-JUNCTION ORGANIC SOLAR CELLS

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P1-T4-38 ALCOHOL-PROCESSABLE NAPHTHALENE DIIMIDE-BASED POLYMERS AND THEIR APPLICATIONS IN ALL-POLYMER SOLAR CELLS

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P1-T4-39 OLIGO ETHYLENE GLYCOL SIDE CHAIN ATTACHED PERYLENE DIIMIDE BASED POLYMER AND THEIR APPLICATIONS IN PEROVSKITE SOLAR CELLS

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P1-T4-40 GRAPHENE USING DRY TRANSFER FOR ORGANIC PHOTOVOLTAICS

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P1-T4-41 HIGH PERFORMANCE SEMI-TRANSPARENT ORGANIC SOLAR CELLS

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P1-T4-42 POLYMER SOLAR CELLS WITH CONJUGATED POLYMER AS A CATHODE BUFFER LAYER

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P1-T4-43 Y5 BASED POLYMERS AND THEIR APPLICATION IN STABLE ALL-POLYMER SOLAR CELLS

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P1-T4-44 IMMISCIBLE TERNARY BLEND ORGANIC SOLAR CELLS

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P1-T4-46 CF3 GROUP CONTAINING RANDOM COPOLYMERS FOR NON-HALOGENATED SOLVENT-PROCESSED ORGANIC PHOTOVOLTAIC MODULES

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P1-T4-47 STABILIZING CUBIC-PHASE OF $CSPBI_3$ PEROVSKITE QUANTUM DOTS IN PHOTOVOLTAICS VIA ENGINEERING OF ELECTRON TRANSPORTING LAYER

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P1-T4-49 EFFECT OF CO-SENSITIZATION OF RUTHENIUM BASED DYES FOR INDOOR DYE- SENSITIZED SOLAR CELLS

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P1-T4-50 ELIMINATION OF RESONANT CLOUDS HAVING DIRECT EFFECTS ON ANCHOR SITES AT SENSITIZER-TIO_2 INTERFACES FOR ENHANCED CHARGE COLLECTION IN TYPE-II DSSCS

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P1-T4-51 STRATEGIES TO IMPROVE THE POWER CONVERSION EFFICIENCY OF ORGANIC SOLAR CELLS UNDER INDOOR LIGHT SOURCES

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P1-T4-52 HIGH-EFFICIENCY ORGANIC SOLAR CELLS EMPLOYING REGIOREGULAR TERPOLYMERS BASED ON TWO-DIMENSIONAL BENZODITHIOPHENE SEGMENT

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P1-T4-53 HIGHLY TRANSPARENT STRETCHABLE SILVER NW / PEDOT:PSS HYBRID ELECTRODE FOR FLEXIBLE DEVICES

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P1-T4-54 NON-FULLERENE POLYMER SOLAR CELLS BASED ON QUINOXALINE UNITS

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P1-T4-55 DEVELOPMENT OF THE HIGHLY TRANSPARENT AND LOW RESISTIVE FLEXIBLE AG NETWORK BASED ITO/PEDOT:PSS COMPOSITE ELECTRODES

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P1-T4-56 EFFECTS OF ELECTRON-DONATING AND ELECTRON-ACCEPTING SUBSTITUTION ON PHOTOVOLTAIC PERFORMANCE IN BENZOTHIADIAZOLE-BASED A-D-A′-D-A TYPE SMALL-MOLECULE ACCEPTOR SOLAR CELLS

Namsun Yoon*, Jiyoung Jung, Chang Eun Song, Hang Ken Lee, WonSuk Shin, Jong-Cheol Lee, Sang-Jin Moon, and Sang Kyu Lee**
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P1-T4-57 INTERFACE ENGINEERING FOR FABRICATING SEMITRANSPARENT AND FLEXIBLE WINDOW-FILM-TYPE ORGANIC SOLAR CELLS

Jaeyoung Kim[1]*, Seok Kim[1], Hongkyu Kang[2]**, and Kwanghee Lee[2]**
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P1-T4-58 EFFECT OF PARTICLE SIZE AND THICKNESS OF NANOCRYSTALLINE TIO2 FILMS ON THE PERFORMANCE OF DYE-SENSITIZED SOLAR CELLS UNDER INDOOR CONDITION

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Nov-9 (Mon), 09:00-10:30 Lobby (3F)

Poster Presentation-01
T8-Systems including BOS components and integrations

Chair(s) Nochang Park (Korea Electronics Technology Institute, Republic of Korea)

P1-T8-1 ANALYSIS OF SOLAR ENERGY FOR TELECOM BASE STATIONS

Songkiate Kittisontirak[1]*, Perawut Chinworarungsee[1], Sasiwimon Songtri[1], Phassapon Manosukritkul[2], Wangpai Lewtaveesap[3], Dheerasak Anantakul[3]**, and Kobsak Sriprapa[1]
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P1-T8-2 RELIABILITY INVESTIGATION ON ELECTRICALLY CONDUCTIVE ADHESIVES FOR SHINGLED PHOTOVOLTAIC CELL APPLICATIONS

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P1-T8-3 EVALUATION OF PV INTRODUCTION IMPACT ON BASE TRANSCEIVER STATIONS USED FOR DR

Daisuke Ohsaki[1]*, Shinji Wakao[1]**, Masayasu Sumiya[2], Yuji Hosokawa[2], and Kazuhiko Takeno[2]
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P1-T8-4 STUDY ON THE OUTPUT POWER OF SHINGLED MINI MODULE DEPENDING ON REFLECTANCE OF BACKSHEETS

Seong Hyeon Cho*, Ji Yeon Moon, Hyoung Jin Son, Da Yeong Jun, and Sung Hyun Kim**
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P1-T8-5 ELECTRICAL SIMULATION OF PV ARRAYS BY PARTIAL SHIADNG AND FAILURE OF BYPASS DIODES

Woo Gyun Shin*, Jong Rok Lim, Gi Hwan Kang, Young Chul Ju, Hye Mi Hwang, and Suk Hwan Ko**
Photovoltaic Research Department, Korea Institute of Energy Research, Daejeon, Republic of Korea

P1-T8-6 A STUDY ON GROWTH OF INTERMETALLIC COMPOUNDS LAYER OF PHOTOVOLTAIC MODULE INTERCONNECTED BY MULTI-WIRES UNDER DAMP-HEAT CONDITIONS

Ji Yeon Moon*, Seong Hyeon Cho, Hyoung Jin Son, Da Yeong Jun, and Sung Hyun Kim**

New & Renewable Energy Research Center, Korea Electronic Technology Institute, Seongnam, Republic of Korea

P1-T8-7 ANALYSIS OF DAMP HEAT TEST RESULT OF PV MODULE WITH ECTFE FILM

Jong Rok Lim*, Woo Gyun Shin, Chung Geun Lee, Suk Whan Ko, Young Chul Ju, Gi Hwan Kang, and Hyemi Hwang**

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P1-T8-8 A STUDY ON CORRELATION PEEL STRENGTH AND THE OUTPUT POWER OF SHINGLED MODULES ACCORDING TO CURING CONDITION OF ELECTRICALLY CONDUCTIVE ADHESIVES

Dayeong Jun*, Hyoungjin Son, Jiyeon Moon, Seonghyeon Cho, and Sung Hyun Kim**

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P1-T8-9 A STUDY ON THE DH CHARACTERISTICS OF ECTFE PV MODULE USING REAR FRP

Chung Geun Lee[1,2]*, Jong Rok Lim[2], Woo Gyun Shin[2], Young Chul Ju[2], Suk Whan Ko[2], Gi Hwan Kang[2], Hyo Sik Chang[1]**, and Hye Mi Hwang[2]**

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P1-T8-10 LOSS ANAYLYSIS OF PV SYSTEM USING SOILING MEASURING DEVICE

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P1-T8-11 ANALYSIS OF THE THERMAL CYCLE CHARACTERISTICS OF ETFE PV MODULE USING REAR FRP

Chung Geun Lee[1,2]*, Jong Rok Lim[2], Woo Gyun Shin[2], Young Chul Ju[2], Suk Hwan Ko[2], Gi Hwan Kang[2], Hyo Sik Chang[1]**, and Hye Mi Hwang[2]**

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P1-T8-12 ANALYSIS OF OUTPUT CHARACTERISTICS OF BIPV BIFACIAL PV MODULE ACCORDING TO THE REAR BLIND CONDITION

Seung Yeop Nam[1,2]*, Chung Geun Lee[2], Jong Rok Lim[2], Woo Gyun Shin[2], Young Chul Ju[2], Hye Mi Hwang[2], Suk Whan Ko[2], Min-Gu Kang[2], Hyo Sik Chang[1]**, and Gi-Hwan Kang[2]**

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P1-T8-13 LIGHT TRASMITTANCE CHARACTERISTIC ANALYSIS OF ETFE FLIM PV MODULE APPLYING FRONT MESH MATERIAL

Yong Kyu Lee[1,2]*, Chung Geun Lee[2], Jong Rok Lim[2], Woo Gyun Shin[2], Young Chul Ju[2], Suk Whan Ko[2], Gi Hwan Kang[2], Hyo Sik Chang[1]**, and Hye Mi Hwang[2]**

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P1-T8-14 A DESIGN AND BUILDING PLAN OF RENEWABLE MANAGEMENT SYSTEM FOR PHOTOVOLTIC POWER PLANTS

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P1-T8-15 OPTICAL CHARACTERISTICS OF C-SI PHOTOVOLTAIC MODULE BY VARIATION OF CONDUCTIVE PASTE AMOUNT

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P1-T8-16 PREDICTION OF END-OF-LIFE PHOTOVOLTAIC MODULES WITH NET ZERO EMISSION TARGET IN AUSTRALIA BY 2050

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P1-T8-17 EXPERIMENTAL STUDY ON THE PERFORMANCE EVALUATION OF BUILDING INTEGRATED PHOTOVOLTAIC(BIPV) GENERATED CURTAIN-WALL FOR RELIABILITY VERIFICATION

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P1-T8-18 DEVELOPMENT OF SALTWATER CIRCULATION TYPE PV GENERATION SYSTEM

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P1-T8-19 OPTIMAL LAYOUT DESIGN OF ROOFTOP FIXED PHOTOVOLTAIC SYSTEM OF NON-SOUTHERN BUILDINGS

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P1-T8-20 AN OVERVIEW OF SOLAR RADIATION MAPPING, SITE EVALUATION, AND POTENTIAL ASSESSMENT USING GIS

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P1-T8-21 DESIGN OF TRANSPARENT SUNSHADE MODULE USING RAY-TRACING SIMULATION

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P1-T8-22 ANALYSIS OF THE FAILURE DIAGNOSIS AND HIGH EFFICIENCY METHODS OF SOLAR POWER PLANT FOR SCHOOL BUILDINGS

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P1-T8-23 OVERCOMING THE CHALLENGES OF LARGE-AREA HIGH-EFFICIENCY PEROVSKITE SOLAR CELLS

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P1-T8-24 LOW TEMPERATURE ENCAPSULATION PROCESS FOR WATER STABLE PEROVSKITE SOLAR CELL

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P1-T8-25 TENSION WIRED STRUCTURE AND LIGHT WEIGHT MODULE FOR WEIGHT REDUCING THE ROOF PHOTOVOLTAIC SYSTEM

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P1-T8-26 ASSESSMENT OF PV POTENTIAL IN UNUSED AREAS OF OPEN-PIT LIMESTONE MINE

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P1-T8-27 THE USE OF AERIAL IMAGES FOR THE FAST SIMULATION OF PV POTENTIAL IN RESIDENTIAL AREA IN YEONGJONG-DO, KOREA

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P1-T8-28 PV REFERENCE CELL ARRAY FOR DIRECT AND DIFFUSE IRRADIANCE MEASUREMENT

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P1-T8-29 STRUCTURE STRESS SIMULATION OF FLOATING PHOTOVOLTAIC FOR OFFSHORE UNDER TYPHOON

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P1-T8-30 RELIABILITY CHARACTERISTICS OF C-SI PHOTOVOLTAIC MODULE BY VARIATION OF CONDUCTIVE PASTE AMOUNT

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P1-T8-31 MANUFACTURING AND EVALUATION OF SINGLE CRYSTAL SILICON INGOT USING RECOVERED SILICON FROM SOLAR CELL

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P1-T8-32 EFFICIENT LEACHING OF SILVER FROM CRYSTALLINE SILICON SOLAR CELL WITHOUT USING NITRIC ACID SOLUTION

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P1-T8-33 MEASUREMENT AND CONTROL OF BOW OF CRYSTALLINE SILICON PHOTOVOLTAIC MODULE WITH A CRACKED GLASS COVER

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P1-T8-34 STABLE AND HIGH EFFICIENT FULL COLORED OPAQUE PV MODUE WITH ECO-FREINENDLY CORE/SHELL QUANTUM DOTS

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P1-T8-35 FUNDAMENTAL STUDY ON USE OF MEPS SOLAR IRRADIANCE DATA

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P1-T8-36 A STUDY ON THE ELECTRICAL CHARACTERISTICS OF BIPV BIFACIAL PV REAR MODULE ACCORDING TO REAR SEPARATION DISTANCE

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P1-T8-37 THE OPTIMIZATION OF CIRCUIT AND CONTROL METHOD FOR MULTICHANNEL PHOTO-VOLTAIC PANEL FAULT DIAGNOSTIC EQUIPMENT

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P1-T8-38 A STUDY ON ADC NOISE REDUCTION TECHNOLOGY TO IMPROVE DIAGNOSTIC ACCURACY OF PHOTOVOLTAIC STRING FAULT DIAGNOSIS SYSTEM

Hyunjin Shin[1,2]*, Yonggeun Seon[1,3], Euiseong Choi[1]**, Woogyun Shin[4], Sukwhan Ko[4], Hongjoo Kim[3], and Pyeong-Shik Ji[2]
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P1-T8-39 RESEARCH ON ENCAPSULATION PROCESS FOR PEROVSKITE SOLAR CELLS

Juyoung Oh[1,2]*, Hyun-Jung Lee[2], Moonhoe Kim[1], Mijoung Kim[1], Gisung Kim[1], Jaekwon Shin[1], Geon Park[1], Donggeun Lee[2]**, and JungYup Yang[1]**
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P1-T8-40 INVESTIGATION OF PEROVSKITE SOLAR MODULE FOR IMPROVED LONG-TERM STABILITY

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P1-T8-41 CHARACTERISTIC ANALYSIS OF PV MODULE WITH PET FILM ACCORDING TO UV TEST

Yong Kyu Lee[1,2]*, Chung Geun Lee[2], Jong Rok Lim[2], Woo Gyun Shin[2], Young Chul Ju[2], Suk Whan Ko[2], Gi Hwan Kang[2], Hyo Sik Chang[1]**, and Hye Mi Hwang[2]**
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P1-T8-42 THE EVALUATION OF SOLAR IRRADIANCE FORECAST FROM SATELLITE IMAGERY IN COMPARISON WITH PERSISTENT MODEL IN KOREA

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P1-T8-43 FABRICATION AND CHARACTERIZATION OF INP THIN FILMS FOR HIGH EFFICIENCY SOLAR MODULES

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P1-T8-44 HEALING EFFECTS OF LIGHT INDUCED DEGRADATION PROCESS WITH A REMOTE HEATING METHOD FOR A PERC SOLAR CELL MODULE

Yonghwan Lee*, Junhee Kim, and Soo Min Kim**

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P1-T8-45 NATURAL AIR-COOLING TECHNOLOGY USING CARBON PASTE TO PREVENT SOLAR MODULE POWER REDUCTION ON RADIATIVE HEAT TRANSFER

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P1-T8-46 PHOTOVOLTAIC-ESS INTEGRATED MODULE WITH CONSTANT POWER TRACKING ALGORITHM

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P1-T8-47 DEVELOPMENT OF GRADING STANDARDS FOR REUSE AND RECYCLING OF BIPV MODULES

Yeon-Bae Shin*, Woo-Jun Nam, Gyu-Gwang Kim, Young-Ho Cho, and Jin-Chel Moon**

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P1-T8-48 ANALYSIS OF OPTIMAL LOCATION FOR PV POWER GENERATION CONSIDERING VULNERABILITY TO FLOODING IN UNSAN MINE

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P1-T8-49 COORDINATED CONTROL STRATEGY FOR PHOTOVOLTAIC AND BATTERY ENERGY STORAGE INTEGRATED SYSTEM

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P1-T8-50 NEURAL NETWORK BASED OPERATION FOR ISOLATED DC MICROGRID WITH PV AND ENERGY STORAGE SYSTEM

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Nov-10 (Tue), 16:50-18:00 Lobby (3F)

Poster Presentation-02
T2-Chalcogenide thin film PV

Chair(s) Choong-Heui Chung (Hanbat National University, Republic of Korea)

P2-T2-43 EFFICIENT QUANTUM DOTS SENSITIZED SOLAR CELLS WITH BACK TRANSFER CONTROLLED BY FUNCTIONAL ORGANIC MOLECULES

Hyo Jeong Jo*, Dae-Hwan Kim, Shi-Joon Sung, Jin-Kyu Kang**, and Dae-kue Hwang**

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P2-T2-44 CHARACTERISTICS OF THIN FILM TRANSISTOR USING CO-SPUTTERED BASNO: INZNSNO ACTIVE LAYER

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P2-T2-45 NANOSTRUCTURE CONTROL OF ANTIMONY SELENIDE THIN FILMS BY SUBSTRATE TREATMENT AND ITS APPLICATION FOR PHOTOVOLTAICS

Si-Nae Park*[1], Se-Yun Kim[1], Sang-Ju Lee[1,2], Shi-Joon Sung[1,2], Kee-Jeong Yang[1,2], Jin-Kyu Kang[1,2], and Dae-Hwan Kim[1,2]**

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P2-T2-46 EFFICIENCY ENHANCEMENT WITH INTERFACIAL LAYER IN $AgBiS_2$ COLLOIDAL QUANTUM DOT SOLAR CELLS

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P2-T2-47 SPECTRAL RESPONSE CHARACTERISTICS OF CIGS THIN-FILM SOLAR CELLS WITH THICKNESS VARIATION OF QUANTUM DOT DOWN-CONVERSION LAYER

Jong Hun Yu[1,2]*, Dae-Hyung Cho[1], Woo-Jung Lee[1], Woo-Ju Kim[1,3], Si Hyuck Jang[1], Seong Jun Kang[2], and Yong-Duck Chung[1,3]**

