PROGRAM BOOK

PROGRAM BOOK

PVSEC-25 & GPVC 2015

PVSEC-25

25th International Photovoltaic Science and Engineering Conference

GPVC 2015

Global Photovoltaic Conference 2015

November 15-20, 2015

BEXCO Busan, Korea

Organized by

Korea Photovoltaic Society

Co-organized by

MSE Department of KAIST,
Regional Innovation Center for Solar Cell & Module,
Green School(Graduate School of Energy and Environment)

Program at a Glance

Nov.**15**, 2015 (SUN)

Time \ Room	205	201~2	203~4	104~5	101~2	106~7	3F
13:30~15:00		Tutorial					
15:00~15:30		Break					
15:30~17:00		Tutorial					
17:30~19:30	Welcome Reception (2F)						

Nov.**16**, 2015 (MON)

Time \ Room	205	201~2	203~4	104~5	101~2	106~7	3F
09:00~09:40	Registration (3F Lobby)						Poster & Exhibition preparation
09:40~10:20	Keynote Speech (205)						
10:20~10:40	Break						
10:40~12:10	CSi 1	NMD 1	SiF 1	CIS 1	PRV 1	IEA-PVPS Workshop	
12:10~13:30	Lunch						
13:30~14:20	Opening & PVSEC Award Ceremony						Exhibition
14:20~15:00	Plenary 1 (205)						
15:00~15:30	Break					IEA-PVPS Workshop ~17:30	
15:30~17:00	CSi 2	NMD 2	SiF 2	CIS 2	PRV 2		

Nov.**17**, 2015 (TUE)

Time \ Room	205	201~2	203~4	104~5	101~2	106~7	3F
09:00~09:40	Plenary 2 (205)						Poster A (09:00~15:30) & Exhibition
09:40~10:20	Plenary 3 (205)						
10:20~10:40	Break						
10:40~12:10	CSi 3	OSC 1	GAS 1	CIS 3	MSI 1	Korea Germany Workshop	
12:10~13:30	Lunch						
13:30~14:10	Plenary 4 (205)						
14:10~15:10	Poster Session A (3F)						
15:10~15:30	Break					Korea Germany Workshop ~17:30	
15:30~17:00	CSi 4	OSC 2	GAS 2	CIS 4	MSI 2		

Nov.**18**, 2015 (WED)

Time \ Room	205	201~2	203~4	104~5	101~2	106~7	3F
09:00~09:40	Plenary 5 (205)						Poster B (09:00~15:30) & Exhibition
09:40~10:20	Plenary 6 (205)						
10:20~10:40	Break						
10:40~12:10	CSi 5	RES 1	SiF 3	NMD 3	PRV 3	National R&D Plan	
12:10~13:30	Lunch						
13:30~14:10	Plenary 7 (205)						
14:10~15:10	Poster Session B (3F)						
15:10~15:30	Break					NRE Hybrids System Workshop	
15:30~17:00	CSi 6	RES 2	SiF 4	NMD 4	OSC 3		
18:00~21:00	Banquet (Haeundae Grand Hotel)						

Nov.**19**, 2015 (THU)

Time \ Room	205	201~2	203~4	104~5	101~2	106~7	3F
09:00~09:40	Plenary 8 (205)					Closed	Poster C (09:00~15:30) & Exhibition
09:40~10:20	Plenary 9 (205)						
10:20~10:40	Break						
10:40~12:10	PRV 4	CIS 5	RES 3	GAS 3	MSI 3		
12:10~13:30	Lunch						
13:30~14:10	Plenary 10 (205)						
14:10~15:10	Poster Session C (3F)						
15:10~15:30	Break						
15:30~17:00	PRV 5	CIS 6	RES 4	PMP 1 & KETEP	OSC 4		

Nov. **20**, 2015 (FRI)

Time \ Room	205	201~2	203~4	104~5	101~2	106~7	3F
09:00~10:30	CSi 7	NMD 5	MSI 4	CIS 7	OSC 5	Closed	Closed
10:30~11:00	Break						
11:00~12:00	Closing Ceremony (205)						

Conference Topics

CSi : Wafer-based Crystalline Silicon Cells and Materials
SiF : Thin-film based Silicon Cells and Materials
CIS : II-VI & Chalcogenide Compound based Cells and Materials
OSC : Organic, Dye Sensitized Solar Cells and Materials
PRV : Perovskite Solar Cells and Materials
NMD : New Concepts, Novel Materials and Devices
GAS : III-V Compound based Concentrator and Space PV Systems
MSI : PV Components, Modules and System
RES : PV Reliability and Standardization
PMP : PV Markets and Policy

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Sponsors for PVSEC-25 & GPVC 2015

KOREA TOURISM ORGANIZATION

BUSAN TOURISM ORGANIZATION

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BJ POWER

KAIST

Hanwha Q CELLS

MSIP

Exhibition at PVSEC-25 & GPVC 2015

Place : 3F of Convention Hall, BEXCO
Time : 13:30 to 17:00 on Nov. 16, 9:00 to 17:00 on Nov. 17~19.

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Experiment & Testing Solution
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THE WIND

Message from General Chair

It is my great pleasure to welcome you to PVSEC-25 & GPVC 2015 to be held from 15 to 20 of Nov. 2015 at Busan Exhibition and Convention Center (BEXCO) in Korea.

Busan is the largest port city in Korea with the population of 3.6 million. Due in part to its geographic location (the southeastern tip of the Korean Peninsula), Busan has enjoyed heavy exchange of culture with neighboring countries and has become an open-minded international metropolis hosting many international events such as Busan International Film Festival. Busan is one of the most popular tourist destinations in Korea, boasting coastal tourist attractions and historical and cultural sites. BEXCO is located very close to Haeundae beach, which is one of the most famous beaches in Korea. Many hotels and restaurants are available in the beach.

In the PVSEC history, the PVSEC-25 is the third PVSEC held in Korea. Previous PVSEC-12 and PVSEC-19 were held in Jeju in 2001 and 2009, respectively. Given relatively long time intervals (six years or more), the PVSEC-25 provides us an opportunity to host foreign PV specialists and promote the connection with them for Korean PV Society.

We are all aware that photovoltaics is the most promising energy technology that is truly renewable, sustainable, and environment friendly for clean earth and healthy human life. PVSCE-25 will be a place for sharing new technological development, exchanging innovative ideas, promoting friendship, and experiencing new culture. The PVSEC-25 committee and Korea PV society warmly welcome you to Busan in Nov. 15-20, 2015.

Prof. **Byung Tae Ahn**
General Chair of PVSEC-25 & GPVC 2015
Prof of KAIST

Message from Program Chair

I am so pleased to welcome all participants including plenary and invited speakers to PVSEC-25 & GPVC-2015. 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.

As you may be aware, this year is 'the International Year of Light and Light-based Technologies' (IYL-2015) proclaimed officially by the UN. We have selected the slogan of this meeting in line with the concept of IYL-2015 as "Sunlight to TW Power" to emphasize the importance of PV technologies as a strong tool to respond to the challenge of global climate change which is a hot issue of later 2015.

As a result, about 670 excellent papers from 20 countries were submitted to 10 different topical areas of PVSEC-2015 which covers nearly all aspects of photovoltaic solar electricity from the conventional crystalline silicon cells and CIGS cells to the emerging organic-halide Perovskite solar cells. We allocated these papers to 56 sessions over 4.5 day-long program, and 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 on Photovoltaics.

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 Busan!

Prof/Dr. **Sang-Jin Moon**
Technical Program Chair of PVSEC-25 & GPVC2015
KRICT/UST

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CSi Session	
Chair	DongHwan Kim (Korea U)
Co-Chairs	Hae-Seok Lee (Korea U)
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	Stefan Glunz (Fraunhofer Inst)
SiF Session	
Chair	Jun-Sik Cho (Kor Inst Ener Res)
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	Dongho Kim (Kor Inst Mater Sci)
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CIS Session	
Chair	Kyung-Hoon Yoon (Kor Inst Ener Res)
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OSC Session	
Chair	Sung-Ho Jin (Pusan U)
Co-Chairs	Min Jae Ko (KIST)
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	Won Suk Shin (Kor Inst Ener Res)
	Yuji Wada (Tokyo Inst of Tech)
PRV Session	
Chair	Nam-Gyu Park (SKKU)
Co-Chairs	Sang Hyuk Im (Kyunghee U)
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NMD Session	
Chair	Jung-Ho Lee (Hanyang U)
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MSI Session	
Chair	GiHwan Kang (Kor Inst Ener Res)
Co-Chairs	Jun Tae Kim (Kongju U)
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RES Session	
Chair	Soo-Young Oh (Yeungnam U)
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SeWang Yoon (Korea PV Soc)

PVSEC Award

The PVSEC Award is presented for outstanding contributions to the development of photovoltaic science and technology. The recipient is selected by the PVSEC Award Committee according to nominations.

The PVSEC Award 2015 is presented to

Emeritus Prof. Koeng Su Lim
Korea Advanced Institute of Science and Technology (KAIST)

For his outstanding contributions to pioneering researches on the development of new structures and materials for amorphous Si based thin-film solar cells and of a novel integration technology to manufacture TFSC modules.

Koeng Su Lim is an Emeritus Professor of School of Electrical Engineering at KAIST. He has been with KAIST since he received the Ph.D. degree in Physical Electronics from TIT in 1984. He focused on the development of new structures and materials for a-Si TFSCs. He adopted for the first time a-SiC buffer between p-a-SiC and i-a-Si layers in 1984. This markedly enhanced the SC efficiency. He adopted wide band-gap materials such as DLC, nc-SiC, MoO_3, and WO_3 as a buffer or window. These largely improved the collection efficiency (CE) in the blue light region. He adopted WO_x, LiF, and SiO_x/LiF at the rear side. These enhanced the CE in the red region. He developed a rear Schottky junction (SJ) SC. Thus, he developed for the first time a novel double-SJ SC of a doping–free Glass/SnO_2/MoO_3/i-a-Si/LiF/Al. He fabricated a low degradation pc-Si multi-layer SC using an alternate H_2 dilution method for the first time, obtaining a world-top-class stabilized η of 9.28 %, confirmed by NREL in 2000. He also developed bifacial a-Si SCs in 1982 for the first time and honeycomb-structure-3D a-Si SCs. He developed extremely transparent and conductive ZnO films. In addition, he played a leading role in the plant layout design for mass production of 5th generation-sized a-Si SC modules as a technical advisor as well as R&D collaborator.
In addition, he focused on the development of a novel integration technology using a self-alignment

method to reduce dead area of a-Si SCs and of a novel fabrication technology of see-through (ST) SCs. He recently demonstrated the feasibility of dramatically reducing the dead area width from several hundred μm to 10 μm. He also showed the feasibility of fabricating flexible ST a-Si SCs. The novel technology is applicable to all kinds of solid-state TFSCs such as CIGS, CdTe, OPV, and perovskite. He obtained 65 patents including 20 foreign patents on the novel integration technology. He published over 300 scientific papers.

PVSEC Award

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The PVSEC Award 2015 is presented to

Dr. Sang Il Seok
Korea Research Institute of Chemical Technology (KRICT)

For his outstanding contributions to pioneering researches on the development of new structures and materials for perovskite solar cells and to the achievement of above 20% cell efficiency in the perovskite solar cells for the first time in the world.

Sang Il Seok is currently director of the center for solar energy materials as research fellow in Korea Research Institute of Chemical Technology (KRICT), Korea. Now he also holds a dual appointment as a full professor at department of energy science in Sungkyunkwan University (SKKU). He obtained his BS at Kyungpook National University and and PhD degree at Department of Inorganic Materials Engineering of Seoul National University, Korea, respectively. From 1996 to 1997, he experienced a post-doc to investigate defects and transport in Fe-Ti-O Spinel structure in Cornell University, USA, and visiting scholar in University of Surrey, UK, in 2003, and École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, in 2006 respectively.
His major research interests were inorganic/organic hybrid materials through sol-gel process for optical amplifier, high dielectrics, corrosion-resistance coatings etc. Since 2006, his research focus is based on the integration of mesoporous architecture/semiconductor nanocrystals (including quantum dots and organometal halide perovskite materials)/organic hole conductors for high-performance inorganic-organic hybrid photovoltaics such as photodetectors and solar cells, and novel materials for them.
He published over 150 peer-reviewed paper including Nature, Nature Materials, JACS etc. and 50 patents with several awards for his excellency.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion. The recipient is also selected by the PVSEC Award Committee according to nominations.

The PVSEC Special Award 2015 is presented to

Mr. Sang Bong Lee
LG Electronics

Mr. Sang Bong Lee is currently an executive vice president as a head of the Energy Business Center of LG Electronics Ltd. responsible for solar, energy storage system, energy management solutions and lighting. He had joined Goldstar's division of machinery as a mechanical engineer in 1982 and LG Production engineering Research Institute (LG-PRI) in 1985. In LG-PRI, he as a head of institute had made efforts to develop several kinds of sophisticated equipment of Photovoltaic solar. Especially he had focused on solar production process by operating a special team of solar process innovation. By doing so, now it is possible for LG Electronics to operate her own innovative production line with unique machines.
Recently he as a head of energy business center has managed strongly to develop new technology in photovoltaic products and finally Cello which is a name of Multi-Wire Busbar technology could be adopted to LGE's solar module. Under his leadership, LG Electronics has been grown up as a major cell and module manufacturer based on unique and superior technologies.
Mr. Lee earned a bachelor's degree in mechanical engineering at Dong-A university and a master's degree in Management of Technology at Chung-Ang University. Also he is a member of the National Academy of Engineering of Korea and he received a medal of science and technology (Ung-bi-jang in Korean) for his contribution to the improvement of production technology from the Korean government in March, 2015.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion. The recipient is also selected by the PVSEC Award Committee according to nominations.

The PVSEC Special Award 2015 is presented to

Mr. Dong Kwan Kim
Hanhwa Q CELLS

Mr. Dong Kwan Kim currently holds a senior position at Hanwha Q CELLS Co Ltd. (Nasdaq: HQCL) as Chief Commercial Officer primarily responsible for defining and executing corporate strategy in global sales and solar downstream development. Prior to his current position, he had served as Chief Strategic Marketing Officer at Hanwha Q CELLS GmbH, where he was instrumental in developing new markets for the company, expanding downstream business opportunities and returning the company to profitability.

As one of key founding members of Hanwha Group's solar business since it first entered in 2010, he spearheaded key strategic initiatives including the acquisition of former Q.cells in 2012, which has become a core foundation of Hanwha Q CELLS' global leadership in technology and quality, and he led the 1.5 GW supply contract with NextEra Energy Resources in 2015, which is the world's largest-ever supply contract in the solar industry.

Under his leadership, Hanwha Q CELLS has now emerged as one of the global top solar companies with globally diverse footprints, technology leadership, and largest cell production capacity in the world.

Mr. Kim earned a B.A. in Government from Harvard College, and was acknowledged as "Young Global Leader" by the World Economic Forum in 2013.

PVSEC Special Award

The PVSEC Special Award is presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion. The recipient is also selected by the PVSEC Award Committee according to nominations.

The PVSEC Special Award 2015 is presented to

Dr. Eun-Chel Cho
Hyundai Heavy Industries Co.

Dr. Eun-Chel Cho is currently Director of Green Energy Research Institute at Hyundai Heavy Industries Co. Ltd. He received Ph.D. in Photovoltaics at University of New South Wales, Australia in 2003. He joined Samsung Advanced Institute of Technology as a member of research staff in 1993, Samsung SDI in 2004 and UNSW as Senior Research Fellow in 2006. He directed solar photovoltaic research since he joined Hyundai Heavy Industries in 2008. He has conducted silicon quantum dot research in UNSW and an efficiency improvement of an industrial screen printing solar cell and commercialization of industrial PERC (Passivated Emitter Rear Contact) solar cells in Hyundai Heavy Industries.
His research interest is mainly industrialization of highly efficient crystalline silicon solar cell not only p-type material but also n-type material and module technology including life cycle reliability and power generation in the system level.
He has published more than 100 scientific papers and 36 patents. He received GPVC's industrial award in 2014 for his long term activity upon basic research and its industrialization for solar cells.

The 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 recipient is selected by the PVSEC Award Committee according to nominations.

The Hamakawa Award 2015 is presented to

Prof. Nam Gyu Park
Sungkyunkwan University, Korea

For his outstanding contributions to the initiation of a perovskite material for solar cell application for the first time and to the pioneering research on perovskite solar cells.

Nam-Gyu Park is professor and SKKU-Fellow of School of Chemical Engineering at Sungkyunkwan University. He received the B.S degree in Chemical Education and the M.S. and Ph.D. degrees in Inorganic Chemistry from Seoul National University in 1988, 1992 and 1995, respectively. He worked at ICMCB-CNRS, France, from 1996 to 1997 and at National Renewable Energy Laboratory, USA, from 1997 to 1999 as postdoctoral researchers. He worked as Director of Solar Cell Research Center at Korea Institute of Science and Technology from 2005 to 2009 and as a principal scientist at Electronics and Telecommunications Research Institute from 2000 to 2005 before joining Sungkyunkwan University in 2009. He has been doing researches on high efficiency mesoscopic solar cells including photo-electrochemical dye-sensitized solar cell since 1997. He is one of pioneers in organo lead halide based perovskite solar cell, where he developed for the first time the long-term durable perovskite solar cell in 2012. His work triggered a surge of interest in perovskite solar cell. His work has been cited over 1,000 times for three years, as of September, 2015. Thanks to his great contribution to pioneering work on perovskite solar cell, perovskite solar cell is now considered as one of most promising technologies for low-cost electricity generation from sun light.
On the basis of his achievements, he received prestigious awards, including Scientist Award of the Month

(MEST, Korea) in 2008, KyungHyang Electricity and Energy Award (KEPCO, Korea) in 2008, KIST Award of the Year (KIST, Korea) in 2009, Dupont Science and Technology Award (Dupont Korea) in 2010, SKKU fellowship (SKKU) in 2013, MRS Outstanding Research Award (MRS, USA) in 2014 and WCPEC-6 Paper Award (Kyoto, Japan) in 2014. He published over 190 scientific papers, including Science, Nature Materials, Nature Nanotechnology and Nature Communications, 35 patent applications and 5 book chapters.

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is presented for outstanding contribution to the development of Photovoltaic Science and technology. The recipient is selected by the PVSEC Award Committee according to nominations.

The PVSEC Young Scientist Award 2015 is presented to:

Dr. Hae-Seok Lee
Korea University, Korea

Hae-Seok LEE is Professor of Materials Science and Engineering at Korea University, Republic of Korea. He received Ph.D. degree in Electronic Engineering from National TUT in 2003 as a national scholarship student supported by MEXT, Japan Government, where his research focused on CuInSe2 (CIS) space solar cells. Since 2003, he 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%). In March 2006, he had a new team, Solar Energy Group of LG Electronics, Korea as a chief researcher, where he began to develop high efficiency large area amorphous Si based thin film solar cells. In July 2008, he joined the R&D center, Shinsung Solar Energy Co., Ltd, Korea, as a Managing Director. From 2008 to 2012, he has been engaged in the mass production of Crystalline Si(c-Si) Solar Cells (Capa. 350MW/yr), Modules (Capa. 150MW/yr), and development of high efficiency c-Si solar cells as a National Project supported by MKE of Korean Government. In 2010, he developed the Record Efficiency of 19.6% for 6-inch Screen Printed p-type Si solar cells, and initiated the mass production of c-Si solar cells over 19% conversion efficiency. In addition, he achieved the World's Highest Record Efficiency of 20.03% for 6-inch Screen Printed p-type Si solar cells. He is currently working on the development of 26% world record efficiency c-Si solar cells, perovskite/silicon hetero-junction solar cells and nano-materials for solar cells.
He has authored over 44 publications in international journals and over 100 international presentations.

In addition, he has authored over 32 patents for PV. In addition to these scientific activities, he has made many contributions to the PV society. He has been worked as a director in Korea Photovoltaic Society, Korean Solar Energy Society and Korean Society for new and renewable energy. He was the Vice Chairman in Global Photovoltaic Conference & DSC-OPV 8 (2013), and is currently the Vice Chairman of technical Program Committee in PVSEC-25 & GPVC 2015.

He has received prestigious awards, including the Best Poster Award at 20-EUPVSEC (2005), WCPEC-4 (2007), PVSEC-19 (2009) and Paper Award at PVSEC-15 (2005). In addition, he also received an Award of Minister by Ministry of Knowledge Economy, Korea (2009), and an Award of Prime Minister, Korea (2010) as R&D results of high-efficiency c-Si solar cells.

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is presented for outstanding contribution to the development of Photovoltaic Science and technology. The recipient is selected by the PVSEC Award Committee according to nominations.

The PVSEC Young Scientist Awardee 2015 is presented to

Dr. Jae Ho Yun
Korea Institute of Energy Research, Korea

Dr. Jae Ho Yun is currently a principal researcher at Korea Institute of Energy Research. He received his B.S. and M.S. degrees in Materials Science and Engineering from the Korea Advanced Institute of Science and Technology in 1997 and 1999 respectively and a Ph.D. in CdTe compound thin film solar cells from the same institution in 2004. He focused on chalcogenide thin film solar cells based on CIGS, CZTSSe and earth abundant binary compounds after joining KIER in 2003. He has also been doing cooperative works with several companies for commercialization of CIGS thin film solar cells in Korea, and his recent interest is flexible CIGS modules for various applications.

He has authored or co-authored over 70 scientific research publications and 2 book chapters, holds 60 domestic or international patents, and served as chief of Photovoltaic Research Center and Solar Energy Department of KIER from 2011 to 2014. He has also served as an organizing or program committee member for several international conferences.

He received a KIER's Best Staff Award in 2008 as well as a Minister's award from Ministry of Knowledge Economy in 2010.

PVSEC Young Scientist Award

The PVSEC Young Scientist Award is presented for outstanding contribution to the development of Photovoltaic Science and technology. The recipient is selected by the PVSEC Award Committee according to nominations.

The PVSEC Young Scientist Awardee in 2015 will be presented to

Dr. Young Hyun Cho
Shinsung Solar, Korea

Dr. Young Hyun Cho is Senior Executive Vice President of Shinsung Solar Energy. For his academic background, he earned B.S. and M.S. degree on Electrical Engineering at Hanyang University and University of New South Wales in 1987 and 1994 respectively, and Ph.D on Photovoltaic Engineering at University of New South Wales in 2007. During his academic years, he has achieved Dean's Award for Ph.D at the University of New South Wales in 2003. He also achieved AINSE (Australian Institute of Nuclear Science and Engineering) Award in 2004 and ASRP (Australian Synchrotron Radiation Program) Award : All Silicon Tandem Solar Cells by Si QDs in 2004 and 2005 for two consecutive years.
In his career, he worked at Samsung Electronics as a senior researcher between 1994 and 1999. He also worked at Georgia Institute of Technology (Atlanta, USA) as a research engineer from 1999 to 2002. After earning his Ph.D, he joined Shinsung Solar Energy as a CTO from 2007 to 2008. Then, he joined Hyosung Corporation and Dongbu Hitek as Vice President from 2008 to 2010 and 2011 to 2014 respectively. For his entire career, he has been devoted himself for both development and commercialization of crystalline silicon solar cells. He is one of the first generation of photovoltaic engineering in Korea. He also participated in the pioneering development of different technologies with the high efficiencies at the time such as BCSC (Buried Contact Solar Cell), RTP (Rapid Thermal Process) silicon solar cells and PERL (Passivated Emitter Rear Locally diffused) solar cells. His dedication and leadership have strengthened commercial solar cells to enhance cell quality and increase production yield steadily. He has published 54 scientific and technological papers and 21 patent applications on photovoltaic & semiconductor engineering. He is currently a director of Korea Photovoltaic Society.

General Information

Registration Desk

Place	3F lobby, Convention Hall, BEXCO
Operating Hours	Nov. 15 (Sun) 13:00~17:00
	Nov. 16 (Mon)-19(Thu) 8:00~17:00
	Nov. 20(Fri) 8:00~12:00

Registration Fee

Registration fee for the conference includes admission to all technical sessions, the Exhibition and Welcome Reception as well as the program book and abstracts (USB).

	Early-bird	Late/On-Site
Regular	USD 650	USD 750
Student	USD 300	USD 400
Tutorial (Nov.15)	USD 100	
Banquet (Nov.18)	USD 80	

Name Badge

A name badge is provided when you arrive at the BEXCO. Please note that admission to all session rooms, exhibition, and coffee lounge may be restricted without a name badge.

Official Language

English is the official language of the conference.

Preview Room

Room #103, Convention Hall, BEXCO

Please check the presentation material is properly working. Presentation materials may be edited in the preview room.

Coffee Lounge

Coffee and tea will be provided in the Coffee lounge which is located at 3F, Convention Hall, BEXCO.

Lunch

Restaurants are available on the B1 of the BEXCO and Shinsegye Department which is on the across the street of BEXCO.

Wireless Internet

Wireless internet service is available in all conference venue. Please select the 'BEXCO Free Zone'.

Currency

Major foreign currencies that can be exchanged at banks, hotels, and the airport include the US Dollar, Japanese Yen, Euro, and UK Sterling. Most hotels, restaurants and shops accept major international credit cards including Visa, American Express, Diners Club, Master Card, and JCB. Foreign-issued ATM cards may have limited use.

Time

The Korean local time is 9 hours ahead of GMT with no daylight savings time.

Weather in Busan

Average temperature in Nov. is around 18℃ at day time and around 12℃ in the evening.

Electricity

In Korea, 220 volt outlets are most common. Some hotels provide 100 volt outlets for shavers. Please check the power supply before use.

International Call

International dialing code to Busan, Korea is +82-51(area code).
Please omit (0) when dialing from overseas.

Tip

Tipping is not a regular practice in Korea. Service charges are included in your bill for rooms, meals and other services at hotels and upscale restaurants. Koreans occasionally do tip when they are especially pleased with the service they receive.

Tax

Visitors can receive a refund on a receipt for a minimum purchase of KRW 50,000(around US$ 45). To receive this refund, present refund receipts with the purchased goods at the customs desk at the Incheon International Airport when departing. These receipts can be caused in at the Cash Refund Office in front of the Airport Duty Free Shop.

Social & Tour Program

Welcome Reception

Date 2015.11.15 (Sun) 17:30~19:30

Place 2F, BEXCO

Standing (Finger food and beverage)

Banquet

Date 2015.11.18 (Wed) 18:00~21:00

Venue Haeundae Grand Hotel

Buffet and celebration performance

Shuttle bus service will be provided between BEXCO and Banquet place.

Korean Tea Event

Date 2015.11.17 (Tue) Afternoon

Place 3F Coffee Lounge, BEXCO

All participants can enjoy Korean traditional tea and cookies

Tour Bus

Please refer the www.citytourbusan.com.

A limited number of tickets is available free of charge at the registration desk for the city tour bus.