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P2-T2-48 GROWTH AND DEVICE CHARACTERISTICS OF CZTSSE THIN-FILM SOLAR CELLS WITH TWO STEP SULFO-SELENIZATION

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P2-T2-49 HIGH-EFFICIENCY CU(IN,GA)SE_2 THIN-FILM PHOTOVOLTAICS ON FLEXIBLE STAINLESS STEEL SUBSTRATES: OPTIMIZATION OF GA GRADING AND ALKALI DOPING

Donghyeop Shin*, Kihwan Kim, Young-Joo Eo, Soomin Song, Inyoung Jeong, Ara Cho, Seung Kyu Ahn, Jun-Sik Cho, Joo Hyung Park, Jinsu Yoo, SeJin Ahn, Jae Ho Yun**, and Jihye Gwak**

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P2-T2-50 PHOTOVOLTAIC APPLICATIONS OF TIN MONOSULFIDE GROWN BY ATOMIC LAYER DEPOSITION

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P2-T2-51 PERFORMANCE ENHANCEMENT OF CIGS THIN-FILM SOLAR CELLS WITH A FUNCTIONAL-WINDOW NIO THIN LAYER

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P2-T2-52 EFFECT OF ZN(O,S) BUFFER LAYER THICKNESS ON THE PERFORMANCE OF FLEXIBLE $CU_2ZNSN(S,SE)_4$(CZTSSE) THIN FILM SOLAR CELLS

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P2-T2-53 OPTIMIZATION OF RTA SYSTEM IN $CU_2ZNSN(S_XSE_{1-X})$ BASED SOLAR CELL BY CONTROLLING THE WORKING TEMPERATURE

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P2-T2-54 STRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES OF CIGS THIN FILM SOLAR CELLS IN LOW TEMPERATURE

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P2-T2-55 OPTIMIZATION OF BONDING PROCESS USING FLEXIBLE CIGS THIN FILM SOLAR CELL

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P2-T2-56 CHARACTERISTICS OF OXIDE/AG/AZO TRANSPARENT CONDUCTING ELECTRODES ACCORDING TO THE TYPE OF LOWER OXIDE LAYER FOR APPLICATION TO $CU_2ZNSN(S,SE)_4$ (CZTSSE) SOLAR CELLS

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P2-T2-57 IMPACT OF V-SHAPED GA GRADING ON FLEXIBLE CU(IN, GA)SE_2 SOLAR CELL VIA NA DIFFUSION: AN OBSERVATION OF ACTIVE DEFECTS USING THERMAL ADMITTANCE SPECTROSCOPY

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P2-T2-58 NON-VACUUM, LOW COST AND SCALABLE $CUINS_2$ ELECTRODEPOSITION ON A FLEXIBLE SUBSTRATE FOR SOLAR CELL APPLICATIONS

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P2-T2-59 FABRICATION AND CHARACTERIZATION OF CZTSSE SOLAR CELLS BY HEAT TREATMENT TEMPERATURE

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P2-T2-60 ANALYSIS OF CIGS PHASE FORMATION BY VARYING SELENIZATION PROCESS OF ELECTRODEPOSITED CU-IN-GA LAYERS

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P2-T2-61 STUDY OF CD FREE INDIUM HYDROXY SULFIDE $IN_2(OH)S_3$ BUFFER LAYER FOR KESTERITE THIN FILM SOLAR CELLS

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P2-T2-62 EFFECT OF FLEXIBLE $CU_2ZNSN(S,SE)_4$ SOLAR CELLS WITH $CUALO_2$ BUFFER LAYERS

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P2-T2-63 NOVEL RROCESSING ROUTE OF TIN MONOSULFIDE THIN FILMS BASED ON DISTILLATION

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P2-T2-64 PHYSICAL PROPERTIES OF AS-GROWN ZNS THIN FILMS DEPOSITED BY RF MAGNETRON SPUTTERING

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P2-T2-65 IMPROVED DEVICE PERFORMANCES OF AG-TREATED CIGS THIN-FILM SOLAR CELLS

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P2-T2-66 ULTIMATE CHARGE EXTRACTION OF MONOLAYER PBS QUANTUM DOT FOR OBSERVATION OF MULTIPLE EXCITION GENERATION

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P2-T2-67 EFFECTS OF H2S MIXED GAS ON THE STRUCTURAL AND OPTICAL PROPERTIES OF SPUTTERED SNS THIN FILMS

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P2-T2-68 SURFACE MODIFICATION OF CU(IN,GA)SE_2 THIN FILMS BY CESIUM FLOURIDE POST-DEPOSITION TREATMENT

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P2-T2-69 SUPERSTRATE STRUCTURED FTO/TIO_2/IN_2S_3/CU2ZNSNS_4 SOLAR CELLS FABRICATED BY SPRAY METHOD WITH AQUEOUS SOLUTIONS

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P2-T2-70 FABRICATION AND CHARACTERIZATION OF BORON DOPED ZNO THIN FILMS PREPARED BY RF MAGNETRON SPUTTERING

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P2-T2-71 CHARACTERIZATION OF CUPROUS OXIDE THIN FILMS DEPOSITED BY RF MAGNETRON SPUTTERING

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P2-T2-72 AIR PROCESSED DMF BASED $CUINSE_2$ SOLAR CELLS

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P2-T2-74 FORMATION AND CHARACTERIZATION OF MOSE2 INTERFACIAL LAYER IN FLEXIBLE CIGS THIN FILM SOLAR CELLS

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P2-T2-75 ALL SOLUTION PROCESSED CUINSE$_2$/PEROVSKITE TANDEM SOLAR CELLS

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P2-T2-76 THE FORMATION MECHANISM AND THICKNESS RELATIONSHIP OF BUFFER LAYER ON CIGS SOLAR CELL

Ara Cho[1,2]*, Marlena Ostrysz[1], Soomin Song[1], Sangmin Lee[1], SeJin Ahn[1], Jae Ho Yun[1], Jihye Gwak[1], Seung Kyu Ahn[1], Young-Joo Eo[1], Jun Sik Cho[1], Ju Hyung Park[1], Jin Su Yoo[1], Kihwan Kim[1], Donghyeop Shin[1], Inyoung Jeong[1], and Ahreum Lee[1]

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P2-T2-77 EFFECTS OF SEQUENCE OF EXTRINSIC ALKALI ADDITION INTO LOW-TEMPERATURE GROWN CIGS ON PI

Kihwan Kim[1]*, Inyoung Jeong[1], Donghyeop Shin[1], Soomin Song[1], Seung Kyu Ahn[1], Young-Joo Eo[1], Ara Cho[1], Jihye Gwak[2], and Jae Ho Yun[1]**

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P2-T2-78 EFFECT OF LAMINATION TEMPERATURE ON THE DURABILITY OF POE-ENCAPSULATED FLEXIBLE CIGS MINI-MODULES

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P2-T2-79 HEAT SOAKING EFFECT ON CU(IN_{1-X},GA_X)SE_2 SOLAR CELLS WITH ZN-BASED ENGINEERED BUFFER BY VARYING ABSORBER LAYER BANDGAP

Sang Su Shin[1], Dong Ryeol Kim[1,2], Young Hee Jo[1,3]*, Kihwan Kim[1], Jinsu Yoo[1], Ara Cho[1], Jun-Sik Cho[1], Jae Ho Yun[1], Jihye Gwak[1], and Joo Hyung Park[1]**

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P2-T2-80 HIGH EFFICIENCY CIGS SOLAR CELLS AND ITS APPLICATION TO TANDEM DEVICES

Inyoung Jeong*, Syed Dildar Haider Naqvi, Kihwan Kim, Yunae Cho, Young-Joo Eo, Dong Hyeop Shin, Seung Kyu Ahn, Ara Cho, Soomin Song, Sang Min Lee, Jin Su Yu, Jun-Sik Cho, Joo Hyung Park, Ahreum Lee, Jihye Gwak, Sejin Ahn, and Jae Ho Yun**

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P2-T2-81 INFLUENCE OF ANNEALING TEMPERATURE ON CRYSTAL ORIENTATION OF ELECTRO-DEPOSITED SB_2SE_3 THIN FILM PHOTOVOLTAIC ABSORBERS

Changwook Jeong[1], Chiho Kim[1], Seonghyun Kim[1]*, Ilyeong Kwon[1], Seonghun Lee[1], Seonghyun Kim[1], Dongyun Lee[2], Shinho Kim[1]**, and Yangdo Kim[1]**

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P2-T2-82 PERFORMANCE IMPROVING OF WIDE BANDGAP CU(IN,GA)S_2 SOLAR CELLS VIA INJECTION ANNEALING

Ilyeong Kwon[1]*, Shinho Kim[1], Changwook Jeong[1], Seonghyun Kim[1], Takehiko Nagai[2], Hitoshi Tampo[2], Shogo Ishizuka[2], Hajime Shibata[2], and Yangdo Kim[1]**

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P2-T2-83 CADMIUM TELLURIDE THIN FILM PV SYSTEM UNDER THE SHADOW

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College of New Materials and New Energies, Shenzhen Technology University, Shenzhen, China

Nov-10 (Tue), 16:50-18:00 Lobby (3F)

Poster Presentation-02
T3-Compound semiconductor, concentrator and space PV

Chair(s) Ho Kwan Kang (Korea Advanced Nano Fab Center, Republic of Korea)

P2-T3-1 ELECTROPLATED BACKSIDE CONTACT FOR INGAP/GAAS DOUBLE HETEROJUNCTION SOLAR CELL

Ji-Seon Yoo[1]*, Ye-Chan Kim[1], Sung-Tae Kim[1], Min-Ho Choi[1], Sang-Hyun Jung[2], Hyun-Beom Shin[2], and Jae-Hyung Jang[1,3]**

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P2-T3-2 WIDE-GAP ZNO FRONT ELECTRON SELECTIVE CONTACT LAYER FOR GAAS SOLAR CELL

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P2-T3-3 HIGH EFFICIENT FLEXIBLE GALLIUM ARSENIDE SOLAR CELLS FOR LUMINESCENT SOLAR CONCENTRATORS

Hyun-Beom Shin[1]*, Won-Hee Lee[1], Sang Hyun Jung[1], Chang Zoo Kim[1], Chul Jong Han[2], Heesun Yang[3], and Ho Kwan Kang[1]**

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P2-T3-4 IMPROVEMENT OF $BASI_2$ THIN FILM QUALITY BY TWO-STEP GROWTH RATE CONTROL OF VACUUM EVAPORATION

Takamasa Yoshino[1]*, Kazuhiro Gotoh[1], Yasuyoshi Kurokawa[1], and Noritaka Usami[1]**

Graduate School of Engineering, Nagoya University, Nagoya, Japan

P2-T3-5 TRANSPARENT THIN FILM HEATER AND ELECTROLUMINESCENT CELL USING AG NANOWIRES/GRAPHENE OXIDE HYBRID TOP ELECTRODE DEPOSITED BY DIRECT SPRAY COATING METHOD

Hyeong-Min Sim*, Sang-Hwi Lim, and Han-Ki Kim**

School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Gyeonggi-do, Republic of Korea

P2-T3-6 STRUCTURE OPTIMIZATION OF HIGHLY FLEXIBLE AND TRANSPARENT OXIDE/METAL/POLYMER TRI-LAYER ELECTRODE FOR FLEXIBLE TOUCH SENSOR

Yong Jun Kim*, Yong Hwan Cho, and Han-Ki Kim**

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P2-T3-7 EFFECT OF INDIUM AND HAFNIUM CONTENT ON CHARACTERISTICS OF HAFNIUM DOPED INDIUM-ZINC-TIN OXIDE FILMS AND THIN FILM TRANSISTORS

Jin-Hyeok Park*, Chan-Hwi Kim, Hae-Jun Seok, and Han-Ki Kim**
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P2-T3-8 OXYGEN FLOW RATIO EFFECT ON PROPERTIES OF GA, TI CO-DOPED IN_2O_3 FILMS ON CYCLIC OLEFIN COPOLYMER SUBSTRATE

Chaeyoung Kang*, Yong-Hwan Cho, Yong Jun Kim, Hae-Jun Seok, Jin Hyeok Park, Ji-Young Heo, and Han-Ki Kim**
Department of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Republic of Korea

P2-T3-9 P-NIO/N-ZNO HETEROJUNCTION DIODES FOR TRANSPARENT OXIDE SOLAR CELLS

Hyeon-Uk Ha*, Hae-Jun Seok, Jin-Hyeok Park, and Han-Ki Kim**
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P2-T3-10 SIGNIFICANT IMPROVEMENT OF THE PHOTORESPONSIVITY OF UNDOPED $BASI_2$ FILMS BY POST-ANNEALING

Yurika Haku*, Yudai Yamashita, Kaoru Toko, and Takashi Suemasu**
Institute of Applied Physics, University of Tsukuba, Ibaraki, Japan

P2-T3-11 INSOLATION PREDICTION MODEL USING MACHINE LEARNING BASED METEOROLOGICAL DATA FOR THE SOLAR POWER GENERATION SYSTEM

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P2-T3-12 DEVELOPMENT OF GAAS SUBSTRATE REUSE PROCESS FOR III-V SOLAR CELLS USING FLEXIBLE SUBSTRATE

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P2-T3-13 FLEXIBLE HIGH-VOLTAGE ALGAINP SOLAR CELL GROWN BY MOCVD

Chae-won Kim[1,2]*, Jae Cheol Shin[2], and Hyo-jin Kim[1]**
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P2-T3-14 FABRICATION AND CHARACTERISTICS OF FLEXIBLE GAAS/INGAAS DUAL-JUNCION SOLAR CELLS

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P2-T3-15 1080 NM LASER-POWER CONVERTER MODULE FOR REMOTE POWER TRANSMISSION

Sunghyun Moon[1]*, Yong Tak Lee[2]**, Kihun Cho[2], Wonseon Choi[2], Ho Kwan Kang[3], Hyun-Beom Shin[3], Won-Hee Lee[3], Junhee Park[1], and Gildong Lee[1]**
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Nov-10 (Tue), 16:50-18:00 Lobby (3F)

Poster Presentation-02
T4-Organic and dye-sensitized solar cells

Chair(s) Seokin Na (Jeonbuk National University, Republic of Korea)

P2-T4-59 CHARACTERISTICS OF QD-LED WITH SPUTTERED V_2O_5 AS HOLE INJECTION LAYER

Seung-Gyun Choi[1]*, Hae-Jun Seok[1], SeungHyun Rhee[2], Wan Ki Bae[3], and Han-Ki Kim[3]**
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P2-T4-60 A STUDY ON THE GA, TI CO-DOPED INDIUM OXIDE (IGTO) AND PTFE (POLYTETRAFLUOROETHYLENE) AS A STRETCHABLE TRANSPARENT CONDUCTOR BY A CO-SPUTTERING PROCESS

Yong-Hwan Cho*, Yong Jun Kim, and Han-Ki Kim**
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P2-T4-61 TRANSPARENT BINARY IONIC-LIQUID BASED ELECTROLYTES FOR DYE-SENSITIZED SOLAR CELLS

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P2-T4-62 DEVELOPMENT OF TRANSPARENT AND HIGH-VOLTAGE ELECTROLYTE USING BINARY REDOX COUPLES FOR DYE-SENSITIZED SOLAR CELLS

Hyeong Cheol Kang*, Kicheon Yoo, Jeong Jae Lee, Jun Hwan Jang, Narayan Chandra Deb Nath, and Jae-Joon Lee**

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P2-T4-63 ENHANCING OF PHOTO-STABILITY OF ORGANIC SOLAR CELLS BY THE INTRODUCTION OF THE SELF-ASSEMBLED MONOLAYER ON ZINC OXIDE SURFACE

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P2-T4-64 MORPHOLOGY CONTROL OF SMALL MOLECULE BASED ORGANIC SOLAR CELLS THROUGH STRATEGIC HALOGENATION

Seung Un Ryu[1]*, Zaheer Abbas[2], Seyeong Lim[1], Dasol Chung[1], Jihyun Min[1], Dohyun Kim[1], Wooteak Jung[1], Sung Ryong Kim[1], Chang Eun Song[2]**, Jong-Cheol Lee[2]**, and Taiho Park[1]**

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P2-T4-65 PHOTO-DEGRADATION IN BULK-HETEROJUNCTION THIN FILMS VISUALIZED BY ELECTRON TOMOGRAPHY

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P2-T4-66 MOLECULAR ORIENTATION CONTROL OF ALL-POLYMER ACTIVE LAYER USING NON-HALOGENATED SOLVENTS

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[2]Korea Research Institute of Chemical Technology, Republic of Korea

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P2-T4-67 HIGHLY STABLE ORGANIC PHOTOVOLTAICS AGAINST HEAT AND LIGHT VIA UV-CURABLE POLYMERIC SEMICONDUCTORS AND NON-FULLERENE ACCEPTORS

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P2-T4-68 A STUDY ON THE IMPROVEMENT OF EFFICIENCY OVER 16% BY USING NEW STAR OLIGOMER SEMICONDUCTOR AS CRYSTALLINE MODIFIER

Daehwan Lee*, Dohyun Kim, Wooteak Jung, Taehyun Kim, Yelim Choi, Sunhee Yun, Sungryong Kim, and Taiho Park**
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P2-T4-69 HIGHLY TRANSPARENT PT-FREE DYE-SENSITIZED SOLAR CELLS

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P2-T4-70 A STUDY ON POLYMER NANO-COMPOSITE ELECTROCATALYST FOR PT-FREE DYE-SENSITIZED SOLAR CELLS

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P2-T4-71 DOPANT EFFECTS ON PHOTOVOLTAIC PERFORMANCE OF SOLID STATE DYE-SENSITIZED SOLAR CELLS WITH HOLE TRANSPORTING POLY(3-HEXYLTHIOPHENE)

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P2-T4-72 INFLEUNCES OF DOPANTS IN TERCARBAZOLE-BASED HOLE TRANSPORTING MATERIAL ON POWER CONVERSION EFFICIENCY OF SOLID STATE DYE-SENSITIZED SOLAR CELLS

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P2-T4-73 DEVELOPMENT OF DIKETOPYRROLOPYRROLE-BASED N-TYPE CONJUGATED POLYMERS FOR THERMOELECTRIC DEVICES AND TRANSISTORS

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P2-T4-74 INTER-DIFFUSED PLANAR HETEROJUNCTION PHOTOACTIVE LAYERS FOR INDOOR ORGANIC PHOTOVOLTAICS