Tourist Information Center

Tourist information center is located on 3rd Floor of BEXCO from Nov. 16 (Mon) to 19 (Thu).

In the center, professional tour guides dressed in a traditional Hanbok (Korean dress) provide Busan tourism information in English and Japanese. A City map of Busan and a coupon book can be found in the center.

Tutorials

Nov. 15 (Sun) 13:30~17:00

Tutorial 1 (Room 201)

13:30-14:15 Crystalline Silicon Solar Cells
Prof. Yoshio Ohshita (Toyota Technological Inst., Japan)

14:15-15:00 Next-Generation Technology for Crystalline Silicon Cells from Industrial Point of View
Dr. Seh-Won Ahn (LG Electronics)

Tutorial 2 (Room 201)

15:30~16:15 Preparation of PV Power Station and System Integration for Medium and small scale Zero Energy Towns
Dr. Hyungkeun Ahn (Konkuk Univ.)

16:15~17:00 PV Reliability
Prof. Soo-Young Oh (Yeungnam Univ.)

Tutorial 3 (Room 202)

13:30-14:15 Fundamentals of organic photovoltaic cells and their future outlook
Prof. Jung-Yong Lee (KAIST)

14:15-15:00 Inorganic-organic Hybrid Halide Perovskite Solar Cells
Dr. JunHong Noh (KRICT)

Tutorial 4 (15:30~17:00, Rm 202)

15:30~16:15 Fundamentals and Research Trend of Cu(In,Ga)Se2 Solar Cell
Prof. Chan-Wook Jeon (Yeungnam Univ.)

16:15~17:00 High Efficient Thin Film Solar Cells Technology based on II-VI Compound Semiconductor
Dr. Sanghyun Lee (Morehead State Univ.)

Presentation Instruction

Oral Presentation

1. Presentation Materials
   - Speakers should prepare their presentation file(s) in MS Power Point or Acrobat PDF slides.
   - If you bring your own laptop, please check it carefully before your session begins.
   - File uploading can be done before your session starts or during the coffee-break.
2. Speaker preparation area
   - Computers available in this area will have MS Windows installed.
   - There will also be several software programs available on the computer including: MS Office 2013, Acrobat Reader X and Windows Media Player.

Poster Presentation

1. Poster Posting Schedule
   - Poster sessions will take place in the Poster room (3rd floor of BEXCO) with the following schedules. Presenting authors must be present during their session.
   - The scheduled posters should be displayed from 09:00 to 15:10 on the presentation day.
2. Dimensions of the Poster Board
   - Your poster presentation code will be indicated on the board.
   - The size of the board is 100 cm (width) by 250 cm (height). So your poster must be smaller than the size of the board.
   - Adhesive will be provided at the conference.
   - Presenters are responsible for removing their own posters. Posters left behind will be disposed of.

Publications

PVSEC-25 & GPVC 2015 have a printed programming book and a USB drive that contains all the materials in the programing book and the abstracts of the presentation materials in this Conference.
PVSEC-25 does not have extended abstracts to avoid the plagiarism with regular papers by the same authors.

For special issues of PVSEC-25, we gathered author's intention of full paper submission. The publication committee will inform you the selection of Journal as soon as possible, preferably by the end of October. The final choice of journals is up to the author's discretion. The review process will be the same as regular papers.

The Journals under permission of Special issues are "IEEE J. Photovoltaics", "Current Applied Physics", and "Electronic Materials Letters".

Authors will be asked to submit their papers through the online submission system by following the instructions offered from each journal.

Approximate Time Schedule

Dec. 2015	Deadline for manuscript submission
Feb. 2016	Notification of the review results to authors
Mar. 2016	Revision (if revision is necessary)
Aug. 2016	Publication

Keynote & Plenary Lectures

Room 205, Convention Hall, BEXCO

Keynote Talk (Nov. 16 (Mon), 9:40-10:20)

Challenges and Opportunities in Technology for Sustainable Growth of Photovoltaics Energy

Dr. Ji-Weon Jeong, Hanwha Q Cells, Korea

Plenary 1 (Nov. 16 (Mon), 14:20-15:00)

Emergence and Progress of Inorganic-Organic Hybrid Perovskite Solar Cells

Dr. Sang Il Seok, KRICT, Korea

Plenary 2 (Nov. 17 (Tue), 9:00-9:40)

Silicon Heterojunction Solar Cells of the Past, the Present, and the Future

Dr. Mikio Taguchi, Panasonic Corporation, Japan

Plenary 3 (Nov. 17 (Tue), 9:40-10:20)

The emerging of high-performance multicrystalline silicon photovoltaics

Prof. Chung-Wen Lan, National Taiwan University, Taipei

Plenary 4 (Nov. 17 (Tue), 13:30-14:10)

Photovoltaic Materials and Devices for Organic Solar Cells

Prof. Yongfang Li, Chinese Academy of Science, China

Plenary 5 (Nov. 18 (Wed), 9:00-9:40)

Crystalline Silicon Photovoltaics - From the Past to the Future

Dr. Stefan Glunz, Fraunhofer ISE, Germany

Plenary 6 (Nov. 18 (Wed), 9:40-10:20)

Present and Future of Super-High Efficiency III-V Multi-junction, Concentrator Solar Cells and Modules

Prof. Masafumi Yamaguchi, Toyota Technological Inst., Japan

Plenary 7 (Nov. 18 (Wed), 13:30-14:10)

Ensuring the reliability of PV systems through the formation of the IECRE Conformity Assessment System and the development of new International Standards

Dr. George Kelly, IEC TC82, USA

Plenary 8 (Nov. 19 (Thu), 9:00-9:40)

Current Status and Future Prospect of CIS-based Thin-film PV Technology

Dr. Katsumi Kushiya, Solar Frontier, Japan

Plenary 9 (Nov. 19 (Thu), 9:40-10:20)

Designed Photovoltaics, from buildings to landscapes. Issues, approaches, problems, and solutions

Dr. Alessandra Scognamiglio, ENEA, Italy

Plenary 10 (Nov. 19 (Thu), 13:30-14:10)

Recent Progress in " FUTURE –PV Innovation" Project

Prof. Makoto Konagai, Tokyo City University, Japan

Oral Sessions

Nov. 16 (Mon), 09:40~10:20 #205, Convention Hall, BEXCO

Keynote Talk

Chair JaeChun Song (KETEP)

Keynote Talk (09:40~10:20)

Challenges and Opportunities in Technology for Sustainable Growth of Photovoltaics Energy

Ji-Weon Jeong* (Hanwha Q CELLS, Germany)

Nov. 16 (Mon), 14:20~15:00 #205, Convention Hall, BEXCO

Plenary Lecture 1

Chair Sang Hyuk Im (Kyunghee University)

Plenary Lecture 1 (14:20~15:00)

Emergence and Progress of Inorganic-Organic Hybrid Perovskite Solar Cells

Sang Il Seok* (KRICT)

Nov. 16 (Mon), 10:40~12:30 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials (CSi) 1

Chair Hae-Seok Lee (Korea Univ.)

CSi-I-01 (10:40~11:05) [*Invited*]

N-type silicon solar cell technology: ready for take off?

Radovan Kopecek* (Advanced Solar Cell Concepts, ISC Konstanz, Germany)

CSi-I-02 (11:05~11:30) [*Invited*]

21%-Efficient N-type Back-Junction PERT Solar Cell with Thin Industrial 156-mm Cz Single Crystalline Silicon Wafer

Eun-Chel Cho, Taejun Kim*, Hoon Oh, Jongchul Lee, Yoonseok Choi, Dohyeon Kyeong, Jieun Lee, Myungick Hwang (Green Energy Research Institute, Hyundai Heavy Industries)

CSi-O-01 (11:30~11:45)

High-efficiency and low-cost crystalline silicon solar cell R&D by universities' network of intelligent technologies

Yoshio Ohshita* (Toyota Technological Institute, Japan), Kyotaro Nakamura, Atushi Ogura (Meiji Univ., Japan)

CSi-O-02 (11:45~12:00)

Characteristics of silicon implanted with unfiltered ions

Hyomin Park, Seunghun Lee (Materials Science and Eng., Korea Univ.), Yoonmook Kang (KU·KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-Seok Lee* (Material Science and Eng., Korea Univ.), Donghwan Kim* (Materials Science and Eng., Korea Univ.)

CSi-O-03 (12:00~12:15)

Single Sided Doped Polysilicon Passivated Contact Implementation into n-Cz Solar Cells

Bill Nemeth*, Vincenzo LaSalvia, Matthew R. Page, Benjamin G. Lee, David Young, Paul Stradins (NCPV, NREL, USA)

CSi-O-04 (12:15~12:30)

Ni/Cu/Ag plated contacts: A study of resistivity and contact adhesion for C-Si solar cells

Atteq ur Rehman, Sang Hee Lee, Eun Gu Shin, Soo Hong Lee* (Green Strategic Energy Research Institute, Dept. of Electronics Eng., Sejong Univ.)

Nov. 16 (Mon), 15:30~16:55 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials (CSi) 2

Chair Yoshio Ohshita (TTI, Japan)

CSi-I-03 (15:30~15:55) [*Invited*]

High-performance passivated tunnel junction for silicon solar cell

Donghwan Kim*, Hae-Seok Lee (Dept. of Materials Science and Eng., Korea Univ.), Yoonmook Kang (KU-KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hyunho Kim, Soo Min Kim, Hyomin Park (Dept. of Materials Science and Eng., Korea Univ.), Kwang-Sun Ji, Seh-Won Ahn, Heon-Min Lee (Solar Energy Team, Materials & Components R&D Lab., LG Electronics)

CSi-O-05 (15:55~16:10)

Front side contact formation of crystalline silicon solar cells using nano particulate ink

Seong Gu Kang, Young Kuk Lee* (Center for Thin Film Materials, KRICT)

CSi-O-06 (16:10~16:25)

Novel Route to Construct High-Aspect-Ratio Electrodes Using Electrostatic-Force-Assisted Dispensing Printing for Improved Adhesion and Contact Resistivity

Dong-Youn Shin* (Dept. of Graphic Arts Information Eng., Pukyong Nat'l Univ.), Min Gu Kang, Hee-eun Song (Solar Energy Research Centre, KIER)

CSi-O-07 (16:25~16:40)

Thin Dielectric Passivated Contacts based on Transparent Conducting Oxides and Transition Metal Oxides for High Efficiency Crystalline Si Solar Cells

Woojun Yoon* (U.S. Naval Research Laboratory, USA), Eunhwan Cho (Univ. Center of Excellence for Photovoltaic Research and Education, School of Electrical and Computer Eng., Georgia Institute of Technology, USA), Jason Myers (U.S. Naval Research Laboratory, USA), Young-Woo Ok (Univ. Center of Excellence for Photovoltaic Research and Education, School of Electrical and Computer Eng., Georgia Institute of Technology, USA), Matthew Lumb (The George Washington Univ., USA), Jesse Frantz (U.S. Naval Research Laboratory, USA), Nicole Kotulak (NRC Postdoctoral Research Associate residing at the U.S. Naval Research Laboratory, USA), David Scheiman, Phillip Jenkins (U.S. Naval Research Laboratory, USA), Ajeet Rohatgi (Univ. Center of Excellence for Photovoltaic Research and Education, School of Electrical and Computer Eng., Georgia Institute of Technology, USA), Robert Walters (U.S. Naval Research Laboratory, USA)

CSi-O-08 (16:40~16:55)

SiC-SiO2 Nanocomposite a New and Effective Anti Reflection Coating (ARC) for Mono Crystalline Silicon Solar Cell

Azmira Jannat (Solar Energy Eng., Student), Woojin Lee (School of Semiconductor and Chemical Eng., student), M. Shaheer Akhtar (School of Semiconductor and Chemical Eng., Associate Professor), Zhen Yu Lia (School of Semiconductor and Chemical Eng., Student), O-Bong Yang* (School of Semiconductor and Chemical Eng., Professor)

Nov. 16 (Mon), 10:40~12:10

#203~4, Convention Hall, BEXCO

Thin-film based Silicon Cells and Materials (SiF) 1

Chair Jung Wook Lim (ETRI)

SiF-I-01 (10:40~11:10) [*Invited*]

Progress in high-efficiency thin-film silicon solar cells with honeycomb textures

Hitoshi Sai*, Takuya Matsui (RCPV, AIST, Japan), Keigo Maejima (Tsukuba Research Laboratory, PVTEC, Japan), Takashi Koida (RCPV, AIST, Japan), Michio Kondo (FREA, AIST, Japan), Isao Yoshida (Tsukuba Research Laboratory, PVTEC, Japan), Hirotaka Katayama (Panasonic Corporation, Japan), Shuichiro Sugiyama (Sharp Corporation, Japan), Teiji Takagawa (PVTEC, Japan), Koji Matsubara (RCPV, AIST, Japan)

SiF-O-01 (11:10~11:25)

Improved Light Management by Highly Transparent and Conductive Doped μc-SiOx:H as Window Layer and Back Reflector in μc-Si:H and a-Si:H/μc-Si:H Solar Cells

Pei-Ling Chen*, Po-Wei Chen, Min-Wen Hsiao, Cheng-Hang Hsu, Chuang-Chuang Tsai (Dept. of Photonics, Nat'l Chiao Tung Univ., Taiwan)

SiF-O-02 (11:25~11:40)

Real time observation of current induced macroscopic changes in thin film solar cells : device degradation mechanism

Ka-Hyun Kim* (KIER-UNIST Advanced Center for Energy, KIER), Erik V. Johnson, Pere Roca i Cabarrocas (Laboratoire de Physique des Interfaces et des Couches Minces, Ecole Polytechnique, France)

SiF-O-03 (11:40~11:55)

Modification of the P/I Buffer Layers on the Performance of Superstrate Hydrogenated Micro-crystalline Silicon Solar Cells

Lisha Bai, Bofei Liu, Qian Huang, Baozhang Li, Dekun Zhang, Changchun Wei, Jian Sun, Ying Zhao, Xiaodan Zhang* (Institute of Photo Electronics thin Film Devices and Technology of Nankai Univ., Key Laboratory of Photoelectronic Thin Film Devices and Technology, China)

SiF-O-04 (11:55~12:10)

Texturization of glass by plasma etching and their application in single junction a-Si thin film solar cell

Gourab Das*, Sukanta Bose, Sourav Mandal, Sukanta Dhar, Sumita Mukhopadhyay, Chandan Banerjee, Ashok Kumar Barua (CEGESS, IIEST, India)

Nov. 16 (Mon), 15:30~17:00 #203~4, Convention Hall, BEXCO

Thin-film based Silicon Cells and Materials(SiF) 2

Chair Ka-Hyun Kim (KIER)

SiF-I-02 (15:30~16:00) [*Invited*]

Characteristics of transparent and colored a-Si:H thin film solar cells

Jung Wook Lim* (Solar Cell Technology Research Laboratory, ETRI), Da Jung Lee (Dept. of Advanced Device Eng., UST), Sun Jin Yun (Solar Cell Technology Research Laboratory, ETRI)

SiF-O-05 (16:00~16:15)

Fabrication of high efficiency a-Si solar cells on flexible Kapton substrate

P.Balaji Bhargav (SSN Research Centre, SSN Institute, India), Gourab Das (CEGESS, Indian Institute of Eng. Science and Technology,Shibpur, India), Arokiyadoss R (SSN Research Centre, SSN Institute, India), Souarv Mandal, Sukanta Bose, Sukanta Dhar, Jayasree Roy Sharma, Sumita Mukhopadhyay, A.K. Barua* (CEGESS, Indian Institute of Eng. Science and Technology,Shibpur, India)

SiF-O-06 (16:15~16:30)

Design and analysis of photon-conversions for hydrogenated amorphous silicon thin-film solar cells

Hyeong-Seok Kim*, Myunghun Shin* (Energy & Photonics Lab, Korea Aerospace Univ.)

SiF-O-07 (16:30~16:45)

Growth of thick polycrystalline silicon layer by aluminum-induced crystallization

Yasuhiro Sujihara* (Graduate School of Eng., Nagoya Univ., Japan), Sergii Tutashkonko (JST-PV innovation, Japan), Isao Takahashi, Noritaka Usami (Graduate School of Eng., Nagoya Univ., Japan)

SiF-O-08 (16:45~17:00)

Growth of High Quality BaSi2 Film on Ge Substrate by Vacuum Evaporation Method

Cham Thi Trinh*, Yoshihiko Nakagawa (Nagoya Univ., Japan), Kosuke. O Hara (Univ. of Yamanashi, Japan), Takashi Suemasu (Univ. of Tsukuba, Japan), Noritaka Usami (Nagoya Univ., Japan)

Nov. 16 (Mon), 10:40~12:05 #104~5, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 1

Chair William Jo (Ewha Womans Univ.)

CIS-I-01 (10:40~11:05) [*Invited*]

Effects of Ag-alloying on the Growth of Cu(InGa)Se2 to form (AgCu)(InGa)Se2 thin films

William Shafarman* (Institute of Energy Converstion, Univ. of Delaware, USA)

CIS-O-01 (11:05~11:20)

Above 15% conversion efficiency in Cu(In,Ga)3Se5 (β–CIGS) solar cells

Ji Hye Kim, Eun Soek Cha, Seung Tae Kim, Gyu Charn Park, Byung Tae Ahn* (MSE, KAIST)

CIS-O-02 (11:20~11:35)

Effect of TiN_x alkali diffusion barrier layer on the physical property modifications of Mo back electrodes for CIGS solar cell applications

Weimin Li*, Xia Yan, Armin Aberle, Selvaraj Venkataraj* (Solar Energy Research Institute of Singapore(SERIS), Nat'l Univ. of Singapore(NUS), Singapore)

CIS-O-03 (11:35~11:50)

Phase separation and coarsening in Cu-In-Ga precursor thin films for sequentially processed Cu(In,Ga)Se2 solar cells

J.P. Bäcker, S.S. Schmidt*, M. Hartig*, C.A. Kaufmann* (PVcomB, Helmholtz Zentrum Berlin, Germany), R. Mainz* (Helmholtz Zentrum Berlin, Germany), H. Rodriguez-Alvarez*, C. Wolf*, R. Schlatmann* (PVcomB, Helmholtz Zentrum Berlin, Germany)

CIS-O-04 (11:50~12:05)

Synthesis of band-gap graded CIGSSe thin film by modified selenization process and its solar cell performance

Se Jin Park, Byoung Koun Min* (Clean Energy Research Center, KIST)

Nov. 16 (Mon), 15:30~16:55 #104~5, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 2

Chair Jin Hyeok Kim (Chonnam Univ.)

CIS-I-02 (15:30~15:55) [*Invited*]

Device characteristics review of world-record kesterite: Current understanding, new techniques, and inventions

Oki Gunawan* (Photovoltaics Science & Technology, IBM T J Watson Research Center, USA)

CIS-O-05 (15:55~16:10)

Electrical properties of kesterite thin-film solar cells probed by Kelvin probe force microscopy

William Jo*, Gee Yeong Kim (Dept. of Physics, Ewha Womans Univ.), Dae-Ho Son, Dae-Hwan Kim, Jin-Kyu Kang (Advanced Solar Energy Research Center, Daegu Gyeongbuk Institute of Science and Technology)

CIS-O-06 (16:10~16:25)

Fabrication of a Cd-free Cu_2ZnSnS_4-based solar cell by using an alternative In_2S_3 buffer layer

Feng Jiang*, Shigeru Ikeda, Takashi Harada, Michio Matsumura (Research Center for Solar Energy Chemistry, Osaka Univ., Japan)

CIS-O-07 (16:25~16:40)

Influence of the energetic alignment on the V_{oc} of $Cu_2ZnSn(S,Se)_4$ solar cells studied by impedance spectroscopy

Xin Zeng (School of Materials Science and Eng., Nanyang Technological Univ., Singapore), Pablo P. Boix* (ERI@N, Nanyang Technological Univ., Singapore), Kian Keat Lee, Xiaodong Chen, Lydia H. Wong (School of Materials Science and Eng., Nanyang Technological Univ., Singapore)

CIS-O-08 (16:40~16:55)

Ge incorporation effects in CZTSe thin-film solar cells

Shinho Kim*, Kang Min Kim, Hitoshi Tampo, Hajime Shibata, Koji Matsubara, Shigeru Niki (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan)

Nov. 16 (Mon), 10:40~12:05 #101~2, Convention Hall, BEXCO

Perovskite Solar Cells and Materials(PRV) 1

Chair Min Jae Ko (KIST)

PRV-O-01 (10:40~10:55)

Surface potential and transport of organic-inorganic $CH_3NH_3Pb(I_{1-x}Br_x)_3$ perovskite solar cells by scanning probe microscopy

Gee Yeong Kim, William Jo* (Dept. of Physics, Ewha Womans Univ.), Byeong Jo Kim, Hyun Suk Jung (School of Advanced Materials Science & Eng., Sungkyunkwan Univ.)

PRV-O-02 (10:55~11:10)

Multi-sequential Deposition of Organometal-halide Perovskites (OHP) Thin Films Using Thermal Evaporation Technique

Mohammad I. Hossain, Vinod E. Madhavan, Marie Buffiere, Mohammed I. Helal, Abdelhak Belaidi*, Nouar Tabet (Qatar Environment & Energy Research Institute (QEERI), Hamad Bin Khalifa Univ., Qatar Foundation, Qatar)

PRV-I-01 (11:10~11:35) [*Invited*]

Nanostructures and Interfaces for Low-cost and High-performance Perovskite Solar Cells

Shihe Yang*, Shihe Yang (Chemistry, The Hong Kong Univ. of Science and Technology, China)

PRV-O-03 (11:35~11:50)

O_3 Treatment Enhances p-doped Spiro-MeOTAD for High Efficiency $CH_3NH_3PbI_3$ Perovskite Solar Cells

Xi Lou (Center of Materials Physics and Chemistry, Dept. of Physics, Beihang Univ., China), Endong Jia (Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Eng.,Chinese Academy of Sciences, China), Chunlan ZHou* (Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Eng., Chinese Academy of Sciences, China), Weichang Hao (Center of Materials Physics and Chemistry, Dept. of Physics, Beihang Univ., China), Wenjing Wang (Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Eng., Chinese Academy of Sciences, China)

PRV-O-04 (11:50~12:05)

Efficient Planar-Heterojunction Perovskite Solar Cells Achieved via Interfacial Modification of Sol-gel ZnO Electron Collection Layer

Junghwan Kim (Heeger Center for Advanced Materials & Research Institute for Solar and Sustainable Energies, GIST), Geunjin Kim (School of Materials Science and Eng., GIST), Tea Kyun Kim (Research Institute for Solar and Sustainable Energies, GIST), Sooncheol Kwon (Dept. of Nanobio Materials and Electronics, GIST), Hyungcheol Back (School of Materials Science and Eng., GIST), Jinho Lee (Dept. of Nanobio Materials and Electronics, GIST), Seoung Ho Lee, Hongkyu Kang (Research Institute for Solar and Sustainable Energies, GIST), Kwanghee Lee* (Heeger Center for Advanced Materials & Research Institute for Solar and Sustainable Energies, GIST)

Nov. 16 (Mon), 15:30~16:50 #101~2, Convention Hall, BEXCO

Perovskite Solar Cells and Materials(PRV) 2

Chair Shihe Yang / HKUST

PRV-I-02 (15:30~15:55) [*Invited*]

Crystalline defect and interface structure for Sn/Pb binary perovskite solar cells

Yuhei Ogomi (Kyushu Institute of Technology, Japan), Qing Shen (Univ. of Electro-communication, Japan), Koji Nishinaka (Kyushu Institute of Technology, Japan), Teresa Ripolles (Kyushu Institute of technology, Japan), Kosei Fujiwara (Kyushu Institute of Technology, Japan), Taro Toyota (Univ. of Electro-communication, Japan), Kenji Yoshino (Miyazaki Univ., Japan), Shuzi Hayase* (Kyushu Institute of Technology, Japan)

PRV-O-05 (15:55~16:10)

Interfacial Modification of Hole Transport Layers for Large-Area Perovskite Solar Cells Achieved by Blade-Coating

Hyungcheol Back (School of Materials Science and Eng., GIST), Junghwan Kim, Geunjin Kim, Tae Kyun Kim, Hongkyu Kang, Jaemin Kong (Heeger Center for Advanced Materials & Research Institute for Solar and Sustainable Energies, GIST), Seoung Ho Lee (Dept. of Chemistry, Daegu Univ.), Kwanghee Lee* (School of Materials Science and Eng., GIST)

PRV-O-06 (16:10~16:25)

Ultra-thin NiO Film Grown by Atomic Layer Deposition as Hole Transporting Layer for Less-hysteresis Inverted Planar Perovskite Solar Cells

Seongrok Seo (Dept. of Energy Science, Sungkyunkwan Univ.), Ikjae Park (Photo-electronic Hybrids Research Center, KIST (KIST)), Myungjun Kim, Seonhee Lee, Changdeuk Bae (Dept. of Energy Science, Sungkyunkwan Univ.), Jinyoung Kim (Photo-electronic Hybrids Research Center, KIST (KIST)), Hyunjung Shin* (Dept. of Energy Science, Sungkyunkwan Univ.)

PRV-I-03 (16:25~16:50) [*Invited*]

Mechanism of carrier transport and hysteresis of the perovskite solar cells

William Jo* (Physics, Ewha Womans Univ.)

Nov. 16 (Mon), 10:40~12:05 #201~2, Convention Hall, BEXCO

New Concepts, Novel Materials and Devices((NMD) 1

Chair Hyung Koun Cho (SungKyunKwan Univ.)

NMD-I-01 (10:40~11:05) [*Invited*]

Novel hybrids of concentrating photovoltaic cells and high-temperature thermal collection to solve the impending solar energy storage crisis

Howard M. Branz* (Branz Technology Partners, Boulder, Colorado, USA)

NMD-O-01 (11:05~11:20)

Hot carrier solar cells: Potential materials and structures

Santosh Shrestha*, Simon Chung, Wenkai Cao, Yuanxun Liao, Neeti Gupta, Hongze Xia, Xi Dai, Yi Zhang, Qiuyang Zhang, Xiaoming Wen, Shujuan Huang, Gavin Conibeer (School of Photovoltaic and Renewable Energy Eng., UNSW Australia, Australia)

NMD-O-02 (11:20~11:35)

Growth of vertically aligned aluminum doped zinc oxide nanorods by hydrothermal process and their influence on structural, optical and electrical properties for thin film solar cells

Govindaraj R*, Magesh M, Arokiyadoss R, Senthil Pandian M, Balaji Bhargav P, Ramasamy P (SSN Research Centre, SSN College of Eng., India), Barua A.K. (Centre of Excellence for Green Energy and Sensor Systems, IIEST, India)

NMD-O-03 (11:35~11:50)

Fabrication of p-Type Doped Single Crystal Germanium Films on Silicon Wafer by Sputtering Process

Wei-Ting Lin (Dept. of Optics and Photonics, Nat'l Central Univ., Taiwan), Shao-Ze Tseng (Optical Sciences Center, Nat'l Central Univ., Taiwan), Yi-Chun Mao, Tsung-Hsiao Lin, Guei-Sheng Zeng, Sheng-Hui Chen* (Dept. of Optics and Photonics, Nat'l Central Univ., Taiwan)

NMD-O-04 (11:50~12:05)

Improved photovoltaic properties of graphene-silicon heterojunction solar cells by molecular doping

Sudip Adhikari* (Institute for General Research of Science, Researcher, Japan), H. Uchida, K. Wakita, M. Yasubayashi, M. Umeno (Professor, Japan)

Nov. 16 (Mon), 15:30~16:55 #201~2, Convention Hall, BEXCO

New Concepts, Novel Materials and Devices(NMD) 2

Chair Il-Ki Han (KIST)

NMD-O-05 (15:30~15:45)

Above 12%, Efficient PEDOT:PSS/black silicon hybrid solar cell

Abdul Sami Rajput (Dept. of Materials and Chemical Eng., Hanyang Univ.), Sun-Mi shin (Materials Science and Eng. Program, Univ. of California, San Diego, La Jolla, USA), Sambhaji Shinde, Yoon-Ho Nam, Imran Hasan, Myung-Hyun Kim, Jung-Ho Lee* (Dept. of Materials and Chemical Eng., Hanyang Univ.)