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P2-T4-75 COMPARATIVE STUDY OF LIGHT AND THERMAL INDUCED DEGRADATION FOR BOTH AMORPHOUS AND HIGH CRYSTALLINE POLYMER BASED ORGANIC SOLAR CELLS

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P2-T4-76 SIMPLE-STRUCTURED NONFULLERENE SMALL MOLECULAR ACCEPTORS FOR ORGANIC SOLAR CELLS

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P2-T4-77 ENHANCED PHOTOSTABILITY OF ORGANIC DYES BY UTILIZING GREEN EMISSIVE CARBON QUANTUM DOTS WAVEGUIDE FOR LUMINESCENT SOLAR CONCENTRATORS

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P2-T4-78 FACILE GROWTH OF NITROGEN DOPED CARBON QUANTUM DOTS ON CARBON NANOTUBES FOR THE ACCELERATED TRIIODIDE REDUCTION IN THE DYE-SENSITIZED SOLAR CELL

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P2-T4-79 POROUS NANONETWORKS OF GRAPHENE SHEETS BY UTILIZING PHASE SEPARATION OF GRAPHENE QUANTUM DOTS FOR THE COUNTER ELECTRODE OF DYE-SENSITIZED SOLAR CELL

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P2-T4-80 EFFECT OF THE FÖRSTER TYPE OF RESONANCE ENERGY TRANSFER ON THE SOLID-STATE DSSCS TO ENHANCE THE PHOTOVOLTAIC EFFICIENCY

Hyun Jo Kim**, Su Jeong Gwak, Na Eun Lee, Hye Yeon Lee, Woo Chang Noh, Min Jung Kim, Hye Soo Park, Hye In Shim, Yoo Jin Lee, Hye Ji Jeon, Ganesh Koyyada, Jae Hong Kim**, and Seung Yoon Seok*

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P2-T4-81 EFFECT OF DOUBLE-ANCHORS/ACCEPTORS STRUCTURE IN TRIPHENYLAMINE BASED DYES WITH DITHIENO[3,2-B:2′,3′-D]PYRROLE (DTP) BRIDGE FOR DSSCS

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P2-T4-82 CONJUGATED POLYELECTROLYTE ADDITIVE FOR IMPROVING CHARGE TRANSPORT ABILITY OF CONJUGATED POLYMERS

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P2-T4-83 EFFICIENCY ACHIEVED 17.40% IN TERNARY ORGANIC SOLAR CELLS ENABLED BY A NEW WIDE BANDGAP π-CONJUGATED POLYMER DONOR

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P2-T4-84 HALOGEN-SUBSTITUTED EFFECT OF SIDE-CHAIN END OF THE DONOR POLYMER APPLIED TO OPTOELECTRONIC DEVICES

Juhyoung Jung[1,2]*, Seung-Hoon Lee[1], Dae-Hee Lim[1], Seo-Jin Ko[1], Minju Kyoung[1], Changjin Lee[1]**, and Sung Cheol Yoon[1,2]**

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P2-T4-85 DEVELOPMENT OF HIGH-PERFORMANCE ORGANIC SOLAR CELLS USING A NEW "Y-SERIES" NON-FULLERENE ACCEPTOR

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P2-T4-86 SYNTHESIS OF LOW BANDGAP POLYMERIC DONOR FOR TRANSPARENT AND NEAR-INFRARED (NIR) ORGANIC PHOTOVOLTAICS

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P2-T4-87 ENHANCEMENT OF THE ELECTRON MOBILITY IN THE DYE ANCHORED COUNTER ELECTRODE(DACE) TYPE DYE SENSITIZED SOLAR CELLS

Seung Yoon Seok*, Gyu Ho Shin, Min Joo Kim, Sang Hyun Baek, Sung Rok Kim, Min Suk Son, Yu Mi Nam, Young Jin Shin, Soo Ho Lee, Min Su Kim, Ganesh Koyyada, and Jae Hong Kim**

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P2-T4-89 EVALUATION DIFFUSION COEFFICIENT AND ELECTRON LIFETIME OF DSSCS(DYE-SENSITIZED SOLAR CELLS) BY THE SLIM-PCV(STEPPED LIGHT-INDUCED TRANSIENT MEASUREMENTS OF PHOTOCURRENT AND PHOTOVOLTAGE) METHOD

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P2-T4-90 ALKYLTHIO-SUBSTITUTION ON WIDE BANDGAP CONJUGATED POLYMERS FOR NON-FULLERENE ACCEPTOR-BASED ORGANIC SOLAR CELLS

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P2-T4-91 SOLUTION-PROCESSED AND TRANSPARENT GRAPHENE OXIDE/TIOX GAS BARRIER VIA AN INTERFACIAL PHOTOCATALYTIC REDUCTION

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P2-T4-92 HIGHLY EFFICIENT PRINTABLE SEMITRANSPARENT ORGANIC SOLAR CELLS BY USING 3D PRINTER WITH SLOT-DIE PROCESS

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P2-T4-93 SURFACE CHEMISTRY OF $AU_{18}(SG)_{22}$-TIO_2 WORKING ELECTRODE AND ITS APPLICATION FOR METAL CLUSTER- SENSITIZED SOLAR CELL (MCSC)

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P2-T4-94 SYNTHESIS AND CHRACTERIZATION OF BDT BASED COPOLYEMER FOR ORGANIC SOLAR CELLS

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P2-T4-95 HIGH COLLOIDAL STABILITY ZNO NANOPARTICLES INDEPENDENT ON SOLVENT POLARITY AND THEIR APPLICATION IN ORGANIC PHOTOVOLTAICS

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P2-T4-96 ENHANCED LONG TERM STABILITY OF DYE-SENSITIZED SOLAR CELLS (DSSCS) COMPOUND WITH ALL SOLID STATE ELECTROLYTE SYSTEM

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P2-T4-97 UNUSUAL ADDITIVE ON IMPROVING THE PERFORMANCE AND STABILITY IN SLOT-DIE COATED ORGANIC PHOTOVOLTAIC CELLS

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P2-T4-98 ENHANCED DYE-SENSITIZED PHOTOELECTROCHEMICAL WATER OXIDATION BY INTRODUCTION OF HYDROXAMIC ACID GROUP

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P2-T4-99 NEWLY SYNTHESIZED PDTBDT-BASED DONOR-ACCEPTOR COPOLYMERS FOR ORGANIC SOLAR CELLS

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P2-T4-100 SYNTHESIS AND CHARACTERIZATION OF OPV CONTAINING FUSED AROMATIC GROIP BASED ON NDT

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P2-T4-101 SYNTHESIS OF A-D-A TYPE SMALL MOLECULE BASED ON NAPHTHALENE-DIIMIDE (NDI) FOR ORGANIC PHOTOVOLTAICS

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P2-T4-102 SYNTHESIS AND CHARACTERIZATION OF ACCEPTOR BASED ON BENZO[1,2-B:4,5-B′] DITHIOPHENE-4,8-DIONE (BDT) FOR OPV

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P2-T4-103 EFFECT OF VARIOUS LIGHT-INTENSITIES ON DYE-SENSITIZED SOLAR CELLS PERFORMANCE

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P2-T4-104 IMPROVED PHOTOVOLTAIC PERFORMANCE OF INVERTED POLYMER SOLAR CELLS USING MULTIFUNCTIONAL QUANTUM-DOTS MONOLAYER WITH HIGH UNIFORMITY

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P2-T4-105 EFFECT ON THE MORPHOLOGY AND ELECTRONIC PROPERTIES BY VARYING THE AMIDE FUNCTIONALIZED MONIMERIC UNIT IN THE CONJUGATED CO-POLYMER

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P2-T4-106 STANDARDIZING PERFORMANCE MEASUREMENT OF DYE-SENSITIZED SOLAR CELLS FOR INDOOR LIGHT HARVESTING

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P2-T4-107 EFFICIENT AND STABLE ORGANIC SOLAR CELL PREPARED BY SEQUENTIAL DEPOSITION OF LOW BAND GAP POLYMER AND NON-FULLERENE ACCEPTOR

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P2-T4-109 SIZE-SCALABLE PREPARATION OF HIGH PERFORMANCE ORGANIC PHOTOVOLTAICS BY DEVELOPING RANDOM TERPOLYMER DONOR

So Hyun Park[1,2]*, Sungmin Park[1], Daniel Kurniawan[1], Jeong Gon Son[1], Jun Hong Noh[2,3], Hyungju Ahn[4], and Hae Jung Son[1,2]**

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P2-T4-110 ELECTRICAL-MODULATION OPTICAL SPECTROSCOPY STUDY ON AN EFFICIENCY ENHANCEMENT OF ORGANIC PHOTOVOLTAIC DEVICES BY ADDITIVES

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P2-T4-111 SELECTIVE NIR CONVERSION IN DYE-SENSITIZED SOLAR CELLS FOR FULLY TRANSPARENT AND COLORLESS PHOTOVOLTAICS

Fionnuala Grifoni[1]*, Francesca Cardano[2], Waad Naim[1], Iva Dzeba[1], Thomas Alnasser[1], Nadia Barbero[2], Claudia Barolo[2], and Frédéric Sauvage[1]**

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P2-T4-112 EFFICIENT TERNARY BLEND SOLAR CELL WITH A VERY SMALL AMOUNT OF THIRD COMPONENT

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P2-T4-113 HOLE TRANSPORT PROPERTIES IN CRYSTALLINE CONDUCTIVE POLYMERS MIXED WITH INSULAING POLYSTYRENE

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Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University, Kyoto, Japan

Nov-10 (Tue), 16:50-18:00 Lobby (3F)

Poster Presentation-02
T5-Perovskite solar cells

Chair(s) Young Yun Kim (Korea Research Institute of Chemical Technology, Republic of Korea)

P2-T5-1 IMPROVING OF MORPHOLOGICAL, STRUCTURAL, AND OPTICAL PROPERTIES OF PEROVSKITE $CH_3NH_3PBI_3$ FILMS PREPARED BY BLENDING SOLVENTS AND THERMAL ANNEALING FOR PHOTOVOLTAIC APPLICATIONS

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P2-T5-2 *IN-SITU* STUDIES OF THE THERMAL DEGRADATION MECHANISMS OF SINGLE AND TRIPLE CATION PEROVSKITE SOLAR CELLS

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P2-T5-3 EFFICIENT AND STABLE ALL-INORGANIC NIOBIUM-INCORPORATED CSPBI2BR–BASED PEROVSKITE SOLAR CELLS

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P2-T5-4 GREEN POLYMER MODIFICATION APPROACH FOR EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS

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P2-T5-5 LONG-TERM STABILITY PEROVSKITE SOLAR CELLS BASED ON HOLE TRANSPORTING COBALT NANOCRYTALS

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P2-T5-6 BIFACIAL PEROVSKITE SOLAR CELLS USING TRANSPARENT ADHESIVE HOLE TRANSPORTING LAYERS BASED ON LOW-TEMPERATURE AND LOW-PRESSURE LAMINATION PROCESS

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P2-T5-7 STABLE AND EFFICIENT CSPBI3 PEROVSKITE QUANTUM DOT SOLAR CELLS ENABLED BY STABILIZATION OF AROMATIC AMMONIUM CATIONS

Jigeon Kim[1]*, Wooyeon Kim[1], Sungyeon Hwang[1], In Choi[1], Dayoung Kim[1], Younghoon Kim[2], and Min Jae Ko[1]**

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P2-T5-8 SYNTHESIS AND CHARACTERIZATION OF POLYTHIOPHENE DERIVATIVES CONTAINING TRIETHYLENE GLYCOL SIDE CHAINS FOR PEROVSKITE SOLAR CELL

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P2-T5-9 SYNTHESIS AND STRUCTURAL ANALYSIS OF SUB-10 NANOMETER-SIZED $MAPBI_3$ PEROVSKITE NANO QUANTUM DOTS

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P2-T5-10 SPECTROSCOPIC STUDY ON FORMAMIDINIUM LEAD IODIDE ($FAPBI_3$) COMPOSITE WITH METHYLAMMONIUM LEAD BROMIDE ($MAPBBR_3$) BY USING PHOTOLUMINESCENCE AND ULTRA-LOW FREQUENCY RAMAN

Ju Won Kim*, Min Gyeong Shin, Yeon Su Jeong, and Myeong Kee Park**

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P2-T5-11 THE BISMUTH-CONTAINING COMPLEX OXIDES WITH PEROVSKITE-LIKE STRUCTURE FOR PEROVSKITE SOLAR CELLS

Anna Nikolskaia[1]*, Marina Vildanova[1], Sergey Kozlov[1], Makarii Lomakin[2,3], Olga Proskurina[3], Oksana Almjasheva[2], Viktor Gusarov[3], Liudmila Larina[1], and Oleg Shevaleevskiy[1]**

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P2-T5-12 FABRICATION OF CONFORMAL PEROVSKITE THIN FILMS ON TEXTURED SILICON SURFACE USING ALL DRY PROCESS

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P2-T5-13 POLY(METHYL METHACRYLATE) EMBEDDED PEROVSKITE FILMS FOR IMPROVING SOLAR CELL PERFORMANCE

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P2-T5-14 SELF-AGGREGATION CONTROLLED RAPID CHEMICAL BATH DEPOSITION OF SNO2 LAYERS AND STABLE DARK DEPOLARIZATION PROCESS FOR HIGHLY EFFICIENT PLANAR PEROVSKITE SOLAR CELLS

Yohan Ko[1], Youbin Kim[1], Chanyong Lee[1], Taemin Kim[1], Seungkyu Kim[1]*, Hui-Jeong Gwon[2], Nam-Ho Lee[2], and Yongseok Jun[1]**
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P2-T5-15 MICROTUNING OF THE WIDE-BANDGAP PEROVSKITE LATTICE PLANE FOR EFFICIENT AND ROBUST HIGH-VOLTAGE PLANAR SOLAR CELLS EXCEEDING 1.5 V

Yohan Ko[1], Youbin Kim[1], Chulhee Yi[1]*, Chanyong Lee[1], Yechan Kim[1], Byoung Koun Min[1], Hui-Jeong Gwon[2], Yong Ju Yun[3], and Yongseok Jun[1]**
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P2-T5-16 PEROVSKITE SOLAR CELL ON STAINLESS STEEL(SUS) SUBSTRATE

Solhee Lee[1]*, Sang-Won Lee[1], Jae-Keun Hwang[1], Ji Yeon Hyun[1], Wonkyu Lee[1], Seok Hyun Jeong[1], Soohyun Bae[1], Donghwan Kim[1], Hae-Seok Lee[2], Yongseok Jun[2], and Yoonmook Kang[2]**
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P2-T5-17 FORMATION OF UNIFORM PEROVSKITE CRYSTAL IN AMBIENT HUMIDITY CONDITION BY USING DIETHYL ETHER AS ANTI-SOLVENT

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P2-T5-18 DEPOSITION TIN OXIDE ELECTRON TRANSPORT LAYER ON TEXTURED SUBSTRATE BY RF SPUTTERING

Ji Seong Hwang[1]*, Wonkyu Lee[1], Jae Keun Hwang[1], Sang-Won Lee[1], Ji Yeon Hyun[1], Solhee Lee[1], Yoonmook Kang[2], Hae-Seok Lee[2], and Donghwan Kim[1]**
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P2-T5-19 POLARIZING PEROVSKITE SOLAR CELL WITH PATTERNED BOTTOM ELECTRODE

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P2-T5-20 A $PBI_{2-X}CL_X$ SEED LAYER FOR OBTAINING EFFICIENT PLANAR-HETEROJUNCTION PEROVSKITE SOLAR CELLS VIA AN INTERDIFFUSION PROCESS

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P2-T5-21 DEW POINT TEMPERATURE AS AN INVARIANT REPLACEMENT FOR RELATIVE HUMIDITY FOR ADVANCED PEROVSKITE SOLAR CELL FABRICATION SYSTEMS

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P2-T5-22 IMPROVEMENT OF PEROVSKITE SOLAR CELL PERFORMANCE WITH PATTERNED INTERFACE THROUGH NANO-IMPRINTING PROCESS

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P2-T5-23 FORMULATION OF PRECURSOR SOLUTION FOR LARGE-AREA PEROVSKITE COATINGS

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P2-T5-24 PEROVSKITE-ORGANIC JUNCTION HYBRID SOLAR CELL WITH EXTENDED ABSORPTION TO THE NIR REGION AND IMPROVED EFFICIENCY

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P2-T5-25 DIVALENT ALKALI METAL CHLORIDE ADDITIVES BCL_2 (B = MG, CA, SR AND BA) ENGINEERING FOR $FAPBI_3$ BASED PEROVSKITE SOLAR CELLS

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P2-T5-26 OLEIC ACID CAPPED TA DOPED TIO_2 FOR LOW-TEMPERATURE PROCESS AND HIGH-PERFORMANCE FLEXIBLE PEROVSKITE SOLAR MODULE

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P2-T5-27 SYNTHESIS OF ORGANOLEAD HALIDE PEROVSKITE NANOPARTICLES WITHOUT QUANTUM CONFINEMENT EFFECTS BY USING ULTRASONIC SPRAY

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P2-T5-29 FABRICATION OF BI-FUNCTIONAL PEROVSKITE LEAD CHLORIDES AS HOLE BLOCKING AND ELECTRON TRANSPORT LAYERS

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P2-T5-30 INTERFACE EFFECTS ON THE ELECTRON AND ION TRANSPORT OF LEAD HALIDE PEROVSKITES

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P2-T5-31 HIGH VOLTAGE PEROVSKITE SOLAR CELLS VIA DUAL ADDITIVE ENGINNERING

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P2-T5-32 PHOTOPHYSICAL EFFECT OF LIGANDS ON ALL- INORGANIC PEROVSKITE MATERIALS

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P2-T5-33 MORPHOLOGY CONTROL OF $CSPBBR_3$ PEROVSKITES BY A SOLVENT-ASSISTED RINSING FOR HIGH PERFORMANCE OF SOLAR CELLS

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P2-T5-34 DEFECT ENGINEERING IN METAL HALIDE PEROVSKITE SOLAR CELLS VIA CHARGE NEUTRALIZATION OF ZWITTERIONIC AMINO ACID ADDITIVE

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P2-T5-35 SOLUTION PROCESSABLE SNO_2/TIO_2 BI-LAYER ELECTRON TRANSPORT LAYER FOR PEROVSKITE SOLAR CELLS

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P2-T5-36 SYNTHESIS OF SOLUTION PROCESSABLE SNO2 NANOSOL-ELECTRON TRANSPORTING LAYER FOR PLANAR PEROVSKITE SOLAR CELLS