NMD-O-06 (15:45~16:00)

NH_3 decomposition catalyst-assisted MOVPE growth of $In_{0.3}Ga_{0.7}N$ for solar cell application

Akio Yamamoto*, Kazuki Kodama (Univ. of Fukui, Japan), Naoteru Shigekawa (Osaka City Univ., Japan), Takashi Matsuoka (Tohoku Univ., Japan), Masaaki Kuzuhara (Univ. of Fukui, Japan)

NMD-I-02 (16:00~16:25) [*Invited*]

Inorganic ligand capped Nanocrystals: synthesis and photovoltaic application

Jong-Soo Lee* (Energy Systems Eng., DGIST)

NMD-O-07 (16:25~16:40)

Near single-crystalline (100) and (110) Ge thin films on glass by Al- induced crystallization of amorphous-Ge

Kaveh Shervin, Khim Kharel, Nadia Idttalbe, Alex Freundlich* (Center for Advanced Materials, Univ. of Houston, USA)

NMD-O-08 (16:40~16:55)

Improvements of the generating power and reliability of PV module using by Cello technology

Jinsung Kim (LG Electronics, Solar business division, Solar R&D Lab.), Hyunho Lee, Sunghyun Hwang, Donghae Oh, Yunhui Cho, Wondoo Song, Sanghwan Park, Eonjoo Lyu, Juseok Kim, Sungho Jang, Youngho Choe* (LG Electronics, Solar business division, Solar R&D Lab)

NMD-O-09 (16:55~17:10)

High efficiency pristine graphene-silicon heterojunction solar cell with a thin aluminum oxide interlayer

Xuegong Yu*, Lifei Yang, Deren Yang* (State Key Lab of Silicon Materials, Zhejiang Univ., China)

Nov. 17 (Tue), 09:00~09:40 #205, Convention Hall, BEXCO

Plenary Lecture 2

Chair Soo Hong Lee (Sejong University)

Plenary Lecture 2 (09:00~09:40)

Silicon Heterojunction Solar Cells of the Past, the Present, and the Future

Mikio Taguchi*, Shingo Okamoto (Solar Business Unit, Eco Solutions Company, Panasonic Corp., Japan)

Nov. 17 (Tue), 09:40~10:20 #205, Convention Hall, BEXCO

Plenary Lecture 3

Chair Sangjin Moon (KRICT/UST)

Plenary Lecture 3 (09:40~10:20)

The emerging of high-performance multicrystalline silicon photovoltaics

C.W. Lan* (Chemical Eng., Nat'l Taiwan Univ., Taiwan), Y.M. Yang, A. Yu (Sino-American Silicon Productions Inc., Taiwan), Y.C. Wu (Chemical Eng., Nat'l Taiwan Univ., Taiwan), B. Hsu, W.C. Hsu (Sino-American Silicon Productions Inc., Taiwan), A. Yang (Solartech Energy Inc., Taiwan)

Nov. 17 (Tue), 13:30~14:10 #205, Convention Hall, BEXCO

Plenary Lecture 4

Chair Taiho Park (POSTEC)

Plenary Lecture 4 (13:30~14:10)

Photovoltaic Materials and Devices for Organic Solar Cells

Yongfang Li* (Laboratory of Organic Solids, Chinese Academy of Sciences, China)

Nov. 17 (Tue), 10:40~12:10 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials(CSi) 3

Chair Jae Hak Jung (Yeungnam Univ.)

CSi-O-09 (10:40~10:55)

High-quality n-type silicon ingot and wafer technology

Baik Sung-sun* (Business Control Division, WoongjinEnergy Co., Ltd.), Yook Youngjin (R&D Center, WoongjinEnergy Co., Ltd.)

CSi-O-10 (10:55~11:10)

Seed Manipulation for Artificially controlled defects Technique (SMART) as a new growth method for high-quality quasi-mono crystalline silicon

Isao Takahashi*, Taisho Iwata, Noritaka Usami (Graduate School of Eng., Nagoya Univ., Japan)

CSi-O-11 (11:10~11:25)

Growth of Si ingots for solar cells with 33 cm diameter using a small crucible with 40 cm diameter by Noncontact crucible method

Kazuo Nakajima*, Saotshi Ono, Ryota Murai, Yuzuru Kaneko (FUTURE-PV Innovation , JST Koriyama Site, Japan), Frédéric JAY, Yannick VESCHETTI, Anis JOUINI (Nat'l Institute of Solar Energy, INES R&D, France)

CSi-O-12 (11:25~11:40)

Numerical modelling on stress and dislocation generation in multi-crystalline silicon during directional solidification for PV applications

Srinivasan Manickam*, Aravinth K, Ramasamy P (Physics, SSNCE, India), Barua A. K (Centre of Excellence for green energy and solar systems, IIEST, India)

CSi-O-13 (11:40~11:55)

Oxygen and Nitrogen Precipitates distributed on Grain Boundaries in Cast-grown Multicrystalline Silicon

Takumi Uno*, Atsushi Ogura (Meiji Univ., Japan), Haruhiko Ono (Kanagawa Industrial Technology Center, Japan)

CSi-O-14 (11:55~12:10)

Improvement of MCLT in N-type mono Si by Cz Method

Sungsun Baik (R&D Center, WoongjinEnergy), Ilsun Pang, Jaemin Kim, Kwanghun Kim* (R&D team, R&D center, WoongjinEnergy)

Nov. 17 (Tue), 15:30~16:55 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials(CSi) 4

Chair Seh-Won Ahn (LG Electronics)

CSi-I-04 (15:30~15:55) [*Invited*]

Advances in silicon heterojunction solar cell research

Stefaan De Wolf* (EPFL, Switzerland), Matthieu Despeisse (CSEM, Switzerland), Christophe Ballif (EPFL, Switzerland)

CSi-O-15 (15:55~16:10)

25.1% Efficiency Cu Metallized Heterojunction Crystalline Si Solar Cell

Toshihiko Uto*, Daisuke Adachi, Masanori Kanematsu, Kunihiro Nakano, Tooru Irie, Tsuyoshi Asatani, Toru Terashita, Tomomi Meguro, Naoaki Nakanishi, Masashi Yoshimi (KANEKA CORPORATION, Japan), José Luis Hernández, Dries Schroos, Nick Valckx, Nicolas Menou (KANEKA Belgium N.V., Belgium), Kenji Yamamoto (KANEKA CORPORATION, Japan)

CSi-O-16 (16:10~16:25)

Suppression of the epitaxial growth of Si films in silicon heterojunction solar cells by the formation of ultra-thin oxide layers

Takafumi Oikawa, Keisuke Ohdaira*, Koichi Higashimine, Hideki Matsumura (Japan Advanced Institute of Science and Technology, Japan)

CSi-O-17 (16:25~16:40)

Formation of copper electroplated contact for silicon heterojunction solar cell with efficiency towards 23%

Jian Yu*, Jiantao Bian, Yucheng Liu, Fanying Meng, Zhengxin Liu (Research Center for New Energy Technology, Shanghai Institute of Microsystem and Information Technology, China)

CSi-O-18 (16:40~16:55)

Analysis of topological defects and broadband absorption for sub-stoichiometric a-Si:H passivating layers

Jonathon Mitchell* (Photovoltaic Power Team, Nat'l Institute of Advanced industrial Science and Technology, Japan)

CSi-O-19 (16:55~17:10)

Investigating the high performance multi-crystalline silicon with optically black texture for hetero-junction with extreme thin layer solar cells

Song Zhang* (Material science and engineering, Norwegian Univ. of science and technology, Norway), Fanying Meng, Zhengxin Liu (Research Center for New Energy Technology, Chinese Academy of Sciences, China), Gabriella Tranell (Material science and engineering, Norwegian Univ. of science and technology, Norway)

Nov. 17 (Tue), 10:40~12:05 #104~5, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 3

Chair Yong-Duck Chung (ETRI)

CIS-I-03 (10:40~11:05) [*Invited*]

Potentials and Future Prospects of CIGS PV Technology

Shigeru Niki* (RENRC, AIST, Japan), Shogo Ishizuka, Yukiko Kamikawa, Jiro Nishinaga, Sungwoo Choi, KangMin Kim, Shinho Kim, Hajime Shibata, Atsushi Masuda, Koji Matsubara (RCPV, AIST, Japan), Norio Terada (Dept. of Electrical and Electronics Eng., Kagoshima Univ., Japan), Takeaki Sakurai, Katsuhiro Akimoto (Univ. of Tsukuba, Japan)

CIS-O-09 (11:05~11:20)

Position of minimum [Ga]/([Ga]+[In]) in $Cu(In,Ga)Se_2$ on flexible stainless steel substrate for high efficiency cell

Jakapan Chantana*, Daisuke Hironiwa (Electrical and Electronic Eng., Ritsumeikan Univ., Japan), Taichi Watanabe, Seiki Teraji (Energy Material Research Center, Nitto Denko Corporation, Japan), Takashi Minemoto (Electrical and Electronic Eng., Ritsumeikan Univ., Japan)

CIS-O-10 (11:20~11:35)

High photo-conversion efficiency double-graded CIGSSe thin-film solar cells by two step post-treatment of sulfurization

Gee Yeong Kim, William Jo* (Dept. of Physics, Ewha Womans Univ.), Jung Yup Yang, Jung Gyu Nam, Dong Sup Kim (Photovoltaic Development Team, Samsung SDI)

CIS-O-11 (11:35~11:50)

Investigation on the cell performance of potassium fluoride modified CIGS solar cell

Ishwor Khatri*, Hirofumi Fukai, Mutsumi Sugiyama, Tokio Nakada (Research Institute for Science and Technology, Tokyo Univ. of Science, Japan)

CIS-O-12 (11:50~12:05)

High-throughput atomic layer deposition tool for commercial scale CIGS solar modules

Jihye Kim, Young Duck Tak, Hyungsang Park* (ISAC research)

Nov. 17 (Tue), 15:30~16:55 #104~5, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 4

Chair Jeha Kim (Chungju Univ.)

CIS-I-04 (15:30~15:55) [*Invited*]

$Cu_2ZnSnSe_4$ based solar cells with efficiency exceeding 10% by adding a superficial Ge nanolayer

Sergio Giraldo (Advanced Materials for Energy, IREC, Spain), Thomas Thersleff (The Ångström Laboratory, Dept. of Eng. Sciences, Uppsala Univ., Sweden), Markus Neuschitzer, Paul Pistor (Advanced Materials for Energy, IREC, Spain), Klaus Leifer (The Ångström Laboratory, Dept. of Eng. Sciences, Uppsala Univ., Sweden), Alejandro Pérez-Rodríguez, Edgardo Saucedo* (Advanced Materials for Energy, IREC, Spain)

CIS-O-13 (15:55~16:10)

Cu_2ZnSnS_4 Thin Film Solar Cells Fabricated by Sulfurization of Single Quaternary Compound Target RF-Sputtered Precursors

P. Chelvanathan, Z. Zakaria (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), Y. Yusoff (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), M. Akhtaruzzaman (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), N. Amin* (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

CIS-O-14 (16:10~16:25)

Evaluation of thiourea treated $Cu_2ZnSn(S,Se)_4$ solar cells

Kento Furuta, Motoki Watanabe* (Dept. of Physical Electronics, Tokyo Institute of Technology, Japan), Noriyuki Sakai*, Takuya Kato*, Hiroki Sugimoto* (Atsugi Research Center, Solar Frontier K.K., Japan), Akira Yamada* (Dept. of Physical Electronics, Tokyo Institute of Technology, Japan)

CIS-O-15 (16:25~16:40)

CZTS thin film solar cells prepared from sulfurization of stacked metallic layers

Kishor Gurav* (Materials Science and Eng., Chonnam Nat'l Univ.)

CIS-O-16 (16:40~16:55)

Sodium incorporation in $Cu_2ZnSnSe_4$-based solar cells

Hitoshi Tampo*, Kang Min Kim, Shinho Kim, Hajime Shibata, Koji Matsubara, Shigeru Niki (Research Center for Photovoltaics, Nat'l Institute of Advanced Science and Technology, Japan)

Nov. 17 (Tue), 10:40~12:05 #201~2, Convention Hall, BEXCO

Organic, Dye Sensitized Solar Cells and Materials(OSC) 1

Chair Won Suk Shin (KRICT)

OSC-I-01 (10:40~11:05) [*Invited*]

Highly Efficient, Stable, and Printable Polymer Solar Cell Modules

Kwanghee Lee* (School of Materials Science and Eng., GIST)

OSC-O-01 (11:05~11:20)

ITO-free polymer solar cell with carbon nanotube as the transparent electrode

Yu-Fan Chang* (Dept. of Photonics, Institute of Electro-Optical Eng., Nat'l Chiao Tung Univ., Taiwan), Pei-Ting Tsai, Tsung-Han Yang (Institute of Physics, Nat'l Chiao Tung Univ., Taiwan), Cheng-Han Yu (Institute of Photonics Technologies, Nat'l Tsing Hua Univ., Taiwan), Shao-Chun Yang, Hsin-Fei Meng* (Institute of Physics, Nat'l Chiao Tung Univ., Taiwan), Hsiao-Wen Zan* (Dept. of Photonics, Institute of Electro-Optical Eng., Nat'l Chiao Tung Univ., Taiwan), Sheng-Fu Horng (Dept. of Electrical Eng., Nat'l Tsing Hua Univ., Taiwan), Mei-Rurng Tseng, Han-Cheng Yeh (Material and Chemical Research Laboratories, Industrial Technology Research Institute, Taiwan)

OSC-O-02 (11:20~11:35)

Synthesis and characterization of new DBTP-based conjugated polymers for organic photovoltaics

In Hwan Jung (Advanced Materials Division, KRICT (KRICT)), Ji-Hoon Kim (Dept. of Chemistry, Pusan Nat'l Univ.), So Yeon Nam, Changjin Lee (Advanced Materials Division, KRICT (KRICT)), Do-Hoon Hwang* (Dept. of Chemistry, Pusan Nat'l Univ.), Sung Cheol Yoon* (Advanced Materials Division, KRICT)

OSC-O-03 (11:35~11:50)

Role of Doped ZnO Interlayer for High Performance Organic Solar Cells

Hyeok Kim*, Jun Young Kim, Jaehoon Kim, Kunsik An, Jiyun Song, Changhee Lee* (Dept. of Electrical and Computer Eng., Seoul Nat'l Univ.)

OSC-O-04 (11:50~12:05)

Highly efficient metal nanoparticles-embedded organic solar cells: Enhanced optical and electrical performance

Se-Woong Baek (EEWS (Energy, Environment, Water and Sustainability) graduate school, KAIST (KAIST), Jung-Yong Lee* (EEWS (Energy, Environment, Water and Sustainability) graduate school, KAIST (KAIST))

Nov. 17 (Tue), 15:30~16:55 #201~2, Convention Hall, BEXCO

Organic, Dye Sensitized Solar Cells and Materials(OSC) 2

Chair Zhan'ao Tan (NCEP Univ., China)

OSC-I-02 (15:30~15:55) [*Invited*]

Dye-Sensitized Solar Cells into Building Windows

Junghyun Yoon, Jongbok Kim, Hwichan Yang, Joocheol Lee, Dong Hyun Lee, Yun Lee, Kyusoon Shin* (Advanced Institute of Research, Dongjin Semichem)

OSC-O-05 (15:55~16:10)

Conducting Polymer/Graphene Composite for Counter Electrode of Organic Dye sensitized Solar Cell

Jaecheon Kim, Md. Mahbubur Rahman, Byung-wook Park (Dept. of Applied Life Science, College of Biomedical and Health Science, Konkuk Univ.), Myung Jong Ju (Interdisciplinary School of Green Energy/Institute of Advanced Materials & Devices, Ulsan Nat'l Institute of Science and Technology (UNIST)), Jae-Joon Lee* (Dept. of Applied Life Science, College of Biomedical and Health Science, Konkuk Univ.)

OSC-O-06 (16:10~16:25)

Reduced graphene oxide -based materials: synthesis, characterization and application in dye-sensitized solar cells

Songping Luo, Hong Lin*, Chenyang Liu, Qiang Luo (State Key Laboratory of New Ceramics & Fine Processing, School of Material Science and Eng., Tsinghua Univ., China)

OSC-O-07 (16:25~16:40)

Catalytic Activation in Polymeric Counter Electrode of Dye-sensitized Solar Cells by Surface Modification

Hyunwoong Seo* (Graduate School of Information Science and Electrical Eng., Kyushu Univ., Japan), Min-Kyu Son (Dept. of Chemical Sciences and Eng., École polytechnique fédérale de Lausanne, Switzerland), Shinji Hashimoto, Naho Itagaki, Kazunori Koga, Masaharu Shiratani (Graduate School of

Information Science and Electrical Eng., Kyushu Univ., Japan)

OSC-O-08 (16:40~16:55)

Complex carbon nanodot/urchin-like ZnO structure toward photovoltaic applications

Xinwei Wang, Hong Liu*, Wenzhong Shen* (Physics and Astronomy, Shanghai Jiao Tong Univ., China)

Nov. 17 (Tue), 10:40~12:05 #203~4, Convention Hall, BEXCO

III-V Compound based Concentrator and Space PV Systems(GAS) 1

Chair Jaejin Lee (Ajou Univ.)

GAS-I-01 (10:40~11:05) [*Invited*]

Thin-film InP solar cells with electron selective TiO_2 contacts

Corsin Battaglia* (Swiss Federal Laboratories for Materials Science and Technology, Switzerland)

GAS-O-01 (11:05~11:20)

Fabrication of InGaAsP (1.65 eV) second cells for smart stack multi-junction solar cells grown using solid-source MBE

Takeyoshi Sugaya* (Nat'l Institute of Advanced Industrial Science and Technology (AIST), Japan), Toru Mochizuki (Tokyo City Univ., Japan), Takeshi Tayagaki, Kikuo Makita, Ryuji Oshima, Koji Matsubara (Nat'l Institute of Advanced Industrial Science and Technology (AIST), Japan), Yoshinobu Okano (Tokyo City Univ., Japan)

GAS-O-02 (11:20~11:35)

Accuracy of internal voltage evaluations in multi-junction solar cells via electroluminescence

Hidefumi Akiyama*, Lin Zhu, Masahiro Yoshita, Changsu Kim (Institute for Solid State Physics, Univ. of Tokyo, and JST-CREST, Japan), Toshimitsu Mochizuki (Fukushima Renewable Energy Institute, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Shaoqiang Chen (Dept. of Electronic Eng., East China Normal Univ., China), Tetsuya Nakamura, Mitsuru Imaizumi (Japan Aerospace Exploration Agency (JAXA), Japan), Yoshihiko Kanemitsu (Institute for Chemical Research, Kyoto Univ., and JST-CREST, Japan)

GAS-O-03 (11:35~11:50)

Spatial carrier collection efficiency imaging by luminescence

Amaury Delamarre* (RCAST, The Univ. of Tokyo, Japan), Laurent Lombez (IRDEP, CNRS, France), Kentaroh Watanabe (RCAST, The Univ. of Tokyo, Japan), Masakazu Sugiyama (Dept. of Electrical Engineeting & Information System, School of Eng., The Univ. of Tokyo, Japan), Jean-François Guillemoles (NextPV, Japan)

GAS-O-04 (11:50~12:05)

Transparent top electrode for Ⅲ-Ⅴ compound semiconductor solar cells using silver nanowires

Wonjung Choi, Jiyoon Nam, Seunghwan Cho, Bowook Seo, Bonhee Ha (School of Architectural, Civil, Environmental, and Energy Eng., Kyungpook Nat'l Univ.), Chang Joo Kim, Ho Kwan Kang (Nano Process Division, Korea Advanced Nano Fab Center), Sungjin Jo* (School of Architectural, Civil, Environmental, and Energy Eng., Kyungpook Nat'l Univ.)

Nov. 17 (Tue), 15:30~16:55 #203~4, Convention Hall, BEXCO

III-V Compound based Concentrator and Space PV Systems(GAS) 2

Chair Sungjin Jo (Kyungpook Univ.)

GAS-I-02 (15:30~15:55) [*Invited*]

Potential and Recent Results of High-Efficiency III-V/Si Tandem Solar Cells

Masafumi Yamaguchi*, Kan-Hua Lee, Kenji Araki, Nobuaki Kojima, Yoshio Ohshita (Toyota Technological Institute, Japan)

GAS-O-05 (15:55~16:10)

MOCVD growth of germanium on Si (001) substrates using an isobutylgermane for high efficiency III-V multi-junction solar cells

Youngjo Kim, Kangho Kim (Dept. of Electrical and Computer Eng., Ajou Univ.), Chang Zoo Kim, Ho Kwan Kang, JeHyuk Choi, Won-Kyu Park (Korea Advanced Nano Fab Center), Jaejin Lee* (Dept. of Electrical and Computer Eng., Ajou Univ.)

GAS-O-06 (16:10~16:25)

Investigation of crack effects on GaAs photovoltaic cells fabricated on Si substrate

Sewoung Oh (Dept. of Materials Science and Eng., Seoul Nat'l Univ.), Dong Hwan Jun (Korea Advanced Nano Fab Center), Keun Wook Shin (Dept. of Materials Science and Eng., Seoul Nat'l Univ.), HinHye Choi, JeHyuk Choi (Korea Advanced Nano Fab Center), Yongjo Park (Energy Semiconductor Research Center, Advanced Institutes of Convergence Technology), Euijoon Yoon* (Dept. of Materials Science and Eng., Seoul Nat'l Univ.)

GAS-O-07 (16:25~16:40)

Epitaxial Growth of Germanium and Silicon-Germanium Thin Films on Silicon Using Magnetron Sputtering System

Shao-Ze Tseng (Optical Sciences Center, Nat'l Central Univ., Taiwan), Wei-Ting Lin, Yi-Chun Mao, Tsung-Hsiao Lin, Guei-Sheng Zeng, Kuan-Hsiang Chen, Sheng-Hui Chen* (Dept. of Optics and Photonics, Nat'l Central Univ., Taiwan)

GAS-O-08 (16:40~16:55)

Possibility of compact stand-alone power system using CPV and Tracking PV hybrid

Kenji Araki* (Toyota Technological Institute, Japan), Hirokazu Nagai (New Business Development, Daido Steel, Japan), Kau-Hua Lee, Masafumi Yamaguchi (Toyota Technological Institute, Japan)

Nov. 17 (Tue), 10:40~12:10 #101~2, Convention Hall, BEXCO

PV Components, Modules and System(MSI) 1

Chair: Kyung Soo Lee (Korea Polytechnic Univ.)

MSI-I-01 (10:40~11:10) [*Invited*]

FREA launches world's largest facility of testing and developing Power Conditioning Systems (PCS) for the mass introduction of DER (Distributed Energy Resources)

Kenji Otani* (Fukushima Renewable Energy Institute (FREA), AIST, Japan)

MSI-O-01 (11:10~11:25)

Efficient MPPT charging of supercapacitor from solar PV module

Indranil Das, Joydip Jana, Abhijit Das, Tanusree Dutta, Anirban Guria, Hiranmay Samanta, Hiranmay Saha* (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science & Technology, India)

MSI-O-02 (11:25~11:40)

Estimation Method of Solar Cell Temperature Using Meteorological Data in Mega Solar Power Plant

Shigeomi Hara*, Hiroyuki Tanaka, Makoto Kasu (Science and Eng., Saga Univ., Japan), Noriaki Matsui (Saga Yoshinogari Solar LLC, Japan)

MSI-O-03 (11:40~11:55)

A performance ratio, energy yield and economic evaluation under Thailand feed in tariff program of grid tie Photovoltaic roof top system under short term measurement and verification

Jeerawan Saelao* (Mathematics, Maejo Univ., Thailand), Nopporn Patcharaprakiti (Electrical engineering, Rajamangala Univ. of technology lanna, Thailand), Anon Numin (Electrical engineering, Rajamangala Univ. of Techonolgy lanna, Thailand), Dhirasak Somsak (Technology and Interdisciplinary College, Rajamangala Univ. of technology lanna, Thailand), Jutturit Thongpron (Electrical engineering, Rajamangala Univ. of Techonolgy lanna, Chiangrai, Thailand, Thailand), Kasem Threepak (Electrical engineering, Rajamangala Univ. of technology lanna, Thailand)

MSI-O-04 (11:55~12:10)

Analysis of Impact to Optical Environment of the Land by Flat-plate and Tracking PV Panels Using METPV-11 Database

Kenji Araki* (Toyota Technological Institute, Japan), Hirokazu Nagai (New Business Development, Daido Steel, Japan), Kan-Hua Lee, Kazuma Ikeda (Toyota Technological Institute, Japan)

Nov. 17 (Tue), 15:30~17:00 #101~2, Convention Hall, BEXCO

PV Components, Modules and System(MSI) 2

Chair Jinseok Lee (KIER)

MSI-I-02 (15:30~16:00) [*Invited*]

Expected environmental impacts of PV module recycling

Keiichi Komoto*, Shohei Oyama, Hiroyuki Uchida (Environment and Energy Division 2, Mizuho Information & Research Institute, Inc., Japan), Matsuhei Noda (Kitakyushu Foundation for the Advancement of Industry, Science and Technology, Japan), Hiroshi Saito (Shinryo Corporation, Japan), Katsumi Kushiya (Solar Frontier K.K., Japan)

MSI-O-05 (16:00~16:20)

Recovery of Valuable Materials from Photovoltaic Ribbon in Spent Solar Module

Jei-Pil Wang (Dept. of Metallurgical Eng., Pukyong Nat'l Univ.), Jin-Seok Lee, Joon-Soo Kim (Advanced Materials and Devices Laboratory, KIER), Young-Soo Ahn (KIER), Bo-Yun Jang (Advanced Materials and Devices Laboratory, KIER), Gi-Hwan Kang (Photovoltaic Laboratory, KIER), Jei-Pil Wang* (Dept. of Metallurgical Eng., Pukyong Nat'l Univ.)