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P2-T5-37 AN EFFECTIVE ENGINEERING TO IMPROVE THE PERFORMANCE OF CARBON-BASED PEROVSKITE SOLAR CELLS

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P2-T5-38 EFFICIENT CHARGE TRANSPORT ACROSS THE PEROVSKITE/HTL INTERFACE INDUCED BY A WORK FUNCTION SHIFT FROM INTERFACIAL TREATMENT

David Sunghwan Lee*, Jin Hyuck Heo, Jin Kyoung Park, Bong Woo Kim, Hyong Joon Lee, and Sang Hyuk Im**
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P2-T5-39 TWO-DIMENSIONAL α-MOO_3 VAN DER WAALS CRYSTALS FOR PEROVSKITE SOLAR CELLS

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P2-T5-40 COLLOIDAL SYNTHESIS OF DOUBLE PEROVSKITE CS2SNX6 NANOCRYSTALS

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P2-T5-41 FORMATION OF VOID-FREE PEROVSKITE LAYER IN TIO2 NANORODS ELECTRODE BY ELECTROSPRAY COATING

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P2-T5-42 DRY STAMPING TRANSFER OF PEDOT: PSS ELECTRON TRANSPORTING ELECTRODE FOR FLEXIBLE SEMITRANSPARENT PEROVSKITE SOLAR CELLS

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P2-T5-43 PEDOT:PSS/MXENE TRANSPARENT CONDUCTIVE ELECTRODE FOR TRANSPARENT CONDUCTIVE OXIDE-FREE PEROVSKITE SOLAR CELLS

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P2-T5-44 LOW TOXICITY ENHANCED PERFORAMANCE TIN-HALIDE PEROVSKITE SOLAR CELLS

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P2-T5-45 ENHANCED OPEN-CIRCUIT VOLTAGE BY INTRODUCTION OF LOW DIMENSIONAL PEROVSKITE INTERLAYER AT PEROVSKITE/HOLE TRANSPORTING LAYER

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P2-T5-46 A MORPHOLOGY CONTROL TIN OXIDE FILM FOR HIGH EFFICIENCY PEROVSKITE SOLAR CELL

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P2-T5-47 HIGHLY EFFICIENT WIDE BANDGAP (1.7 ~ 2.0 EV) PEROVSKITE SOLAR CELLS

Zijia Li*, Seongrok Seo, Seonghwa Jeong, Sooeun Shin, Hyonwoo Yang, Eunsoo Kim, Pronoy Nandi, Tae Kyu Ahn, and Hyunjung Shin**

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P2-T5-48 DEFECT PASSIVATION EFFECT OF NOVEL ADDITIVES FOR HIGH EFFICIENT PLANAR PEROVSKITE SOLAR CELLS

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P2-T5-49 HIGHLY STABLE AND EFFICIENT FREE-CATHODE-BUFFER-LAYER INVERTED PEROVSKITE SOLAR CELL

Yong Ryun Kim*, Chang Mok Oh, Chang Jae Yoon, Ju-Hyeon Kim, Kiyoung Park, Kwanghee Lee, In-Wook Hwang, and Heejoo Kim**

Gwangju Institute of Science and Technology, Republic of Korea

P2-T5-50 PHOTOSENSITIVITY ENHANCEMENT OF METHYLAMMONIUM LEAD HALIDE PEROVSKITES BY QUANTUM DOTS

Thi Kim Oanh Vu[1]*, Il-Wook Cho[2], Jae-Won Oh[2], Dong Uk Lee[1], Mee-Yi Ryu[2], and Eun Kyu Kim[1]**

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P2-T5-51 IMPROVED STABILITY TOWARD HALIDE SEGREGATION VIA THERMAL PRESS METHOD

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P2-T5-52 LAYER STRUCTURED $FA_XCS_{3-X}SB_2I_6CL_3$ PB-FREE QUASI-PEROVSKITE SOLAR CELLS

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P2-T5-53 SYNTHESIS OF POST-PROCESSABLE METAL HALIDE PEROVSKITE NANOCRYSTALS VIA MODIFIED LIGAND-ASSISTED RE-PRECIPITATION METHOD AND THEIR APPLICATIONS TO SELF-POWERED PANCHROMATIC PHOTODETECTORS

Jin Kyoung Park*, Jin Hyuck Heo, and Sang Hyuk Im**
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P2-T5-54 EXTRACTION PROCESS FOR THE PRODUCTION OF UNIFORM PBI2(DMSO) COMPLEX POWDERS

Ye Chan Jee*, Sang Jin Lee, Jin Hyuck Heo, and Sang Hyuk Im**
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P2-T5-55 CHIRAL ELECTRON TRANSPORTING MATERIALS FOR HIGH PERFORMANCE PEROVSKITE SOLAR CELLS

Yun Mi Song[1]*, Su-Kyo Jung[2], Jin Hyuck Heo[1], Jong H. Kim[2]**, O-Pil Kwon[2]**, and Sang Hyuk Im[1]**
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P2-T5-56 CO-DOPED MOO2 HOLE TRANSPORTING MATERIAL FOR EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS

Bong Woo Kim[1]*, Linlin Feng[1], Abimbola Jacob Olasoji[1], Jinsoo Kim[2]**, and Sang Hyuk Im[1]**
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P2-T5-57 WETTING INDUCED FORMATION OF VOID-FREE METAL HALIDE PEROVSKITE FILMS BY GREEN ULTRASONIC SPRAY COATING FOR MESOSCOPIC PEROVSKITE SOLAR CELLS

Bong Woo Kim*, Jin Hyuck Heo, and Sang Hyuk Im**
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P2-T5-58 DEVELOPMENT OF QUASI 2-DIMENSION PEROVSKITE SOLAR CELL USING 2-(4-METH-OXYPHENYL)ETHYLAMINE HYDROIODIDE WITH HALIDE ADDITIVES

Eun-Bi Kim[1]*, Abdullah Abdullah[3], Hyung-Shik Shin[1,2], and Sadia Ameen[3]**
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[2]*Korea Basic Science Institute, Daejeon, Republic of Korea*
[3]*Advanced Materials and Devices Laboratory, Department of Bio-Convergence Science, Jeongeup Campus, Jeonbuk National University, Republic of Korea*

P2-T5-59 THE ROLE OF POST-ANNEALING IN STRUCTURAL AND ELECTRICAL PROPERTIES OF SPUTTER-DEPOSITED BARIUM STANNATE AND LA-DOPED BARIUM STANNATE

Shuai Lan*, Jun Yeong Kim, Hyun Suk Jung, and Han-Ki Kim**
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P2-T5-60 GA AND TI DOPED INDIUM OXIDE AS A TOP ELECTRODE OF SEMI-TRANSPARENT PEROVSKITE SOLAR CELL FOR FUTUER BUILDING WINDOW

Sang-Hwi Lim[1]*, Hae-Jun Seok[1], Min-Jun Kwak[2], and Han-Ki Kim[1]**
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[2]*Korea electric power research institute, Daejeon, Republic of Korea*

P2-T5-62 STRUCTURAL EFFECT OF CB-OME (4,4'-(ORTHO-CARBORANE) BIS(N,N-BIS(4-METHOXY-PHENYL)ANILINE) ON ACCELERATING CHARGE TRANSFER IN PEROVSKITE PHOTOVOLTAICS

Byung Gi Kim[1]*, Woongsik Jang[1], Hani Jeon, Sunhee Lee[2], Won-Sik Han[2]**, and Dong Hwan Wang[1]**
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P2-T5-63 AMORPHOUS METAL ALLOY THIN FILM FOR APPLICATIONS ON FLEXIBLE STRAIN SENSORS AND ORGANIC PHOTOVOLTAICS

Jae Sang Cho[1]*, Woongsik Jang[1], Keum Hwan Park[2]**, and Dong Hwan Wang[1]**
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Nov-10 (Tue), 16:50-18:00 Lobby (3F)

Poster Presentation-02
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Jae Hyun Kim (Daegu Gyeongbuk Institute of Science & Technology, Republic of Korea)

P2-T6-1 HIGH ELECTRICAL PERFORMANCE OF LOW-TEMPERATURE-CURED FLEXIBLE SILVER ELECTRODE USING SCREEN-PRINTING FOR SOLAR CELL

Chae-Song Kwak*, and Sun Hong Yoon**
Department of IT Application Research Center, Korea Electronic Technology Institute, Jeonju, Republic of Korea

P2-T6-2 FORMATION OF THE HIGH-PHOTORESPONSIVITY BASI2 FILMS SPUTTERED ON GLASS SUBSTRATES

R. Koitabashi[1]*, T. Nemoto[1], M. Mesuda[2], K. Toko[1], and T. Suemasu[1]**

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P2-T6-3 OPTICAL ASYMMETRY OF GREEN CORE/SHELL QUANTUM DOTS

Sungjun Koh*, and Doh C. Lee**
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P2-T6-4 DESIGN OF PHOTOVOLTAIC PANEL ON OFFICE-BUILDING USING FLAT ROOF CONCEPT AND ARDUINO-BASED CONTROLLER INTEGRATED WITH SMARTPHONE

Wisik Adelina*, Hasna Azizah Zahra**, Indah Ika Nurcahyani, and Dimas Nauffal Rayhan
Universitas Islam Indonesia, Yogyakarta, Indonesia

P2-T6-5 FLOW-INDUCED ALIGNMENT OF SEMICONDUCTOR NANORODS FOR HIGH OUTCOUPLING-FACTOR LIGHT-EMITTING DEVICES

Do Joong Shin*, and Doh C. Lee**
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P2-T6-6 IMPROVED EFFICIENCY OF LIGHT-EMITTING ELECTROCHEMICAL CELLS FOR APPLICATION OF LIGHT-EMITTING SOLAR CELLS

Woo Jin Jeong*, Jae Hyun Kim, Dong Yoon Kwon, Hee Jung Kwak, Seong Hwan Kim, Ki Beom Park, Bong Min Park, and Jun Young Kim**
Department of Semiconductor Engineering, Gyeongsang National University, Jinju, Republic of Korea

P2-T6-7 CORE POSITION CONTROL OF DOT-IN-ROD HETEROSTRUCTURE FOR EFFICIENT PHOTO-CATALYTIC HYDROGEN GENERATION

Gui-Min Kim*, and Doh C. Lee**
Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

P2-T6-8 ECONOMIC ASSESSMENT OF DYNAMIC OPERATION OF SOLAR PV DRIVEN ALKALINE WATER ELECTROLYZER COUPLED WITH ENERGY STORAGE SYSTEM

Haider Niaz[1]*, Jun Hyung Ryu[2], and Jay Liu[1]**
[1]*Pukyong National University, Busan, Republic of Korea*
[2]*Division of Creative Convergence Engineering, Dongguk University, Republic of Korea*

P2-T6-9 TIN SULFIDES FILMS FORMED BY MOLECULAR PRECURSOR INK

Hyejin Kwon[1]*, Jae Soo Yoo[2], Vasudeva Reddy Minnam Reddy[1], and Chinho Park[1]**
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[2]*School of Chemical Engineering & Materials Science, Chung-Ang University, Seoul, Republic of Korea*

P2-T6-10 BANDGAP-ENGINEERED CADMIUM-FREE QUANTUM DOTS FOR ANTIBIOTIC-RESISTANT BACTERIAL CELL KILLING

Ilsong Lee*, and Doh C. Lee**
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P2-T6-11 REDESIGNING SURFACE OF ALL INORGANIC COLLOIDAL PEROVSKITE NANOCRYSTALS ACHIEVING SUPER-STABILITY

Ju Young Woo[1]*, Sung Nam Lim[1], Shin Ae Song[1], Kiyoung Kim[1], Dongsuk Yoo[2], Youngsik Kim[3], Jusun Park[3], Yong-Hyun Kim[2]**, and Sohee Jeong[3]**
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[3]Department of Energy Science, Sungkyunkwan University, Republic of Korea

P2-T6-12 INVESTIGATION ON SUB-BAND GAP OPERATION MECHANISM OF INP QUANTUM DOT-BASED LIGHT-EMITTING DIODES

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P2-T6-13 PHOTOVOLTAIC CHARACTERISTICS OF GASE/$MOSE_2$ HETEROJUNCTION DEVICES

Gilgu Oh[1], Ryoutaro Anzo[1], Chang Lim Woo[2]*, Pil Ju Ko[2], Nozomu Tsuboi[1], and Ryousuke Ishikawa[3]**
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P2-T6-14 EFFICIENT HYDROGEN AND SOLAR CELLS GENERATION USING GR-CDS HYBRID NANO-COMPOSITE

Salh Alhammadi*, Sreedevi Gedi, Chelim Jang, Bo Gyeong Mun, and Woo Kyoung Kim**
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P2-T6-15 PREPARATION AND INVESTIGATION OF HYDROPHOBIC SIO_2 ANTIREFLECTION COATING ON GLASS

Muhammad Aleem Zahid*, Khushabu Agrawal, Young Hyun Cho**, and Junsin Yi**
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P2-T6-16 REDUCTION IN THE OPTICAL REFLECTANCE OF KERF-LOSS FREE SILICON WAFERS USING CF_4/O_2 PLASMAS

Sanghyun You[1]*, Chang-Koo Kim[1]**, Jun-Hyun Kim[2], Suhyun Kim[3], and Jihyun Kim[3]**

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P2-T6-17 NANOPOROUS TA_3N_5 VIA ELECTROCHEMICAL ANODIZATION FOLLOWED BY NITRIDATION FOR SOLAR WATER OXIDATION

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P2-T6-18 VISIBLE-LIGHT RESPONSIVE $BINBO_4$ NANOSHEETS PHOTOANODE FOR STABLE AND EFFICIENT SOLAR-DRIVEN WATER OXIDATION

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P2-T6-19 UNDERSTANDING THE HYDROGEN TREATED CUO PHOTOELECTRODE FOR SOLAR WATER REDUCTION

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P2-T6-20 ELECTROCHEMICAL REDUCTION OF SULFUR MODIFIED COPPER CATALYST FOR CO_2 REDUCTION

Rohini S Kanase[1]*, Maheswari Arunachalam[2], and Soon Hyung Kang[3]**
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[2]*Department of Chemistry, Chonnam National University, Gwangju, Republic of Korea*
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P2-T6-21 RECOVERY OF SILICON FROM SPENT SOLAR CELL USING CAVITATION METHOD

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P2-T6-22 PHASE-CONTROLLED METAL SELENIDES SYNTHESIS AND ITS BI-FUNCTIONAL ACTIVITY IN WATER ELECTROLYSIS APPLICATION

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P2-T6-23 BIOMIMETICS CATHODES USING HIGH-DENSITY CARBON PAPERS WITH EDDY EFFECT FOR HIGH PERFORMANCE LITHIUM-AIR BATTERIES

Min-Cheol Kim*, Soo Jung Lee, and Jung Inn Sohn**

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P2-T6-24 LAYERED ORGANIC CUPRIC BROMIDE PEROVSKITE FOR MULTILEVEL (ON/OFF > 108) RESISTIVE SWITCHING MEMORY

So-Yeon Kim*, June-Mo Yang, Eun-Suk Choi, Dong-Am Park, and Nam-Gyu Park**

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P2-T6-25 PHOTO-RECHARGEABLE SELF-POWERED SYSTEM CONSISTING OF ORGANIC SOLAR CELL AND SUPERCAPACITOR BY SHARING ELECTRODE

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P2-T6-26 INVESTIGATION OF MULTI-METAL SPINEL B-SITE CATION COMPOSITION VARIATION IN OXYGEN EVOLUTION REACTION

Keon Beom Lee*, Seung Hwan Jo, Min Kyu Seo, Prakash Ramakrishnan, and Jung Inn Sohn**

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P2-T6-27 UV-THERMAL TREATMENT OF HIGH-PERFORMANCE METAL-CHALCOGENIDE SEMI-CONDUCTORS

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P2-T6-28 HIGH TRNASMITTANCE TRANSPARENT CONDUCTIVE OXIDES OF ROCKSALT-AL-DOPED ZNCDO FOR FULL SPECTRUM SOLAR CELLS

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P2-T6-29 TRIPLE LAYERED GA_2O_3/CU_2O/AU PHOTOANODES WITH ENHANCED PHOTOACTIVITY AND STABILITY BY IRON NICKEL OXIDE CATALYSTS

Hee Jun Kim[1]*, Tae Won Lee[2], Hye Hyeon Kim[2], U Jeong Yang[2], Chan Ul Kim[2], Kyoung Jin Choi[2],

Heon Lee[3], and Jeong Min Baik[1]**
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P2-T6-30 SOLAR-THERMOELECTRICS USING SPIN SEEBECK EFFECTS

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P2-T6-31 2D NICOFE LDH AS AN EFFICIENT ELECTROCATALYST FOR HYDROGEN EVOLUTION REACTION

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P2-T6-32 COMBINATORIAL INVESTIGATION OF AMORPHOUS LI-LA-ZR-O THIN FILM BY SOL-GEL PROCESSING

Tan Tan Bui[1]*, Boseon Yun[2], and Myung Gil Kim[1]**
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[2]*Department of Chemistry, Chung Ang University, Seoul, Republic of Korea*

P2-T6-33 IN SITU DIRECTIONAL FORMATION OF CO@COOX EMBEDDED IN 1D CARBON NANO-TUBES FROM MOF AS AN EFFICIENT OXYGEN ELECTROCATALYST FOR ULTRA-HIGH RATE ZN-AIR BATTERIES

Chao Lin*, and Jung-Ho Lee**
Department of Materials and Chemical Engineering, Hanyang University, Ansan, Republic of Korea

P2-T6-34 ANTI-SELF-DISCHARGE FLEXIBLE AND RECHARGEABLE SOLID-STATE ZN-AIR BATTERY BASED ON ION EXCHANGE POLYMER MEMBRANE ENGINEERED WITH FAST ION TRANSPORT NANOCHANNEL

Chao Lin*, and Jung-Ho Lee**
Department of Materials and Chemical Engineering, Hanyang University, Ansan, Republic of Korea

P2-T6-35 A LONG-LIFE RECHARGEABLE ZN AIR BATTERY BASED ON BINARY METAL CARBIDE

Chao Lin*, and Jung-Ho Lee**
Department of Materials and Chemical Engineering, Hanyang University, Ansan, Republic of Korea