MSI-O-06 (16:20~16:40)

Recycling process of waste Photovoltaic cells and its application

SinHyong Joo, TaeHyuk Lee, Hayk Nersisyan (Graduate School of Materials Science and Eng., Chungnam Nat'l Univ.), JinSeok Lee, YoungSoo An (KIER), JongHyeon Lee* (Graduate School of Materials Science and Eng., Chungnam Nat'l Univ.)

MSI-O-07 (16:40~17:00)

Low-cost Recovery Process of Unbroken Solar Cell from PV Module

Jun-Kyu Lee, Jin-Seok Lee*, Young-Soo Ahn (Advanced Materials and Devices Laboratory, KIER), Gi-Hwan Kang (Photovoltaic Laboratory, KIER), Churl-Hee Cho (Graduate School of Energy Science and Technology, Chungnam Nat'l Univ.)

Nov. 18 (Wed), 09:00~09:40 #205, Convention Hall, BEXCO

Plenary Lecture 5

Chair Donghwan Kim (Korea University)

Plenary Lecture 5 (09:00~09:40)

Crystalline Silicon Photovoltaics - From the Past to the Future

Stefan Glunz* (Fraunhofer Institute for Solar Energy Systems, Germany)

Nov. 18 (Wed), 09:40~10:20 #205, Convention Hall, BEXCO

Plenary Lecture 6

Chair Won-Kyu Park (KANC)

Plenary Lecture 6 (09:40~10:20)

Present and Future of Super-High Efficiency III-V Multi-junction, Concentrator Solar Cells and Modules

Masafumi Yamaguchi* (Research Center for Smart Energy Technology, Toyota Technological Institute, Japan)

Nov. 18 (Wed), 13:30~14:10 #205, Convention Hall, BEXCO

Plenary Lecture 7

Chair Soo-Young Oh (Yeungnam University)

Plenary Lecture-7 (13:30~14:10)

Ensuring the reliability of PV systems through the formation of the IECRE Conformity Assessment System and the development of new International Standards

George Kelly* (Sunset Technology, USA), Adrian Häring (SMA Solar Technology, Germany), Ted Spooner (UNSW, Australia), Greg Ball (DNV GL, USA), Sarah Kurtz (NREL, USA)

Nov. 18 (Wed), 10:40~12:05 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials(CSi) 5

Chair Eun-Chel Cho (Hyundai Heavy Industries)

CSi-I-05 (10:40~11:05) [*Invited*]

Hole selective MoOx contacts for high-efficiency silicon solar cells

Corsin Battaglia* (Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland)

CSi-O-20 (11:05~11:20)

Industrial p-type PERC solar cell with locally laser doped p^+ BSF from Al_2O_3/SiN_x stacks

Marco Ernst*, Daniel Walter, Andreas Fell (Centre for Sustainable Energy Systems, Australian Nat'l Univ., Australia), Bianca Lim (Institute for Solar Energy Research Hamelin (ISFH), Germany), Klaus Weber (Centre for Sustainable Energy Systems, Australian Nat'l Univ., Australia)

CSi-O-21 (11:20~11:35)

Optimization of laser-transferred contact process for PERC cells with high open-circuit voltage

Shunsuke Urabe, Kazuki Shimizu*, Ateto Eric Omondi*, Miyajima Shinsuke* (Dept. of Physical Electronics, Tokyo Institute of Technology, Japan)

CSi-O-22 (11:35~11:50)

Mass production of multicrystalline PERC solar cells with efficiency above 19%

Hsing-Hua Wu*, Tseng-Chieh Pan, Kuang-Hui Hung, Nai-Tien Ou, Kuei-Wu Huang (Gintech Energy Corporation, Taiwan)

CSi-O-23 (11:50~12:05)

An improved methodology for extracting the interface defect density (D_{it}) of passivated silicon solar cells

Zheng Xin, Muzhi Tang, Armin G. Aberle (Dept. of Electrical and Computer Eng., Nat'l Univ. of Singapore, Singapore), Rolf Stangl* (Solar Energy Research Institute of Singapore, Nat'l Univ. of Singapore, Singapore)

Nov. 18 (Wed), 15:30~16:55 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials(CSi) 6

Chair Yoonmook Kang (Korea Univ.)

CSi-I-06 (15:30~15:55) [*Invited*]

LG's One-step-ahead toward solar innovation

Youngho Choe* (Solar R&D Lab, LG Electronics)

CSi-O-24 (15:55~16:10)

Elimination of the BO defect related LID in production solar cells

Malcolm Abbott*, Brett Hallam, Catherine Chan, Phillip Hamer, Nitin Nampalli, Bram Hoex (UNSW, Australia), Jianhua Zhao, Aihua Wang (China Sunergy, China), Budi Tjahjono (Sunrise Global, Taiwan), Chee Mun Chong, Stuart Wenham (UNSW, Australia)

CSi-O-25 (16:10~16:25)

A study of light induced degradation and regeneration process with kinetic modeling in crystalline silicon solar cells

Soo Min Kim, Sujeong Jeong (Dept. of materials science and engineering, Korea Univ.), Yoonmook Kang* (KU·KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-seok Lee*, Donghwan Kim* (Dept. of materials science and engineering, Korea Univ.)

CSi-O-26 (16:25~16:40)

An online, web based solar cell simulation interface for the personalized simulation of various solar cell architectures, using various simulation programs, free of charge for public use

Rolf Stangl* (SERIS (Solar Energy Research Institute of Singapore), Head: Novel Cell Concepts & Simulation, Singapore), Gautam Anand (SERIS (Solar Energy Research Institute of Singapore), Software develloper - web based simulation interface, Singapore), Armin Aberle (SERIS (Solar Energy Research Institute of Singapore), CEO, Singapore)

CSi-O-27 (16:40~16:55)

Suppression of LID by Regeneration: Field Results on Silicon PERC Modules

Moonseok Kim, Jong-Keun Lim, Jinhyung Ahn, Kyumin Lee*, Myung-Ick Hwang, Eun-Chel Cho (Hyundai Heavy Industries, Co., Ltd.)

Nov. 18 (Wed), 10:40~12:10 #203~4, Convention Hall, BEXCO

Thin-film based Silicon Cells and Materials(SiF) 3

Chair Dong-Ho Kim (KIMS)

SiF-I-03 (10:40~11:10) [*Invited*]

Thin-Film Silicon in Hybrid Solar Cell Architectures

Miro Zeman*, Andrea Ingenito, Guangtao Yang, FaiTong Si, Johan Blanker, Hairen Tan, Olindo Isabella, Arno Smets (Photovoltaic Materials and Devices, Delft Univ. of Technology, Netherlands), Rene Janssen (Molecular Materials and Nanosystems, Eindhoven Univ. of Technology, Netherlands)

SiF-O-09 (11:10~11:25)

Three-Dimensional Nanoparticle Structure Arrays for Enhanced Light Trapping in Nanocrystalline Silicon Thin-Film Solar Cells

Kyungyeon Ha (School of Mechanical and Aerospace Eng., Seoul Nat'l Univ.), Eunseok Jang (Photovoltaic Laboratory, KIER), Segeun Jang (School of Mechanical and Aerospace Eng., Seoul Nat'l Univ.), Jong-Kwon Lee, Min Seok Jang (Global Frontier Center for Multiscale Energy System), Hoseop Choi (School of Mechanical and Aerospace Eng., Seoul Nat'l Univ.), Jun-Sik Cho* (Photovoltaic Laboratory, KIER), Mansoo Choi* (School of Mechanical and Aerospace Eng., Seoul Nat'l Univ.)

SiF-O-10 (11:25~11:40)

Bulk Heterojunction Hybrid Solar Cells Based on Silicon Nanocrystals and Organic Semiconductors

Shuangyi Zhao, Xiaodong Pi*, Deren Yang (School of Materials Science and Eng., Zhejiang Univ., China)

SiF-O-11 (11:40~11:55)

Influence of different types of seeding on the growth of ZnO nanorods for application in radial junction silicon thin film solar cells

Jayasree Roy Sharma*, Sukanta Bose, Sourav Mandal, Gourab Das, Arpita Jana, Sukanta Dhar, Rajasi Mandal, Sumita Mukhopadhyay, A. K. Barua (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science and Technology (IIEST), Shibpur, India)

SiF-O-12 (11:55~12:10)

Gridless semi-transparent hydrogenated amorphous silicon solar cells with ultra-thin transparent multi-layered electrodes with various thicknesses of metal layers

Da Jung Lee, Jung Wook Lim*, Sun Jin Yun (Solar Cell Technology Research Laboratory, ETRI (ETRI))

Nov. 18 (Wed), 15:30~17:00 #203~4, Convention Hall, BEXCO

Thin-film based Silicon Cells and Materials(SiF) 4

Chair Hitoshi Sai (AIST, Japan)

SiF-I-04 (15:30~16:00) [*Invited*]

Processes and technology for silicon-based solar cells: A versatile industrial PECVD platform

Bernd Stannowski*, Onno Gabriel, Simon Kirner, Matthias Zelt, Björn Rau, Rutger Schlatmann (PVcomB, Helmholtz-Zentrum Berlin, Germany)

SiF-O-13 (16:00~16:15)

Progress in a-SiOx:H Thin Film Solar Cells for Top Cell of Multi-junction System

Dong-Won Kang* (Solar & Energy Eng., Cheongju Univ.), Porponth Sichanugrist, Makoto Konagai (Physical Electronics, Tokyo Institute of Technology, Japan)

SiF-O-14 (16:15~16:30)

Development of high quality p-a-SiO_xC_y:H using additional Trimethylboron as carbon source gas

Bancha Junthong, Porponth Sichanugrist* (MEXT/FUTURE-PV Innovation Research, Japan Science and Technology Agency, Japan), Chisato Niikura (Photovoltaic Materials Unit, Nat'l Institute for Materials Sciences, Japan), Makoto Konagai (Advance Research Lab., Tokyo City Univ., Japan)

SiF-O-15 (16:30~16:45)

Determining criteria for near-ideal operation of amorphous silicon solar cell

S M Iftiquar*, Junsin Yi (College of Information and Communication Eng., Sungkyunkwan Univ.)

SiF-O-16 (16:45~17:00)

Light-induced degradation of a-Si:H photovoltaic module study on dynamics characterization

Nitikorn Silsirivanich* (Ruttanakosin College for Sustainable Energy and Environment, Rajamangala Univ. of Technology Ruttanakosin, Lecture and Researcher, Thailand), Dhirayut Chenvidhya (CES Solar Cell Testing Center, Pilot Plant Development and Training Institute, Researcher, Thailand), Roongrojana Songprakorp (Division of Energy Technology, School of Energy, Environment and Materials, King Mongkut's Univ. of Technology Thonburi, Lecture, Thailand), Anon Namin (Faculty of Eng., Rajamangala Univ. of Technology Lanna, Lecture, Thailand), Krissanapong Kirtikara (CES Solar Cell Testing Center, Pilot Plant Development and Training Institute, Lecture, Thailand)

SiF-O-17 (17:00~17:15)

The silicon oxide thickness effects to aluminum induced crystallization on graphite substrate

Doo Won Lee, Muhammad Fahad Bhopal, Soo Hong Lee* (Green Strategic Energy Research Institute, Electronics engineering, Sejong Univ.)