P2-T6-36 2D-ORGANIC FRAMEWORK CONFINED METAL SINGLE ATOMS WITH THE LOADING REACHING THE THEORETICAL LIMIT

Chao Lin*, and Jung-Ho Lee**
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P2-T6-37 DESIGNING OF $Bi_2O_2CO_3/Bi_2S_3$ COMPOSITE ARCHITECTURE FOR EFFICIENT VISIBLE LIGHT INDUCED PHOTODEGRADATION OF OFLOXACIN ANTIBIOTIC

Sangeeta Adhikari, and Do-Heyoung Kim*
School of Chemical Engineering, Chonnam National University, Gwangju, Republic of Korea

P2-T6-38 GATE-TUNABLE AMBIPOLAR TRANSISTOR AND PHOTODETECTOR IN GRAPHENE/MOSE2 BARRISTOR DEVICE

Gwangtaek Oh[1]*, Young Chul Kim[2], Yeong Hwan Ahn[2], DaYea Oh[1], ChanSoo Yoon[1], Mi Jung Lee[2], and Bae Ho Park[1]**
[1]*Konkuk University, Republic of Korea*
[2]*Ajou University, Republic of Korea*

P2-T6-39 NOBLE METAL FREE CO-SN-S_X CHALCOGELS FOR HIGH PERFORMANCE HYDROGEN EVOLUTION

Dong-Hyung Kim*, S. S. Shinde, and Jung-Ho Lee**
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P2-T6-40 FABRICATION OF P-SNS / N-SI HETEROSTRUCTURE FOR SOLAR CELL APPLICATION

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Nov-11 (Wed), 17:00-18:30 Lobby (3F)

Poster Presentation-03
T1-Crystalline and thin film silicon PV

Chair(s) Taejun Kim (Hyundai Energy Solutions, Republic of Korea)
Min Gu Kang (Korea Institute of Energy Research, Republic of Korea)

P3-T1-52 STUDY ON THE ENERGY CONSERVATION OF OPTIMUM DESIGN OF WATER COOLING JACKET TO MAINTAIN SILICON SINGLE CRYSTAL GROW AND AMORPHOUS DEFECT REGIONS OF THE CZOCHRALSKI METHOD

Hong Myeong Kim*, Mancheol Heo, and Jae Hak Jung**
YeungNam University, Gyeongsan-si, Gyeongbuk, Republic of Korea

P3-T1-53 RESEARCH ON IMPROVEMENT OF HEAT DISSIPATION SOLAR MODULE POWER GENERATION USING GRAPHITE SHEET

Seong Hwan Kang[1,2]*, In Sung Jung[1], Jae Woo Park[1], Chong Yeal Kim[1], and Jae Ho Choi[1]**
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P3-T1-54 TRIPLE JUNCTIONS OF RANDOM ANGLE GRAIN BOUNDARIES ACTING AS DISLOCATION SOURCES IN HP MC-SILICON INGOTS

Y. Ohno[1]*, K. Tajima[2], K. Kutsukake[2], and N. Usami[3]
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[2]Graduate School of Engineering, Nagoya University, Nagoya, Japan
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P3-T1-55 IMPACT OF MISALIGNMENT OF Σ3{111} GRAIN BOUNDARIES ON PHOTOVOLTAIC PROPERTIES IN SILICON

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[5]Graduate School of Engineering, Nagoya University, Nagoya, Japan

P3-T1-56 IMPACT OF GE DEPOSITION TEMPERATURE ON FABRICATION OF SURFACE TEXTURE USING SIGE ISLANDS AS A MASK

V. H. Nguyen[1]*, A. Novikov[2], M. Shaleev[2], D. Yurasov[2], Y. Kurokawa[1], and N. Usami[1]
[1]Graduate School of Engineering, Nagoya University, Nagoya, Japan
[2]Institute for Physics of Microstructures RAS, Nizhny Novgorod, Russia

P3-T1-57 MINIMIZING LIGHT-INDUCED DEGRADATION OF ALUMINA REAR PASSIVATION LAYER FOR PERC SOLAR CELLS

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[2]*KU-KIST Green School, Korea University, Seoul, Republic of Korea*

P3-T1-58 EFFECT OF TEMPERATURE ON THE POTENTIAL-INDUCED DEGRADATION OF SILICON HETEROJUNCTION PHOTOVOLTAIC MODULES

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P3-T1-59 SOLAR ENERGY SYSTEM FAULT DETECTION USING DECISION TREE ENSEMBLE

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P3-T1-60 SWCT MODULE OUTPUT IMPROVEMENT USING LOW MELTING POINT COATED WIRE

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P3-T1-61 OPTIMUM POINT FOR MEASURING THE REPRESENGING TEMPERATURE OF PV MODULE AND ARRAY IN OUTDOOR CONDITIONS

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P3-T1-62 PASSIVATION PROPERTIES OF A-SI AFTER PLASMA ION IMPLANTATION THROUGH A HARD MASK

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P3-T1-64 PASSIVATION EFFECT OF SPUTTERED ITO/SiO_2 LAYER ON NANOTEXTURED SI SOLAR CELLS

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P3-T1-65 DEPENDENCE OF ELECTRICAL PROPERTIES OF STACKED SN-DOPED IN_2O_3 FILMS ON OXYGEN PARTIAL PRESSURE

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P3-T1-66 GRID DESIGNS ON SOLAR CELLS/MODULE INTEGRATION USING A WIRE EMBEDDED EVA SHEET

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P3-T1-67 FABRICATION OF SI TEXTURES WITH LOW ETCHING MARGIN USING AG-ASSISTED ALKALINE SOLUTION

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P3-T1-68 A STUDY OF SURFACE ROUGHNESS OF SILICON WAFER: EFFECT FROM CONTROLLING X-Y TRANSLATION TABLE SPEEDS OF PULSED ND: YAG LASER TEXTURING

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P3-T1-69 MAGNETRON SPUTTERED ITO:ZR BI-LAYERS WITH HIGH WORK FUNCTION FOR SILICON HETEROJUNCTION SOLAR CELLS

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P3-T1-70 AMBIENT ANNEALING INFLUENCE ON SURFACE PASSIVATION OF MOLYBDENUM OXIDE LAYER FOR CARRIER SELECTIVE CONTACT SOLAR CELLS

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P3-T1-71 FABRICATION OF TANTALUM-DOPED TITANIUM-OXIDE ELECTRON-SELECTIVE CONTACTS WITH HIGH PASSIVATION QUALITY

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P3-T1-72 EFFECT OF HYDROGENATED INDIUM BASED TCO FILMS FOR APPLICATION OF OPTO-ELECTRONIC DEVICES

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P3-T1-73 STUDY ON SPUTTERING DAMAGE TO CRYSTALLINE SILICON SUBSTRATE AND ITS RECOVERY

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P3-T1-74 APPLICATION OF ARTIFICIAL NEURAL NETWORK TO PREDICT DISTRIBUTION OF DISLOCATIONS IN SILICON INGOTS

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P3-T1-75 PASSIVATION OF CRYSTALLINE SI SURFACES BY STACKED AMORPHOUS SI FILMS FORMED BY CAT-CVD

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P3-T1-76 CORRELATION BETWEEN DEGREE OF DISORDER OF A-SI:H PASSIVATED LAYER AND CHARACTERISTICS OF A-SI:H/C-SI HETEROJUNCTION SOLAR CELLS

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P3-T1-78 UV LIGHT INDUCED DEFECTS DURING REACTIVE PLASMA DEPOSITION

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P3-T1-79 TEST ROUTINE FOR RAPID ASSESMENT OF POTENTIAL INDUCED DEGRADATION AT THE REAR SIDE OF BIFACIAL SOLAR CELLS

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P3-T1-80 PASSIVATION PERFORMANCE AND STABILITY OF ALD-MOOX FILM WITH AL_2O_3 CAPPING LAYER

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P3-T1-81 CARBON DIOXIDE/ SILANE GAS FLOW RATE DEPENDENCY ON ELECTRICAL PROPERTIES IN SILICON-NANOCRYSTALS-EMBEDDED SILICON OXIDE PASSIVATING CONTACTS

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P3-T1-82 LASER ASSISTED NANO-TEXTURING PROCESS FOR ULTRATHIN CRYSTALLINE SI SOLAR CELLS

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P3-T1-83 FORMATION OF POLY-SI FILMS ON TEXTURED GLASS SUBSTRATES BY THE FLASH LAMP ANNEALING OF HYDROGENATED AMORPHOUS SI FILMS

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P3-T1-84 INVESTIGATION OF EMITTER DOPING PROFILE OF FABRICATED SELECTIVE EMITTER SOLAR CELL BY LASER-OVERDOPING PROCESS

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P3-T1-85 ADVANCEMENT OF SCHOTTKY BARRIER SOLAR CELLS: A REVIEW

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P3-T1-86 MONITORING STUDY ON THE POWER GENERATION OF BIPV AND INTEGRATED SYSTEM FOR SCHOOL BUILDING APPLICATION

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P3-T1-87 A WEB BASED PV SIMULATION PLATFORM (XSOLAR-HETERO) TARGETING AT MACHINE LEARNING COMBINED WITH DEVICE SIMULATION, DEVELOPING A NOVEL ALL-BACK-CONTACT CONTACT PASSIVATED SOLAR CELL

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P3-T1-88 STABILITY OF CU/TIW/ITO ELECTRODE FOR SI HETEROJUNCTION SOLAR CELL UNDER DAMP HEAT

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P3-T1-89 ANALYSIS OF ELECTRODE PROPERTIES WITH A FINER FINGER FOR IMPROVING THE EFFICIENCY OF SHJ SOLAR CELLS

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P3-T1-91 CHARACTERISTICS OF BONDING CELL USING EPOXY ECA

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P3-T1-92 LASER PHOSPHORUS DOPING AT HIGH SCAN RATES FOR CRYSTALLINE JUNCTION FORMATION IN SILICON/PEROVSKITE TANDEM SOLAR CELLS

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P3-T1-93 A RESEARCH ON PERC SOLAR CELLS APPLIED WITH SMALL PYRAMID TEXTURING

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P3-T1-94 ATOMIC LAYER DEPOSITED ALUMINIUM DOPED TITANIUM OXIDE LAYER AS PASSIVATING CONTACTS ON SILICON SOLAR CELLS

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P3-T1-95 DEVELOPMENT OF SIMULTANEOUSLY BIFACIAL PLATING TECHNOLOGY FOR RAPID PLATING METALLIZATION

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P3-T1-96 OXIDE DISRUPTION IN POLY-SI/SIO_X PASSIVATING CONTACTS AT DIFFERENT LOCATIONS OF RANDOM PYRAMIDS

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P3-T1-97 PV PERFORMANCE EVALUATION AND PREDICTION BY NORMALIZED EFFICIENCY CONSIDERING PARTIAL SHADING

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P3-T1-98 EFFECTS OF VARYING DEPOSITION PARAMETERS OF HYDROGENATED SILICON THIN FILMS ON THE PASSIVAION AND DEVICE CHARACTERISTICS OF SILICON HETEROJUNCTION SOLAR CELLS

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P3-T1-99 PASSIVATION OF SI/TIO_2 USING SIO_X INTERFACIAL LAYER BY ZONE HEATING RECRYSTALLIZATION FOR 2-TERMINAL PEROVSKITE/SI TANDEM SOLAR CELL

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P3-T1-100 ANALYSIS OF TEMPERATURE AND OUTPUT CHARACTERISTICS OF BUILDING INTEGRATED SHINGLED PHOTOVOLTAIC MODULE ACCORDING TO THE TYPES OF STEEL PLATES

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P3-T1-101 MODELLING OF 3D SOLAR CELL WITH FINITE VOLUME DISCRETIZATION

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P3-T1-102 CARBON NANOTUBE ELECTRODE-BASED PEROVSKITE-SILICON TANDEM SOLAR CELLS

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P3-T1-103 HIGH-EFFICIENCY SOLAR PV CONVERGENCE SYSTEM

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Nov-11 (Wed), 17:00-18:30 Lobby (3F)

Poster Presentation-03
T5-Perovskite solar cells

Chair(s) Byungha Shin (Korea Advanced Institute of Science and Technology, Republic of Korea)

P3-T5-64 POLYMORPH ENGINEERING OF BI-BASED LEAD-FREE HALIDE PEROVSKITES THROUGH DENSITY FUNCTIONAL THEORY CALCULATIONS

Jong-Goo Park*, Hoon-Hwe Cho, and Ki-Ha Hong**
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P3-T5-65 ENHANCED CONDUCTIVITY NETWORK OF POLY(3,4-ETHYLENEDIOXYTHIOPHENE)-POLY (STYRENESULFONATE) (PEDOT:PSS) ELECTRODE BY POST-TREATMENT WITH ALCOHOLIC SOLVENT FOR HIGH PERFORMANCE IN ORGANIC PHOTOVOLTAICS

Min Soo Kim[1]*, Woongsik Jang[1], Felix Sun Joo Kim[2], and Dong Hwan Wang[1]**
[1]School of Integrative Engineering, Chug-Ang University, Seoul, Republic of Korea
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P3-T5-66 NOVEL METHOD FOR SYNTHESIZING COLLOIDAL PEROVSKITE QUANTUM DOTS WITH IMPROVED LUMINESCENCE RETENTION

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P3-T5-68 EFFECT OF V-INCORPORATED NIO HOLE TRANSPORT LAYER ON THE PERFORMANCE OF INVERTED PEROVSKITE SOLAR CELLS

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P3-T5-69 APPLICATION OF LOW-DIMENSIONAL PEROVSKITE MATERIALS IN PHOTOVOLTAICS

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P3-T5-70 EFFICIENT AND STABLE WIDE BANDGAP PEROVSKITE TANDEM CELLS VIA ANION-ENGINEERED TWO-DIMENSIONAL ADDITIVES

Daehan Kim[1]*, Hee Joon Jung[2], Ik Jae Park[3], Bryon W. Larson[4], Sean P. Dunfield[4], Chuanxiao Xiao[4], Jekyung Kim[1], Jinhui Tong[4], Passarut Boonmongkolras[1], Su Geun Ji[3], Fei Zhang[4], Seong Ryul Pae[1], Minkyu Kim[1], Seok Beom Kang[5], Vinayak Dravid[2], Joseph J. Berry[5], Jin Young Kim[3]**, Kai Zhu[4]**, Dong Hoe Kim[4,5]**, and Byungha Shin[1]**
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P3-T5-71 HIGH-EFFICIENCY AND UV STABLE PEROVSKITE SOLAR CELL BY SNO_2 MODIFIED TIO_2 ELECTRON TRANSPORT LAYER

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P3-T5-72 CARRIER PATHWAY OF THREE-DIMENSIONAL STRUCTURE BY TRIAZINE-BASED POROUS ORGANIC POLYMER FOR EFFICIENT INVERTED PEROVSKITE SOLAR CELLS

Jihyun Lim[1]*, Min-Sung Kim[2], Woongsik Jang[1], Jin Kuen Park[2]**, and Dong Hwan Wang[1]**
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P3-T5-73 ENHANCED ENDURANCE PROPERTY IN PEROVSKITE HALIDE RESISTIVE SWITCHING MEMORY BY ADOPTING 2D/3D HETEROINTERFACE

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P3-T5-75 HIGHLY STRETCHABLE PEDOT:PSS FOR PEROSVKISTE SOLAR CELLS WITH IMPROVED STABILITY

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P3-T5-76 DUAL COATING METHOD FOR BAND ALIGNMENT ENGINEERING BETWEEN SNO_2 AND HALIDE PEROVSKITES

Jung Hwan Lee*, and Jong Hyeok Park**
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P3-T5-77 OPTO-ELECTRONIC MODULATION OF PEROVSKITE SOLAR CELL VIA WRINKLE MORPHOLOGY

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P3-T5-78 COMPOSITIONAL ENGINEERING OF FA-BASED LEAD HALIDE PEROVSKITES FOR SHEAR COATING PROCESSES

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P3-T5-79 OPTIMIZATION STUDY OF THE CHARGE TRANSPORT LAYERS IN SN-BASED PEROVSKITE SOLAR CELLS BY TCAD SIMULATION

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P3-T5-80 MORPHOLOGICAL CONTROL FOR EFFICIENT TIN-BASED PEROVSKITE SOLAR CELLS WITH PLANAR N-I-P STRUCTURE

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P3-T5-81 ENHANCED PERFORAMANCE IN TIN-HALIDE PEROVSKITE SOLAR CELLS

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P3-T5-82 STRUCTURAL AND OPTICAL PROPERTIES OF $CSPBBR_3$-GRAPHENE COMPOSITES AND THEIR APPLICATIONS

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P3-T5-83 SOLUTION-PROCESSED LI DOPED NIO_X AS A HOLE TRANSPORT LAYER FOR PB-SN MIXED LOW BANDGAP PEROVSKITE SOLAR CELLS

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P3-T5-84 A DOPANT-FREE NAPHTHALENE-BASED POLYMERIC HOLE TRANSPORTING MATERIAL FOR PEROVSKITE SOLAR CELLS WITH IMPROVED STABILITY

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P3-T5-85 DITHIOPHENE-FLUORENE BASED HOLE TRANSPORTING MATERIAL FOR PEROVSKITE SOLAR CELLS WITH 18 % PCE AND HIGH STABILITY

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P3-T5-86 TRANSPARENT CONDUCTIVE FILMS WITH EMBEDDED AG GRID MESH FOR ORGANIC THIN-FILM PHOTOVOLTAIC CELLS

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P3-T5-89 SLOT-DIE COATING PROCESS FOR HIGH-EFFICIENCY TRIPLE-CATION PEROVSKITE SOLAR CELLS IN AN AMBIENT ENVIRONMENT

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P3-T5-90 LIGHT ILLUMINATION EFFECT ON PEROVSKITE PRECURSOR SOLUTION CHEMISTY AND ITS PHOTOVOLTAIC PERFORMANCE

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P3-T5-91 COMPOSITIONAL ENGINEERING OF BI-BASED HALIDE PEROVSKITES FOR THE SHEAR COATING PROCESS

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P3-T5-92 ENHANCED LONG-TERM STABILITY OF PEROVSKITE SOLAR CELLS BY USING DEFECT-TOLERANT SODIUM-BASED DOPANT

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P3-T5-93 EFFECT OF BR/(I+BR) RATIO IN PEROVSKITE ABSORBER ON CELL PERFORMANCE BY DEVICE SIMULATION

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P3-T5-94 HIGHLY EFFICIENT AND FLEXIBLE PEROVSKITE/III-V TANDEM SOLAR CELLS

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P3-T5-95 FUNCTIONALIZED HYBRID HOLE TRANSPORT LAYER FOR DEFECT-PASSIVATED PEROVSKITE SOLAR CELL

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P3-T5-96 FUNCTIONALIZED ORGANIC HOLE TRANSPORT INTERLAYER FOR DEFECT PASSIVATED PEROVSKITE SOLAR CELLS

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P3-T5-97 OPTIMAL INTERFACIAL ENGINEERING WITH DIFFERENT LENGTH OF ALKYLAMMONIUM HALIDE FOR EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS

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P3-T5-98 IMPROVED PEROVSKITE CRYSTAL GROWTH BY SUPPRESSING MOISTURE IN SOLUTION STATE FOR STABLE PEROVSKITE SOLAR CELLS

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P3-T5-99 ENHANCED PERFORMANCE OF INVERTED PLANAR PEROVSKITE SOLAR CELLS VIA TWO-IN-ONE ANTISOLVENT PROCESS WITH FUNCTIONAL ADDITIVE

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P3-T5-100 CATIONIC CHLORIDE ADDITIVE EFFECT FOR HIGH EFFICIENCY OF FORMAMIDINIUM LEAD IODIDE BASED PEROVSKITE SOLAR CELLS

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P3-T5-101 CARBAZOLE-BASED SPIRO[FLUORENE-9,9`-XANTHENE] AS EFFICIENT HOLE-TRANSPORTING MATERIAL FOR PEROVSKITE SOLAR CELLS

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P3-T5-102 TIO_2 COLLOID-SPRAY COATED ELECTRON-TRANSPORTING LAYERS FOR EFFICIENT PEROVSKITE SOLAR CELLS

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P3-T5-103 PEROVSKITE SOLAR CELL USING N-TYPE AMORPHOUS SI AS AN ELECTRON TRANSPORT LAYER

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P3-T5-104 AN EFFECT OF PHOTOEXCITED STATE OF ORGANIC HOLE-TRANSPORT LAYER ON THE PERFORMANCES OF PEROVSKITE SOLAR CELLS

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P3-T5-105 A NAPHTHALENE MODIFIED SPIRO-OMETAD FOR HIGHLY THERMAL STABLE AND EFFICIENT PEROVSKITE SOLAR CLEES

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P3-T5-106 TRIARYLAMINE-BASED HOLE TRANSPORTING POLYMER WITH ELECTRON DONATING GROUP FOR HIGHLY EFFICIENT AND STABLE PEROVSKITE SOLAR CELLS

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P3-T5-107 A THERMAL ANNEALING STRATEGY FOR EFFICIENT AND PHOTOSTABLE WIDE-BANDGAP PEROVSKITE SOLAR CELLS

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P3-T5-108 ENHANCING THE EFFICIENCY OF PEROVSKITE SOLAR CELL WITH LIGHT-TRANSMITTING TYPE OF PATTERNED SUBSTRATE

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P3-T5-109 CHARACTERISTIC OF METHYL-AMMONIUM LEAD BROMIDE PEROVSKITES SOLAR CELLS FABRICATED BY ONE-STEP SPIN COATING PROCESS FOR THE APPLICATION OF TRANSPARENT PHOTOVOLTAICS

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P3-T5-110 INVESTIGATION OF ANTI-SOLVENT ENGINEERING FOR ENHANCED EFFICIENCY OF $MAPBI_3$ PEROVSKITE SOLAR CELLS

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P3-T5-111 INVESTIGATION OF TRIPLE CATION ORGANO-METAL HALIDE PEROVSKITE SOLAR CELLS

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P3-T5-112 A ROOM-TEMPERATURE SOLUTION PROCESSED ELECTRODE FOR SEMITRANSPARENT PEROVSKITE SOLAR CELLS

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P3-T5-113 CHARACTERISTIC ANALYSIS OF DIFFERENT HOLE TRANSPORT LAYER IN SILICON-PEROVSKITE TANDEM SOLAR CELLS

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P3-T5-114 SOLUTION PROCESSED FLEXIBLE DBR AND ITS APPLICATION FOR FLEXIBLE SOLAR CELLS

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P3-T5-115 APPLICATION OF BIFACIAL ILLUMINATION IN PEROVSKITE/C-SI TANDEM SOLAR CELLS FOR PCE APPROACHING 30%

Syed Dildar Haider Naqvi[1,2]*, Yasir Siddique[1,2], Kyugnan Son[2,3], Minh Hoang Pham[1,2], Asmat Ullah[1,2], Inyoung Jeong[2], Sungjun Hong[1,2], Min Koo Kang[2], He-Eun Song[2], Sang Min Lee[2], Seung Kyu Ahn[2], and Sejin Ahn[1,2]**
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P3-T5-116 NIOX MEDIATED OXIDATION OF SPIRO-OMETAD FOR TRANSPARENT PEROVSKITE SOLAR CELL APPLICATION

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P3-T5-117 AGING EFFECT OF PRECURSOR SOLUTION ON PHOTOVOLTAIC PERFORMANCE OF PEROVSKITE SOLAR CELLS: DEPENDENCE OF PRECURSOR MATERIALS

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P3-T5-118 HOW THE MIXED ORGANIC CATIONS IN TIN IODIDE PEROVSKITES AFFECT THEIR CHARGE CARRIER DYNAMICS AND SOLAR CELL CHARACTERISTICS

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P3-T5-119 CHARGE RECOMBINATION IN STORAGED AND PASSIVATED PEROVSKITE SOLAR CELLS

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P3-T5-120 NEAR-ULTRAVIOLET TRANSPARENT ORGANIC HOLE-TRANSPORTING MATERIALS FOR EFFICIENT PEROVSKITE SOLAR CELLS

Minh Anh Truong*, Hayoon Lee, Ai Shimazaki, Richard Murdey, and Atsushi Wakamiya**
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P3-T5-121 ACCELERATED LIFETIME TESTING OF MIXED COMPOSITION PEROVSKITE SOLAR CELLS

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P3-T5-122 OPTOELECTRONIC AND ENERGY LEVEL EXPLORATION OF BISMUTH AND ANTIMONY-BASED MATERIALS FOR LEAD-FREE SOLAR CELLS

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P3-T5-123 TIN-BASED PEROVSKITE SOLAR CELLS USING PRECURSOR MATERIALS PURIFIED BY TIN(0) NANOPARTICLE TREATMENT

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P3-T5-124 BALLOON FLIGHT DEMONSTRATION OF PEROVSKITE SOLAR CELL TOWARD APPLICATIONS TO INFLATABLE STRUCTURES

Hideyuki Fuke[1]*, Shuusaku Kanaya[2], Yu Miyazawa[2], Hiroyuki Toyota[1], Kazuyuki Hirose[1], and Masashi Ikegami[3]
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P3-T5-125 M13 BACTERIOPHAGE-TEMPLATED GOLD NANOWIRE AS STRETCHABLE ELECTRODES IN PEROVSKITE SOLAR CELLS

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Nov-11 (Wed), 17:00-18:30 Lobby (3F)

Poster Presentation-03
T6-Advanced concepts and new emerging materials & PV energy storage, solar fuels and novel applications

Chair(s) Hyung Koun Cho (Sungkyunkwan University, Republic of Korea)

P3-T6-41 SCALABLE 3-D CARBON NITRIDE SPONGE AS AN EFFICIENT METAL- FREE BIFUNCTIONAL OXYGEN ELECTROCATALYST FOR RECHARGEABLE ZN-AIR BATTERIES

S. S. Shinde*, Dong-Hyung Kim, Sung-Hae Kim, and Jung-Ho Lee**
Department of Materials Science and Chemical Engineering, Hanyang University, Ansan, Gyeonggi-do, Republic of Korea

P3-T6-42 SELF-ASSEMBLED AIR-STABLE MAGNESIUM HYDRIDE EMBEDDED IN 3-D ACTIVATED CARBON FOR REVERSIBLE HYDROGEN STORAGE

S. S. Shinde*, Dong-Hyung Kim, Sung-Hae Kim, and Jung-Ho Lee
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P3-T6-43 LANTHANIDES-BASED GRAPHENE CATALYSTS FOR HIGH PERFORMANCE HYDROGEN EVOLUTION AND OXYGEN REDUCTION

S. S. Shinde*, Dong-Hyung Kim, and Jung-Ho Lee**

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P3-T6-44 17.25%-EFFICIENT, ALL ROOM-TEMPERATURE SILICON SOLAR CELLS

Sung-Hae Kim[1]*, Jin-Young Jung[1], Ralf B. Wehrspohn[2,3], and Jung-Ho Lee[1]**

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P3-T6-45 LOW COST, DOPANT-FREE HETEROJUNCTION INTERDIGITATED BACK CONTACT SOLAR CELL ON EXFOLIATED THIN CRYSTALLINE SILICON SUBSTRATE

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P3-T6-46 NANOSTRUCTURED DESIGN OF CUPROUS OXIDE PHOTOCATHODE USING FACILE HOT WATER OXIDATION

Sung-Hae Kim*, Jin-Young Yu, and Jung-Ho Lee**

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P3-T6-47 EFFECT OF SOLVENT VAPOR ANNEALING ON THE PERFORMANCE OF SOLUTION-PROCESSED TIN-BASED ORGANIC-INORGANIC PEROVSKITE THIN FILM TRANSISTOR

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P3-T6-48 UTILIZING LNG COLD ENERGY FOR EFFICIENT HYDROGEN LIQUEFACTION

Amjad Riaz, Seongwoong Min*, Muhammad Abdul Qyyum, and Moonyong Lee**

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P3-T6-49 SYNTHESIS OF HOLLOW NICKEL COBALT SULFIDE AND ITS COMPOSITES AS HIGH-PERFORMANCE CATHODES FOR ALUMINUM ION BATTERIES

Jisu Kim*, Nangyeong Kim, and Gibaek Lee**

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P3-T6-50 HIGH ENERGY SURFACE ETCHED GRAPHITE CATHODE FOR A NOVEL AQUEOUS ALUMINUM ION BATTERY

Nangyeong Kim*, Jisu Kim, and Gibaek Lee**

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P3-T6-51 PERYLENE-BASED AROMATIC POLYIMIDE WITH MULTIPLE CARBONYLS ENABLING HIGH-PERFORMANCE ORGANIC LITHIUM AND SODIUM BATTERIES

Michael Ruby Raj*, Nangyeong Kim, Jisu Kim, and Gibaek Lee**

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P3-T6-52 HIERARCHICAL HETERO-ARCHITETURE OF NICOMO LAYERED DOUBLE HYDROXIDE AS AN EFFICIENT BIFUNCTIONAL ELECTROCATALYST FOR THE OER AND HER

Shrine Maria Nithya Jeghan[1]*, Jisu Kim[1], Nangyeong Kim[1], and Gibaek Lee[1]**

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P3-T6-53 CHARACTERIZATION OF CUPROUS OXIDE THIN FILMS GROWN BY ELECTROCHEMICAL DEPOSITION WITH SB-DOPING

Ji Hoon Choi*, Dong Su Kim, Sung Hyeon Jung, Hyeon Seong Han, Sang Jun Oh, and Hyung Koun Cho**

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P3-T6-54 PD NANOPARTICLES SUPPORTED ON $CO(OH)_2$ NANOPLATELETS AS BIFUNCTIONAL ELECTROCATALYST AND THEIR APPLICATION IN METAL-AIR BATTERIES

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P3-T6-55 THE SYNERGISTIC EFFECT OF $NICO_2S_4$/S-DOPED POROUS GRAPHENE NANOSTRUCTURE FOR ENHANCED RECHARGEABLE LI-O_2 BATTERIES

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P3-T6-56 CONTROLLED CHEMICAL OXIDATION OF GRAPHITE TO GRAPHITE OXIDE AS HIGH PERFORMANCE ANODE MATERIAL FOR LITHIUM ION BATTERY

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P3-T6-57 NANOSTRUCTURED EXPANDED GRAPHITE ANODE MATERIALS ENABLING HIGH CAPACITY AND LONG LIFE CYCLE LITHIUM-ION BATTERIES

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P3-T6-58 NATURAL SULFUR DOPING PROMOTES THE ELECTROCHEMICAL ACTIVITY: CAMELLIA JAPONICA FLOWER-DERIVED SULFUR-ENRICHED ACTIVATED CARBON

Yujin Chae[1]*, Subramani Surendran[1], Seulgi Ji[2], Yelyn Sim[1], Chang Hyuck Choi[3]**, Heechae Choi[2]**, and Uk Sim[1]**

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P3-T6-59 REALIZATION OF COMPOSITE ELECTROLYTE WITH ULTRA-HIGH LI-ION CONDUCTION VIA SURFACE FUNCTIONALIZATION OF ZEOLITE EMBEDDED IN POLYETHYLENE OXIDE: APPLICATION IN HIGH PERFORMANCE LI-METAL BATTERIES

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P3-T6-60 PHOTOELECTROCHEMICAL CHARACTERISTICS OF NH_3-TREATED N-GAN FILM

SeongWoo Sim[1]*, and Soon Hyung Kang[2]**
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P3-T6-61 LOW TEMPERATURE SYNTHESIS OF $CUCRO_2$ AS POSSIBLE ELECTRODE MATERIAL FOR ELECTROCHEMICAL SUPERCAPACITOR

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P3-T6-62 SYNTHESIS AND PROPERTIES OF π-SNS NANOPARTICLES PV APPLICATION

Sreedevi Gedi, Hyelim Lee*, Vasudeva Reddy Minnam Reddy, Salh Alhammadi, Hyeonwook Park, Yeongju Seo, Chelim Jang, Bo Gyeong Mun, and Woo Kyoung Kim**
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P3-T6-63 CHARACTERISTICS IMPROVEMENT OF THIN C-SI PHOTOANODE USING LITHIUM FLUORIDE ELECTRON-SELECTIVE CONTACT

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P3-T6-64 EXCELLENT RATE CAPABILITY OF FE_7S_8@NCG POROUS HOLLOW NANOFIBER FOR SODIUM-ION BATTERY ANODES

Dingcheng Yang[1]*, Linghong Yin[1], Hang Yang[1], Jinhyun Hwang[1], Mihee Park[2], and Chae-Ryong Cho[1,3]**

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P3-T6-65 SMART BIFUNCTIONAL SB_2SE_3 NANORODS FOR INTEGRATED WATER PURIFICATION

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P3-T6-66 HIGHLY STABLE PHOTOELECTROCHEMICAL OPERATION OF CU_2O NANOWIRE PHOTO-CATHODES USING A STRATEGICALLY DESIGNED SOLUTION-PROCESSED TITANIUM OXIDE PASSIVATION COATING

Sung Hyeon Jung*, Young Been Kim, Dong Su Kim, Ji Hoon Choi, and Hyung Koun Cho**
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P3-T6-67 RATIONAL DESIGN OF DIMENSIONALLY STABLE ANODE BY GENERATING NOVEL ACTIVE SITE THROUGH NIOBIUM DOPED TIO_2/RUO_2 STRUCTURE

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P3-T6-68 HIGHLY EFFICIENT PT SINGLE-ATOM CATALYST SUPPORTED ON WO_{3-X} FOR HYDROGEN EVOLUTION REACTION

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P3-T6-69 SYNTHESIS AND APPLICATIONS OF LEAD-FREE PEROVSKITE CESIUM YTTERBIUM HALIDE NANOCRYSTALS

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P3-T6-70 SYNTHESIS OF CARBON-COATED FE2O3 NANOFIBERS BY ONE-STEP ANNEALING OF THE ELECTROSPUN COMPOSITIE FIBERS AND THEIR ELECTROCHEMICAL PROPERTIES

Jinhyun Hwang[1]*, Injun Jeon[1], Linghong Yin[1], Hang Yang[1], Dingcheng Yang[1], Mi-Hee Park[2], and Chae Ryong Cho[1,3]**

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P3-T6-71 HIGH PERFORMANCE TRIBOELECTRIC NANOGENERATORS THROUGH HIGH PERMITTIVITY $CACU_3TI_4O_{12}$ PARTICLE-INDUCED INTERNAL POLARIZATION AMPLIFICATION

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P3-T6-72 POINT-DEFECT-PASSIVATED MOS_2 NANOSHEET FOR HIGH PERFORMANCE PIEZOELECTRIC NANOGENERATOR

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P3-T6-73 SELF-POWERED MOTION-DRIVEN TRIBOELECTRIC ELECTROLUMINESCENCE TEXTILE DEVICE

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P3-T6-74 INVESTIGATION OF INTERNAL ELECTRIC FIELD FOR INAS/INGAAS DOT-IN-A-WELL SOLAR CELL GROWN BY STRANSKI-KRASTANOV AND SUB-MONOLAYER METHODS

Gyoung Du Park[1]*, Hyun-Jun Jo[2], Jong Su Kim[1]**, and Sang Jun Lee[2]
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P3-T6-75 PHOTOTHERMALLY OXOZIRCONIUM CLUSTER AS AN ORGANIC-INORGANIC HYBRID DIELECTRIC MATERIAL

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P3-T6-76 PHOTOREFLECTANCE STUDY OF ORGANIC–INORGANIC HALIDE PEROVSKITE SINGLE CRYSTAL

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P3-T6-77 HYDROGEN LIQUEFACTION TECHNOLOGIES: A DETAILED ASSESSMENT

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P3-T6-78 A RADIATIVE COOLER FOR PASSIVELY MITIGATING GREENHOUSE EFFECT IN ENCLOSURE

Se-Yeon Heo*, Gil Ju Lee, Do-Hyeon Kim, Yeong Jae Kim, Min Seok Kim, and Young Min Song**

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P3-T6-79 SIMULATION OF $BaSi_2$ HETEROJUNCTION SOLAR CELLS FOR HIGH EFFICIENCY DEVICE DESIGN

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P3-T6-80 LASER SCRIBING PROCESSES FOR THE BIFACIAL SHINGLED MODULE USING HIT CELLS

Dae Han Moon[1,2]*, Han Jun Kim[1]**, Do-Hyoung Kim[2]**, and Chae Hwan Jeong[1]**

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P3-T6-81 INTERACTION MEDIATOR ASSISTED SYNTHESIS OF MESOPOROUS MOLYBDENUM CARBIDE: MO-VALENCE STATE ADJUSTMENT FOR OPTIMIZING HYDROGEN EVOLUTION

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P3-T6-82 OPTICAL PROPERTIES STUDY FOR INAS/GAASSB SUB-MONOLAYER QUANTUM DOTS WITH VARIOUS SB COMPOSITIONS

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P3-T6-83 IMPROVING THE OPTICAL PROPERTIES OF DROPLET-EPITAXY-GROWN GAAS/ALGAAS QUANTUM DOTS BY THERMAL ANNEALING

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P3-T6-84 CONTROLLING THE ELECTRONIC STRUCTURE OF 2D BLACK PHOSPHORUS NANOSHEET BY THE RAPID PLASMA DOPING PROCESS

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P3-T6-85 HIGH-PERFORMANCE MULTI ORIENTED GRAPHITE ANODE SYNTHESIZED FROM THE COORDINATION STATE OF METAL-PHENOLIC COMPOUNDS

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P3-T6-86 BIO-HYDROGEN VALUE CHAIN: ENHANCEMENT IN SEPARATION AND PURIFICATION STEP

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P3-T6-87 BIFUNCTIONAL CATALYTIC ACTIVITY OF NI–CO LAYERED DOUBLE HYDROXIDE FOR THE ELECTRO-OXIDATION OF WATER AND METHANOL

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P3-T6-88 SELF-STANDING HIERARCHICAL 3D CORE-SHELL NANOHYBRIDS BASED ON AMORPHOUS CO-FE-B_I NANOSHEETS GRAFTED ON $NICO_2O_4$ NANOWIRES FOR EFFICIENT AND DURABLE WATER OXIDATION

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P3-T6-89 ENHANCED PHOTOCATALYTIC CO_2 REUCTION BY POROUS AU CATHODE AND GAN PHOTOANODE

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P3-T6-90 COPI DECORATED TIO2 NANOROD BASED PHOTOELECTRODE FOR EFFICIENT WATER SPLITTING

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P3-T6-91 FABRICATION OF CELLULOSE MICRO/NANOFIBER INCORPORATED WITH AG @ AU NPS FOR HIGHLY EFFICIENT SOLAR STEAM GENERATION

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P3-T6-92 EVALUATION OF MECHANICAL PROPERTY OF 3D-PRINTED TUNGSTEN CARBIDE-BASED ELECTRODE AS AN ELECTROCHEMICAL NITROGEN REDUCTION REACTION CATALYST

Dong-Kyu Lee*, Sung-Jun Wee, and Uk Sim**

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P3-T6-93 CARBONIZED NON-WOVEN FABRIC FOR EFFICIENT OIL SPILL REMEDIATION VIA SOLAR-DRIVEN EVAPORATION COMBINED WITH ADSORPTION

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P3-T6-94 PERFORMANCE EVALUATION OF AIR-BASED BIPVT COLLECTOR COMBINED WITH HEAT PUMP SYSTEM

Sang Myung Kim[1]*, Jeong Hyeon Hong[1], Ha Young Kim[2], Jin Hee Kim[3], and Jun Tae Kim[2]**

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P3-T6-95 HIGH-PERFORMANCE AG COORDINATED WITH N DOPED CARBON QUANTUM DOTS FOR THE SELECTIVE CO_2 REDUCTION REACTION

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P3-T6-96 ANNUAL ENERGY PERFORMANCE ANALYSIS OF AHU SYSTEM CONNECTED WITH AIR-TYPE BIPV/T COLLECTOR THROUGH SIMULATION

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P3-T6-97 THE ROLE OF METAL DOPANT / THERMAL ANNEALING FOR ELECTROCHEMICALLY PREPARED PHOTOCATHODES AND EFFECTIVE WATER SEPARATION

Dong Su Kim*, Young Been Kim, Sung Hyeon Jung, Ji Hoon Choi, Hak Hyeon Lee, and Hyung Koun Cho**

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P3-T6-98 IMPROVED ELECTROCATALYTIC PERFORMANCE OF CRYSTALLIZED POLY(3,4-ETHYLENE-DIOXYTHIOPHENE):POLY(STYRENESULFONATE) LOADED PLATINUM NANOPARTICLES WITH LIGHT IRRADIATION

Da-Young Lee*, Hye-Min Shin, and Myung-Han Yoon**

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P3-T6-99 COUPLED MO2C/MO2N NANOPARTICLES FOR ELECTROCHEMICAL AMMONIA SYNTHESIS UNDER AMBIENT CONDITION

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P3-T6-100 C_{60} EMBEDDED DIAMOND-LIKE NANOCOMPOSITE THIN FILM DEPOSITED BY PECVD METHOD FOR ANTI-REFLECTION COATING ON SOLAR CELL

Sukhendu Jana[1]*, Sayan Das[1], Debasis De[1], Anup Mondal[2], Nanda Shakti[3], and Utpal Gangopadhyay[1]**

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P3-T6-101 SMART GRID TECHNOLOGY FOR BIPVT ASSISTED HEAT PUMP WITH EMBEDDED STORAGE

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P3-T6-102 ANODIC HALOGENATION OF COPPER SURFACE FOR SELECTIVE ELECTROCATALYTIC CO_2 REDUCTION INTO C_{2+} PRODUCTS

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P3-T6-103 ENHANCED CRYSTALLINITY AND LUMINESCENCE PROPERTIES OF RARE-EARTH DOPED BORON NITRIDE FOR VARIOUS OPTICAL APPLICATIONS

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P3-T6-104 BIAS-CONTROLLABLE COLOR DISCRIMINATION ENABLED BY ORGANIC-INORGANIC HYBRID PEROVSKITE BACK-TO-BACK DIODE

Woochul Kim[1]*, Hyeonghun Kim[2], Sungjun Cho[1], Sejin Han[1], Yoseop Shin[1], and Gun Young Jung[1]**
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P3-T6-105 ELUCIDATION OF DETERIORATION MECHANISM OF TERNARY POLYMER SOLAR CELLS USING LIGHT-INDUCED ESR SPECTROSCOPY

Dong Xue[1]*, Masahiko Saito[2], Itaru Osaka[2], and Kazuhiro Marumoto[1,3]**
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Poster Presentation-03
T7-Weather and grid connection performance, reliability and standardization

Chair(s) Chan-Wook Jeon (Yeungnam University, Republic of Korea)

P3-T7-1 PERFORMANCE COMPARISON BETWEEN VERTICALLY MOUNTED BIFACIAL AND MONO-FACIAL PV MODULES

Hyeonwook Park*, Eui Seon Kim, Jae Hong Han, Hyun Dong Jang, Seong Woo Kim, Seong Hwan Park, and Woo Kyoung Kim**
School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea

P3-T7-2 A STUDY ON CHANGE OF ALBEDO DATA BY BOTTOM SURFACE

Eui Seon Kim*, Hye Jun Jeon, Moon Ju Kim, and Jae Hak Jung**
Department of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea

P3-T7-3 ANALYSIS OF THE IMPACT OF POWER LOSS BY DEGRADATION OF THE SNAIL TRAIL IN SOLAR POWER PLANT

Wonwook Oh*, Daesung Kim, Seonggeun Jeon, Ayoung Yoon, Namseung Kim, Sangsoo Kim, Kun Won Seo, and Hoonjoo Choi**
STECO Corporation, Sejong, Republic of Korea

P3-T7-4 THE TEST FIELD CONSTRUCTION FOR PERFORMANCE MONITORING AND VERIFICATION OF PHOTOVOLTAIC POWER PLANT

Hongwan Choi[1]*, Jihyun Kim[1], Cheolhyun Lim[1], Sukho Lee[1], Sooyoung Oh[2], Jaehak Jung[2], and Changheon Kim[1]**

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P3-T7-5 A DATA STANDARDIZATION METHOD FOR DETECTING DEGRADATION OF POWER GENERATION BY FRONT WEED'S SHADOW EFFECT

Hong Myeong Kim*, Won Shoup So, and Jae Hak Jung**
Department of Chemical Engineering, Gyeongsangbuk-do, Republic of Korea

P3-T7-6 ANALYSIS OF SOLAR RADIATION CONDITIONS AND POWER GENERATION IN BOSEONG'S APV

Chang Yong Yoon[1]*, Kyu Nam An[1], Sung Ju Kang[1]**, Jong Han Ko[2], and Su Min Kim[3]
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[3]*Department of Environmental Horticulture, Dankook University, Cheonan, Republic of Korea*

P3-T7-7 GROWTH CHARACTERISTICS OF BARLEY UNDER APV IN BOSEONG

Chang Yong Yoon[1]*, Kyu Nam An[1]**, Boo Deok Jeong[1], Jae Il Cho[2], and Su Min Kim[3]
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P3-T7-8 STUDY ON INORGANIC ENCAPSULATION WITH PERHYDROPOLYSILAZANE FOR FLEXIBLE SOLAR CELLS

Ju-Hee Kim*, Jincheol Kim, and Nochang Park**
Renewable Energy Research Center, Korea Electronics Technology Institute, Seongnam, Republic of Korea

P3-T7-10 DECISION RESEARCH UTILIZING BIM FOR BIPV OPTIMIZATION

Kyu Hyeok Choi*, and Hyun Woo Jeon**
BIMS Co., Ltd, Seoul, Republic of Korea

P3-T7-11 EFFICIENT MOS_2/GRAPHENE OXIDE NANOCOMPOSITE FOR ELECTROCHEMICAL SUPER-CAPACITORS

Ha-Ryeon Lee[1]*, M. Shaheer Akhtar[2,3]**, and O-Bong Yang[1,2]**
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P3-T7-12 STANDARD REFERENCE DATA SELECTION METHOD AMONG 22 TMY(TYPICAL METEOROLOGICAL YEAR) SITES FOR PV GENERATION

Boyoung Kim*, Myeongchan Oh, Hyun-Goo Kim, Chang Ki Kim, Jin Young Kim, Chang-Yeol Yun, and Yong-Heack Kang**
New and Renewable Energy Resource Map Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

P3-T7-13 CHARACTERISTICS OF FLEXIBLE CIGS BIPV MODULES UNDER DIFFUSE IRRADIATION

Ru Da Lee*, Hyo Mun Lee, Dong Su Kim, and Jong Ho Yoon**

Department of Architecture Engineering, Hanbat National University, Daejeon, Republic of Korea

P3-T7-14 ANALYSIS OF LONG TERM PERFORMANCE OF BIPV SYSTEM BY ACCELERATED TEST

Jong Gwon Ahn[1]*, Ji Hye Kim[1], Jin Hee Kim[2], and Jun Tae Kim[3]**

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P3-T7-15 EMPIRICAL PERFORMANCE ASSESSMENT OF COLOR BIPV MODULE WITH SPUTTER-COATED COVER GLASS

Hyo Mun Lee[1]*, Hyun Il Kim[2], Gun Hwan Lee[3], and Jong Ho Yoon[1]**

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P3-T7-16 ENERGY SELF-SUFFICIENCY RATE OF BIPV INSTALLATION FOR RETROFFTING AND NEW APARTMENTS

Sang Yoon Lee*, Hwan Ho Kim, Ru Da Lee, Jong Ho Yoon**, and Dong Su Kim

Department of Architectural Engineering, Hanbat National University, Daejeon, Republic of Korea

P3-T7-17 THE IMPACT OF CRACKS IN PV CELLS ON POWER OUTPUTS: CASE STUDY BASED ON MEASURED AND SIMULATED DATA

Kyung Woo Lee*, Eun Ho Kang, Hyo Mun Lee, Jong Ho Yoon**, and Dong Su Kim

Department of Architectural Engineering, Hanbat National University, Daejeon, Republic of Korea

P3-T7-18 EVALUATION OF BIPV POWER GENERATION INSTALLED ON CURVED FA ADE OF A COMMERCIAL BUILDING

Jeong-yun Heo*, Goo Seomun, Hyo-mun Lee, Dong-su Kim, and Jong-ho Yun**

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P3-T7-19 COMPARISON OF TYPICAL YEAR AND MULTIYEAR ELECTRIC POWER OUTPUT USING 10 YEARS WEATHER DATA SET FROM SOUTH KOREA

Laetitia Uwineza[1]*, Hyun-Goo Kim[2]**, Jin-Young Kim[2], Chang Ki Kim[2], and Bo-Young Kim[2]

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P3-T7-20 POWER GENERATION MONITORING AND PERFORMANCE PREDICTION OF FLEXIBLE CIGS PV MODULE ACCORDING TO METEOROLOGICAL VARIABLES

Donghyun Hwang[1]*, Sangwoon Lee[2], Hyunah Lee[3], Jin-Yong Shin[4], Yang Pyo Kong[4], and Chang Sik Son[1]**

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P3-T7-21 REGIONAL CORRELATION AND RAMP CHARACTERISTICS OF PHOTOVOLTAIC POWER GENERATION SITES OF SOUTH KOREA

Alebachew Tenna[1,2], Hyun-Goo Kim[1]*, Chang Ki Kim[1], and Bo-Young Kim[1]

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P3-T7-22 CHANGES IN MICROCLIMATE UNDER THE APV DURING THE RICE CULTIVATION

Kyu Nam An[1]*, Chang Yong Yoon[1], Seo Ho Shin[1], Ju Hyun Im[1], Jae Il Cho[2], Jong Han Ko[2], and Su Min Kim[3]

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P3-T7-23 EXPERIMENTAL STUDIES ON THE NATURAL DUST ACCUMULATION ON LOW-IRON GLASS SURFACE AND ITS IMPACT ON THE SOLAR PHOTOVOLTAIC SYSTEM PERFORMANCE

Prasanth K. Enaganti[1]*, Ankur Bhattacharjee[2]**, Aritra Ghosh[3], and Sanket Goel[1]

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P3-T7-24 LATENT HEAT ANALYSIS OF HIGH DENSITY POWER PV MODULE WITH LIGHT SOAKING FOR LONG LIFETIME EVALUATION OF FLOATING AND MARINE PVS

Jin Hee Hyun[1]*, Woo Jun Nam[1,2], Sung Cheol Woo[1,2], Jinho Choi[1], Won Bin Lee[1], Byeong Gwan Bhang[1], and Hyung Keun Ahn[1]**

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Poster Presentation-03
T9-PV deployment: Industry, market, policy and financing

Chair(s) Young Kuk Kim (Sungkyunkwan University, Republic of Korea)

P3-T9-1 A CASE STUDY ON THE AGROPHOTOVOLTAIC SYSTEM: POWER GENERATION AND EFFECT ON CROP

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Eun-Chel Cho[1]*, Jae Chun Song[2], Young Hyun Cho[1], and Junsin Yi[1]**

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Sunhwa Lee*, Eun-Chel Cho[1]**, Jae Chun Song[2], Youngkuk Kim[1], and Junsin Yi[1]**

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Sehyeon Kim[1], Markus Holz[2], Soojin Park[3], Yong-Beum Yoon[3], Younghyun Cho[1], Eun-chel Cho[1]*, and Junsin Yi[1]**

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Jin-Young Kim*, Hyun-Goo Kim, Changyeol Yun**, Chang Ki Kim, and Yong-Heack Kang

New & Renewable Resource Map Laboratory, Korea Institute of Energy Research, Daejeon, Republic of Korea

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Hyun Young Lee*, Hyun Seok Choi, Jong Hyuk Na, and Jea Yeop Rho

Korea Institute of Lighting Technology & ICT, Bucheon, Republic of Korea

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Marine Cauz[1,2]**, Lionel Bloch[1], Christian Rod[2], Lionel Perret[2]*, Christophe Ballif[1,3], and Nicolas Wyrsch[1]

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R&D General Department, Korea Institute of Lighting & ICT, Bucheon, Republic of Korea

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Hyunseok Choi*, Jonghyuk Na, Hyunyoung Lee, and Jayeop Noh

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[2]*Water Resource & Environment Research Department, Rural Research Institute, Ansan, Republic of Korea*

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SeungWook Shin[1]*, and Chul-sung Lee[2]**

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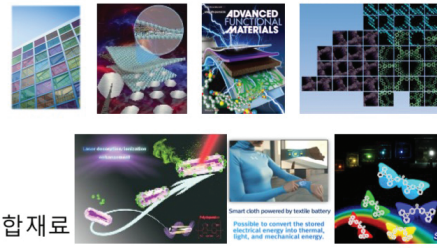

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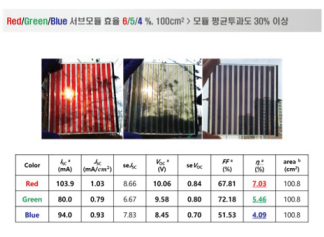

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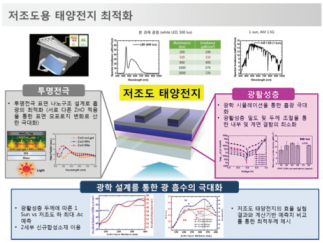

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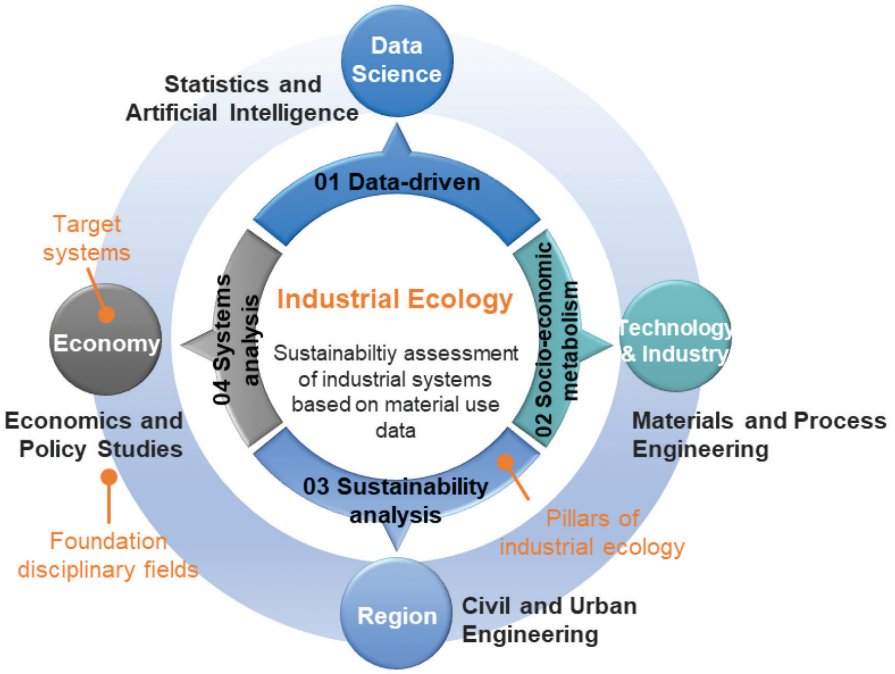

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구조물 부착형 차세대 태양전지
미니 발전소 실증 시스템 개발

국제·산학협력
- Imperial College London
- Central South University

광주과학기술원 Gwangju Institute of Science and Technology

RISE 차세대에너지연구소 RESEARCH INSTITUTE FOR SOLAR AND SUSTAINABLE ENERGIES

CEPRC
청정에너지중점연구소

청정에너지중점연구소사업단

Clean Energy Priority Research Center

Sustainable IT and Energy Materials and Processes Using Cleaner Nanotechnology and Biotechnology

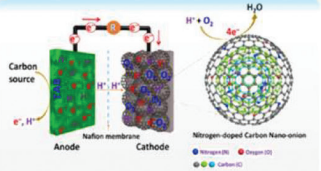
(Director: School of Chemical Engineering, Yeungnam University, prof. Jae-Jin Shim (심재진 교수))

연구소 비전

연구목표

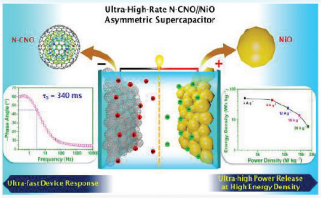
우수 연구성과

Microbial Fuel Cell

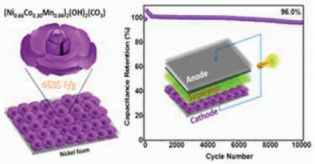


ORR in N-CNO-based Microbial Fuel Cell

Supercapacitor

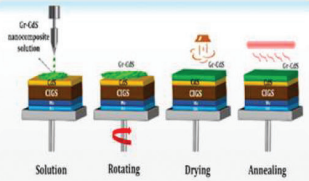


Graphene & CNO-based Metal Oxide/Sulfide Composites



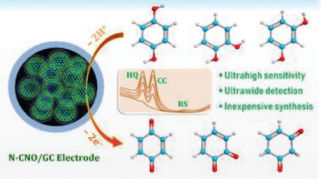
$NiCoMn(OH)_2(CO_3)$ Supercapacitor

Solar Cell



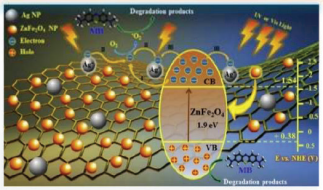
Gr-CdS Solar Cell

Sensor



Ultrasensitive N-CNO Sensor for Dihydroxybenzene Isomers

Photocatalysis



사업단 주최 심포지엄

주소: *경북 경산시 영남대학교 화공관 (우)38541* ***Website:*** *http://clean.yu.ac.kr* ***Tel:*** *053)810-3653*

영남대학교
Yeungnam University

수소산업 융복합 인력양성사업단

사업개요 및 목표

수소신산업 창출과 확산에 기여할 수 있는 융복합 고급인력양성

수소 생산/저장/운송 및 활용 Value Chain 이해
전/후방산업을 관통하는 기술간 융합능력 함양
(수혜인원 116명, 배출인력 53명)

선순환적 산학협력 특성화 네트워크 구축

지역 수소산업 밀착형 선도 모델

- 지역특화 수소산업 활성화
- 산학 Co-op 프로그램
- 취업연계 선순환형 모델
- 수소산업 특성화 네트워크
- 학위테마의 기업과제 의무화

수소생산/운송/저장/활용 융복합 교과/비교과 트랙

수소산업 기반 자율 순환형 교육과정 구축

- 수소산업 융복합 교육트랙 (영남대-포스텍)
- 기관, 출연인, 지자체, 기업 참여 기반 교육 시스템 구축
- 최고수준의 해외 연구기관 참여로 선진화 교육시스템

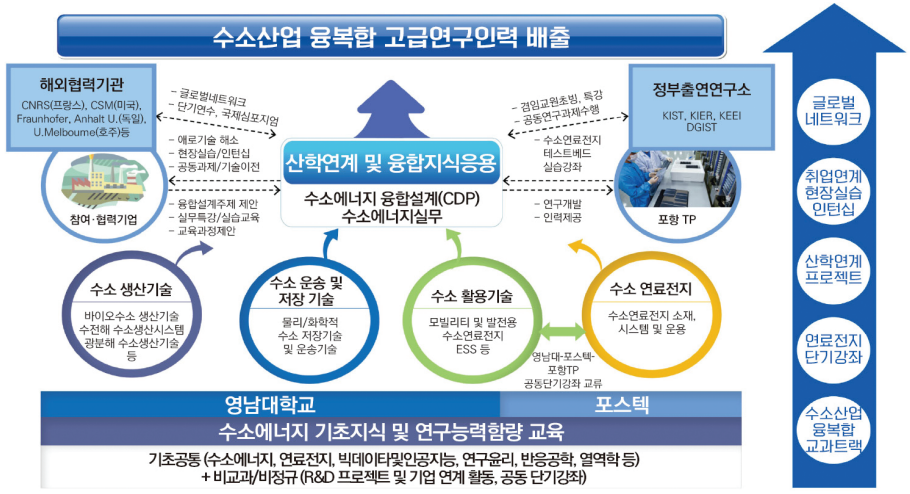
R&D 프로젝트 기반 융복합 연구역량 강화

수소융합연구분야 R&D 프로젝트 운영

- 기업 및 정책수요 기반 융합 연구 R&D 프로젝트 발굴
- 특화된 집단연구의 시너지 연구분야의 특성화 강화
- 연구지원 수월성 제고
- 수소 연구인력 확보

수소산업 융복합 인력 양성사업단

인력양성 추진체계 및 전략



수소산업융복합인력양성사업단
Hydrogen Education & Research Consortium

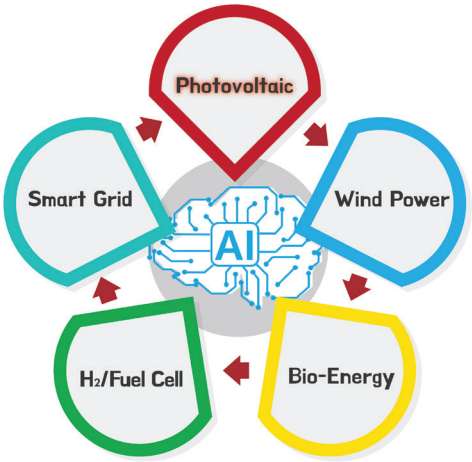
경북 경산시 대학로 280 영남대학교 화공관 110호 | TEL 053-810-1491
주관기관: 영남대학교 산학협력단 전담기관: 한국에너지기술평가원

Supported by Ministry of Trade, Industry and Energy KETEP

Graduate School of Integrated Energy-AI
Jeonbuk National University, Korea

Admission for Spring 2021

Graduate School of Integrated Energy–AI



Admission Process, Spring 2021

1st : 2020. 9. 21(Mon)~10.8(Thursday)
2st : 2020. 11. 2(Mon)~11.20(Friday)

Degree Program

- Master program
- Ph.D. program
- Master & Ph.D. program

Contents of Course

- Artificial Intelligence(AI) theory & application
- Deep Learning
- Machine Learning
- Solar cells
- Next generation Solar cell materials & devices
- AI-based solar power plant design
- AI-based smart grid

Scholaship & Support

- Full scholarship support:
  Master's program 1,000$(1,200,000₩)/mon
  Ph.D. program 1,500$(1,800,000₩)/mon
- Additional support for project labor costs when participation in research projects.
- Personal laptops are provided for education and research

Administration Office

H http://eai.jbnu.ac.kr/
T (+82)-63-270-3939
A JBNU College of Engineering, Building No.6, Room No.215
E E-mail: eai@jbnu.ac.kr

Winter special lecture

2021.1.11~2.5

- Programming for Artificial Intelligence(AI)
- Solar energy

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Autolab Multi channel 전기화학 분석기 / 임피던스 분석기

Potentiostats / Galvanostats / Impedance Analyzer

- 최대 12채널 Potentiostat/Galvanostat 또는 6채널 임피던스 분석기로 구성 가능.
- NOVA 소프트웨어를 통해 각 채널의 동시측정 및 개별측정이 가능함.
- NOVA 소프트웨어의 Synchronization 기능을 사용하여 각 채널의 측정 동기화 가능.

Optional modules

- FRA32M - Electrochemical impedance spectroscopy
- pX1000 - pH and temperature measurements
- MUX - Multiplexing module for complete cells or individual working electrodes
- BA - Dual mode bipotentiostat
- EQCM - Electrochemical quartz crystal microbalance

nova

3 year
instrument warranty

E-Chem Technology

서울시 구로구 경인로 ***53***가길 ***10,*** 대명벨리온 지식산업센터 ***810***호

Tel. 02- 868- 2975, Fax. 02- 6455- 2975

E- mail : info@echem- technology.co.kr

홈페이지 ***: www.echem- technology.co.kr***

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- Multi-modular type
- IP65-rated and anti-chloride coating enclosure for installation at seaside (Optional)

$1500V_{DC}$ PV combiner box release

- Korea standard certificated (KS C 8567)
- IP66 certified for installation at seaside (STS316)
- Integrated inverter and combiner box system for easy maintenance

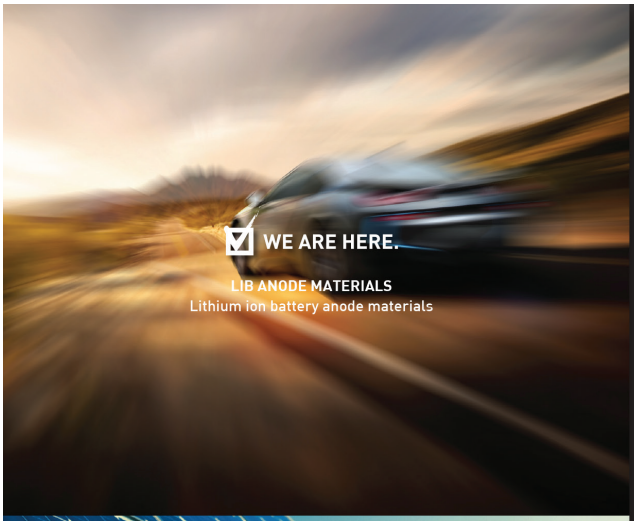
OPCB-15K20N

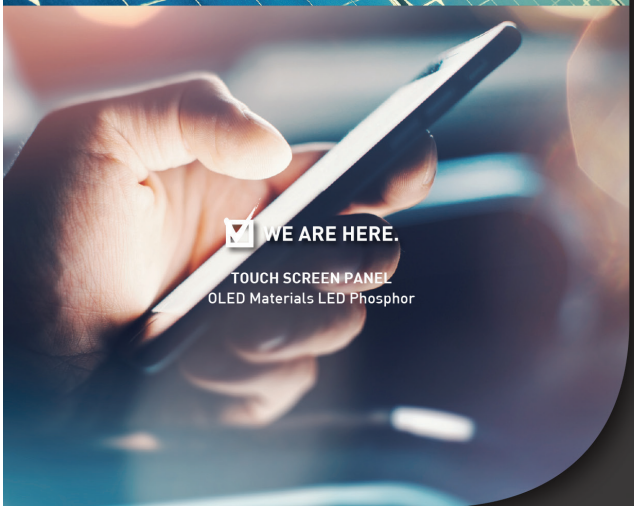
PV inverter	PV AIO system	Monitoring system	Connection box	PCS for ESS	EPC(Solar, ESS)
					

OCI Power Co.,Ltd

1st-2nd Floor, 5th factory, 15, Jayumuyeok 2-gil, Gunsan-si, Jeollabuk-do, Republic of Korea

Tel +82 2 3016 1118 I **Homepage** ocipower.co.kr I **E-mail** sales@ocipower.co.kr





대주전자재료만의 신소재는 언제나 가까이 있습니다

지구 곳곳을 달리게 할 배터리 소재기술을 찾아내고
태양의 무한한 에너지를 담을 신소재를 개발하며
터치 한 번으로 세상을 만날 수 있는 혁신.
대주전자재료의 신소재에 대한 식지않는 열정은
늘 그렇듯 세상에 가득 차 있습니다.

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Taking another step toward becoming a new and renewable energy powerhouse

The New and Renewable energy center (NREC) plays a central role in creating a safe and clean future for Korea by making new and renewable energy accessible nationwide.

To promote the use and deployment of new and renewable energy, the NREC undertakes a wide variety of projects, including projects related to policy formulation and research, deployment of renewable energy, the KS certification system, support of 100% renewable electricity use initiative in Korea(RE100), and the renewable portfolio standard(RPS)

NRE policy support and statistics

research on new projects and policy and provision of statistics on the NRE industry and deployment

Supporting of NRE industry

technical standardization, operation of the KS certification system, provision of startup support, safety supervision, etc

New & Renewable Energy

NRE deployment

Provision of support for the development of large-scale PV and wind power projects, granting of financial support for Renewable energy system installation, etc.

Renewable Portfolio Standard Program(RPS)

Issuance of renewable energy certificates(REC) and operation of the PV fixed-price contract and purchase program

KOREA ENERGY AGENCY
New & Renewable Energy Center

The Apex of Solar Generation

LG NeON®R

25 YEARS
LG Product and Performance Guarantee

LG NeON®R Modules and Back Contact Technology™

LG back contact modules show impressive results even in harsh environment acceleration tests done over duration that are 5 times longer than IEC standards (TC200 cycles, DH 1000 hrs).

High-Quality Modules with Low LID

Based on a high-quality N-type wafer design, LG NeON®R modules minimize Light Induced Degradation (LID), the power drop that can happen to some solar modules at the first exposure to light after installation.

Enhanced Warranties

LG is a trusted global brand that stands behind our solar power products. LG's NeON®R solar modules come with the strong warranties available from LG–a 25-year warranty that covers product-related issues and a 25-year performance warranty.

Why LG?

LG, a global icon of excellence in the electronics industry with half a century of success, has more than 30 years of experience in the solar industry. LG Solar products are designed for residential and commercial use and reflect our company's expertise in world-class manufacturing. When you purchase LG Solar panels, you invest in a product manufactured with the most stringent research, testing, and development standards.

For more information, visit lg-solar.com

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LG NeON®R

PV MODULE MOBILE SIMULATOR

❖ MAIN FUNCTION

- **PV Module 발전현장 정밀 시험**
  - I-V Curve 분석 지원
  - EL 측정 시험 지원
  - 절연특성 시험 지원
  - Reference Cell 내장 및 시험 신뢰성 비교
- **대형 PV 모듈 시험**
  - 시험 유효 면적: 1.2m x 2.5m
- **다양한 유틸리티**
  - 독립전원 제공: 가솔린 엔진 5.5kW 급
  - PV 모듈 세척 시스템 내장: 150ℓ
  - 2.5T 트럭 채택으로 이동 편의성 향상
  - 사용자 휴식공간 내장
- **100% 국내기술 제작**
  - 고객 요구사항 반영 가능(Customization)
  - 빠른 A/S 대응

❖ SPECIFICATIONS

LED Light Source

- Class(IEC 60904-9) : AAA
- Spectrum Range : 300 ~ 1200nm
- Intensity Range : 0.2 ~ 1.2 Sun
- Irradiance Time : 50 ~ 500ms
- Flash to Flash Time Interval : 60sec
- Effective Test Area : 1.2m x 2.5m
  (2.5m : Test area : 2.4m + Reference cell : 0.1m)
- Weight : <100kg
- Power : AC 220V
- Operation Temperature : 20~30℃
- Self LED Calibration Function Included(Changeable)
- TTL Trigger Function Included
- Anti-Pollution Glass Cover Included(Changeable)
- Serial Communication with PC Installed

I-V Tracing

- Max Power : 600W
- Voltage Range : -1~120V
- Current Range : 0~20A
- Measurement Resolution : 16bits
- Sweep Mode : Voltage Up/Down Sweep
- Measurement Items : Voc, Isc, Vmp, Imp, FF, Eff, Rs, Rsh
- STC Conversion
- Temperature Measurement : 8ch T/C/K Type (Option : 16 bit)
- Sample Counts : ~1000 Samples

EL Measurement System

- NIR Camera
  : 1" NIR CMOS; C-Mount; mono; 2048x2048
  : 28.6fps; 12bit ADC; PoE interface
- Visible Light Filter : LP920
- 4/3" LENS
- Test area : 2400mm x 1200mm

절연특성시험

- DC Power Supply : Maximum 3000V
- Test Items : Withstand Voltage, Insulation Resistance
- 10kV/5mA, 최대 출력 50W의 DC 내전압시험
  : 25V ~ -1500V / 0.01MΩ~9.99GΩ의 절연저항시험
- IEC61730-2, IEC61215, IEC61646 등에 대응
- 고정도 전류 계측, 1μA 판정 분해능

Utility

- 운송기기 : 2.5t 마이티 트럭
- 독립전원 : 가솔린 엔진 5.5kW 급
- 태양광 모듈 세척 시스템
  : 최대토출량 : 26.5 LPM ,최대압력 : 60psi (4.14 bar)
  : 호스 길이 : 30m, 물탱크 용량 : 150 ℓ
- 기준 태양전지(Reference Cell) : 자체제작
  : PV Cell 종류 : 모노실리콘
  : PV Cell온도 25℃ 유지장치 포함 (펠티어소자 방식 항온장치 사용)
  : PV Cell 상부에 항온유지를 위해서 2mm두께의 유리판 설치

SINCE 1977

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전라북도 김제에서 생산될
고출력 태양광 모듈

블룸버그 뉴에너지 파이낸스(BNEF)
1등급 태양광 모듈 제조기업 선정!

블룸버그 뉴에너지 파이낸스(BNEF)는
에너지 시장 경제의 변화와 이해를 돕는 글로벌 마켓리서치 기업으로,
태양광 제조 기업의 생산시설, 실적, 기업평가, 제품 경쟁력 등을 토대로 1등급 기업을 선정하고 있다.

전라북도 김제시 새만금 지역 고출력 태양광 모듈 생산공장 건설로

신성이엔지, 태양광 모듈 1GW급 생산라인 구축!

충북 음성 / 증평 (350 MW)

전북 김제 (700 MW)

신성이엔지가 궁금하시면, 아래의 연락처로 연락주세요

- 분당본사 : 경기도 성남시 분당구 대왕판교로 395번길 8
- 클린환경사업부문 : 031)788-9000 / clean@shinsung.co.kr
- 홈페이지 www.shinsungeng.com
- 재생에너지사업부문 : 031-788-9500 / solar@shinsung.co.kr

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