Nov. 18 (Wed), 15:30~17:20 #101~2, Convention Hall, BEXCO

Organic, Dye Sensitized Solar Cells and Materials(OSC) 3

Chair Min Jae Ko (KIST)

OSC-O-09 (15:30~15:45)

Efficient Organic Dyes with Julolidine Unit for Application in Dye-sensitized Solar cells

Guohua Wu, Fantai Kong* (Key Laboratory of Novel Thin Film Solar Cells, Institute of Applied Technology, Chinese Academy of Sciences, China), Songyuan Dai (School of Renewable Energy, North China Electric Power Univ., China)

OSC-O-10 (15:45~16:00)

A new self-assembly printing method for simplifying tandem organic photovoltaics with four-layer structure

Seok Kim (School of Materials Science and Eng., GIST), Hongkyu Kang (Research Institute for Solar and Sustainable Energies, GIST), Soonil Hong, Jinho Lee, Seongyu Lee, Byoungwook Park, Kwanghee Lee* (School of Materials Science and Eng., GIST)

OSC-I-03 (16:00~16:25) [*Invited*]

Light Trapping in Submicorspheres Based Photoelectrode of Dye-sensitized Solar Cells

Yong Ding, Linhua Hu (Key Laboratory of Novel Thin Film Solar Cells, Institute of Applied Technology, Chinese Academy of Sciences, China), Songyuan Dai* (School of Renewable Energy, North China Electric Power Univ., China)

OSC-O-11 (16:25~16:40)

Tungsten carbide nanorods: Effect of ZrO2 binder in counter electrode for dye sensitized solar cells (DSSC)

Vijayakumar P, Senthilpandian M, Ramasamy P* (Physics, SSN College of Eng., India)

OSC-I-04 (16:40~17:05) [*Invited*]

Interface Engineering for Efficient Polymer Solar Cells with Solution-Processed Electrode Modification Layer

Zhan'ao Tan*, Songyuan Dai (School of Renewable Energy, North China Electric Power Univ., China), Yongfang Li (Institute of Chemistry, Chinese Academy of Sciences, China)

Nov. 18 (Wed), 10:40~12:05 #101~2, Convention Hall, BEXCO

Perovskite Solar Cells and Materials(PRV) 3

Chair Howard M. Branz/ Branz Tech. Partners

PRV-I-04 (10:40~11:05) [*Invited*]

Limiting process and working mechanisms of Pb-free and lower dimensionality perovskite solar cells

Pablo P. Boix*, Nripan Mathews, Subodh Mhaisalkar (ERI@N, Nanyang Technological Univ., Singapore)

PRV-O-07 (11:05~11:20)

Tunneling-Junction Control for Two-Terminal Mechanical-Stacked Tandem Solar Cells Based on Silicon and Perovskite

Hiroyuki Kanda, Abdullah Uzum (Graduate School of Eng., Univ. of Hyogo, Japan), Hitoshi Nishino (Energy Technology Laboratories, Osaka Gas Co., Ltd., Japan), Tomokazu Umeyama, Hiroshi Imahori (Dept. of Molecular Eng., Kyoto Univ., Japan), Yasuaki Ishikawa, Yukiharu Uraoka (Graduate School of Materials Science, Nara Institute of Science and Technology, Japan), Seigo Ito* (Graduate School of Eng., Univ. of Hyogo, Japan)

PRV-O-08 (11:20~11:35)

Photoluminescence and electroluminescence imaging of perovskite solar cells

Ziv Hameiri*, Arman Soufiani, Mattias Juhl (SPREE, UNSW, Australia), Juergen Weber (BT Imaging, BT Imaging, Australia), Martin Green, Thorsten Trupke (SPREE, UNSW, Australia)

PRV-O-09 (11:35~11:50)

Sputtering method preparation of titanium dioxide electron transport layer and its application in planar perovskite solar cells

Lin Fan, Junhui Liang, Yu Xing, Xin Yao, Changchun Wei, Dekun Zhang, Guangcai Wang, Ying Zhao, Xiaodan Zhang* (Institute of Photo Electronics thin Film Devices and Technology of Nankai Univ., Key Laboratory of Photoelectronic Thin Film Devices and Technology, China)

PRV-O-10 (11:50~12:05)

Strategy for improving photo- and moisture-stability of perovskite solar cell

Jin-Wook Lee, Deok-Hwan Kim, Hui-Seon Kim, Nam-Gyu Park* (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ. (SKKU))

Nov. 18 (Wed), 10:40~12:05

#104~5, Convention Hall, BEXCO

New Concepts, Novel Materials and Devices(NMD) 3

Chair Tae Joo Park (Hanyang Univ.)

NMD-O-10 (10:40~10:55)

Dependence of open-circuit voltage in GaNAs/AlGaAs quantum structure solar cells on N concentration

Martin Elborg* (International Center for Young Researchers, Nat'l Institute for Materials Science, Japan), Takeshi Noda (Solar Cell Materials Unit, Nat'l Institute for Material Science, Japan), Yoshiki Sakuma (Photonic Materials Unit, Nat'l Institute for Material Science, Japan)

NMD-O-11 (10:55~11:10)

Electromagnetic Field Assisted Manipulated in-situ Growth of Compound Semiconductor in Nanostructures for next Generation Solar Cells

Hong Liu* (Physics and Anstronomy, Shanghai Jiao Tong Univ., China), Xiwa Deng, Wenzhong Shen* (Physics and Astronomy, Shanghai Jiao Tong Univ., China)

NMD-I-03 (11:10~11:35) [*Invited*]

Upconversion and Downshifting Luminescence for Photovoltaic Cells

Kyu-Tae Lee, Jong-Hyun Park, Hyungduk Ko, Il-Ki Han (KIST), Doo-Hyun Ko* (Dept. of Applied Chemistry, Kyung Hee Univ.)

NMD-O-12 (11:35~11:50)

Fabrication of two terminal Perovskite/Crystalline Silicon Tandem Solar Cells and Simulation Studies of Related Structures

Abdullah Uzum*, Hiroyuki Kanda, Seigo Ito (Graduate School of Eng., Univ. of Hyogo, Japan)

NMD-O-13 (11:50~12:05)

Hybrid photoelectrochemical-photovoltaic devices for water splitting based on silicon wafer hetero-junctions and thin-film silicon multi-junctions

Paula Perez Rodriguez*, Ibadillah Digdaya, Bernhard Dam, Wilson Smith, Lihao Han, Miro Zeman, Arno Smets* (Delft Univ. of Technology, Netherlands)

Nov. 18 (Wed), 15:30~16:55 #104~5, Convention Hall, BEXCO

New Concepts, Novel Materials and Devices(NMD) 4

Chair Doo-Hyun Ko (Kyunghee Univ.)

NMD-I-04 (15:30~15:55) [*Invited*]

Record Performance Dilute Nitride Solar Cells Enabled by Resonantly Coupled Quantum Wells

Alex Freundlich*, Gopi Krishna Vijaya, Wei Wang, Kaveh Shervin (Center for Advanced Materials, Univ. of Houston, USA), Dinghao Tang, David J. Smith (Physics Dept., Arizona State Univ., USA)

NMD-O-14 (15:55~16:10)

The effect of diameter on radial type wire-structure crystalline silicon solar cells

Yasutoshi Yashiki*, Yuusuke Shirayanagi, Tomohiro Hakamata (Japan Science and Technology Agency, Japan), Makoto Konagai (Advanced Research Laboratories, Tokyo City Univ., Japan)

NMD-O-15 (16:10~16:25)

High efficient silicon nanopyramid textured heterojunction solar cells

Sihua Zhong, Wenzhong Shen* (Institute of Solar Energy, and Key Laboratory of Artificial Structures and Quantum Control (Ministry of Education), Dept. of Physics and Astronomy, Shanghai Jiao Tong Univ., China)

NMD-O-16 (16:25~16:40)

Efficient Conductive Polymer/Crystalline Si Heterojunction Solar Cells with Improved Stability

Qiming Liu*, Shuji Funada, Tatsuya Ohki, Ryo Ishikawa, Keiji Ueno, Hajime Shirai (Graduate School of Science and Eng., Saitama Univ., Japan)

NMD-O-17 (16:40~16:55)

Electroless & Electrodeposit Assisted Stripping for Spalling of a Single Crystalline Silicon Layer with All-Wet Process

Changyol Yang, Jaeho Jeon (Advanced Material Eng., Hanyang Univ.), Bongyoung Yoo* (Materials and Chemical Eng., Hanyang Univ.)

Nov. 18 (Wed), 10:40~12:05 #201~2 Convention Hall, BEXCO

PV Reliability and Standardization(RES) 1

Chair Soo-Young Oh (Yeungnam Univ.)

RES-I-01 (10:40~11:05) [*Invited*]

Potential induced degradation (PID) of p-type crystalline solar cells and modules

Joerg Bagdahn*, Dominik Lausch, Volker Naumann, Christian Hagendorf (Fraunhofer Center for Silicon Photovoltaics CSP, Germany)

RES-O-01 (11:05~11:20)

High voltage stress test for potential-induced degradation of crystalline Si photovoltaic modules

Atsushi Masuda*, Minoru Akitomi, Masanao Inoue (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Keizo Okuwaki, Atsuo Okugawa (Kikusui Electronics Corporation, Japan), Kohjiro Hara (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan)

RES-O-02 (11:20~11:35)

Correlation Study between Material Degradation Behavior and PV module Performance

Ethan Wang* (Research & Development, Underwriters Laboratories, Taiwan), Chien-Yu Peng (Institute of Statistical Science, Academia Sinica, Taiwan), Chih-Chun Tsai (Dept. of Mathematics, Tamkang Univ., Taiwan), Ivan Chou (Quality, Hulk Energy Technology Co. Ltd., Taiwan), Carl Wang (Research & Development, Underwriters Laboratories, Taiwan)

RES-O-03 (11:35~11:50)

Development of reliability model and simulator for forecasting photovoltaic power generation lifetime

Wonshoup So, Jae Hak Jung*, Soo Young Oh (Chemical Eng., Yeungnam Univ.)

RES-O-04 (11:50~12:05)

Long term reliability on PV module performance

Pilkyu Kim* (Korea Testing lab.)

Nov. 18 (Wed), 15:30~17:05 #201~2, Convention Hall, BEXCO

PV Reliability and Standardization(RES) 2

Chair Donggun Lim (Korea Nat'l Univ. of Transportation)

RES-I-02 (15:30~15:55) [*Invited*]

Climate Specific Thermal Cycling- Is It Required For Reliability Testing?

Nick Bosco* (Reliability & Systems Eng., Nat'l Renewable Energy Laboratory, USA)

RES-I-03 (15:55~16:20) [*Invited*]

Soiling and anti-soiling coating for photovoltaic module glass

Sung-Il Chan*, Wonwook Oh (Robust Components and System Research Center, Korea Electronic Technology Institute)

RES-O-05 (16:20~16:35)

Investigation of Irradiance Measurement for Precise Outdoor PV Module Performance Characterization

Yoshihiro HISHIKAWA*, Takuya Doi, Michiya HIGA, Kengo YAMAGOE, Hironori OHSHIMA (Characterization, standards, and measurement team, AIST, Japan)

RES-O-06 (16:35~16:50)

A Study on Nowcasting of Irradiance Distribution based on Kriging and All-sky Image Information

Kento Takashima, Muneaki Kurimoto*, Yasuo Suzuoki* (Electrical Eng. and Computer Science, Nagoya Univ., Japan), Yusuke Manabe*, Toshihisa Funabashi*, Takeyoshi Kato* (Funded Reserch Division of EcoTopia Science Institute, Nagoya Univ., Japan)

RES-O-07 (16:50~17:05)

Various degradation mechanisms in crystalline PV modules under moderate climatic conditions

Tetsuyuki Ishii* (Materials Science Research Laboratory, Central Research Institute of Electric Power Industry, Japan), Atsushi Masuda (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan)

Nov. 19 (Thu), 09:00~09:40 #205, Convention Hall, BEXCO

Plenary Lecture 8

Chair Byung Tae Ahn (KAIST)

Plenary Lecture 8 (09:00~09:40)

Current Status and Future Prospect of CIS-based Thin-film PV Technology

Katsumi Kushiya* (Solar Frontier, Japan)

Nov. 19 (Thu), 09:40~10:20 #205, Convention Hall, BEXCO

Plenary Lecture 9

Chair Jun Tae Kim (Kongju National Univ.)

Plenary Lecture 9 (09:40~10:20)

"Designed Photovoltaics", from buildings to landscapes. Issues, approaches, problems, solutions"

Alessandra Scognamiglio* (ENEA (Italian Nat'l Agency for New Technologies, Energy and Sustainable Economic Development), Italy)

Nov. 19 (Thu), 13:30~14:10 #205, Convention Hall, BEXCO

Plenary Lecture 10

Chair Jinsoo Song (Silla Univ.)

Plenary Lecture 10 (13:30~14:10)

Recent Progress in " FUTURE –PV Innovation" Project

Makoto KONAGAI* (Advanced Research Laboratories, Tokyo City Univ., Japan)

Nov. 19 (Thu), 10:40~12:05 #201~2, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 5

Chair Chan Wook Jeon (Yeungnam Univ.)

CIS-I-05 (10:40~11:05) [*Invited*]

Above 18% CIGS solar cells using ALD-ZnSnO buffer layer

Sun Cheol Kim, Ji Hye Kim, Seung Tae Kim, Joong Keun Park*, Byung Tae Ahn* (MSE, KAIST)

CIS-O-17 (11:05~11:20)

15.2% efficiency on pure-sulfide $CuInGaS_2$ solar cell

Homare Hiroi*, Yasuaki Iwata, Kyouhei Horiguchi, Noriyuki Sakai, Hiroki Sugimoto (Technology Development Division, Atsugi Research Center, Solar Frontier K.K., Japan)

CIS-O-18 (11:20~11:35)

Revival of CIGSe Superstrate Solar Cells?

Marc D. Heinemann* (PVcomB, Helmholtz Zentrum Berlin, Germany), Joe Berry (Nat'l Renewable Energy Laboratory, USA), Dieter Greiner (PVcomB, Helmholtz Zentrum Berlin, Germany), Thomas Unold, Hans-Werner Schock (Helmholtz Zentrum Berlin, Germany), Rutger Schlatmann, Christian A. Kaufmann (PVcomB, Helmholtz Zentrum Berlin, Germany)

CIS-O-19 (11:35~11:50)

Investigation of the effects of rear surface recombination on the $Cu(In,Ga)Se_2$ solar cell performances

Takeshi Umehara, Shohei Iinuma*, Akira Yamada* (Dept. of Physical Electronics, Tokyo Institute of Technology, Japan)

CIS-O-20 (11:50~12:05)

Fabrication of 3-D nanostructured $CuInGaS_2$ thin film solar cells by a solution process

Van Ben Chu (Clean Energy and Chemical Eng., Korea Univ. of Science and Technology, 176 Gajeong-dong, 217 Gajeongro Yuseong-gu, Daejeon 305-350, Republic of Korea), Se Jin Park (Clean Energy Research Center, KIST, 39-1 Hawolgok-dong, Seongbuk-gu, Seoul 136-791, Republic of Korea), Byoung Koun Min* (Clean Energy and Chemical Eng., Korea Univ. of Science and Technology, 176 Gajeong-dong, 217 Gajeongro Yuseong-gu, Daejeon 305-350, Republic of Korea)

Nov. 19 (Thu), 15:30~16:55 #201~2, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 6

Chair Byungha Shin (KAIST)

CIS-I-06 (15:30~15:55) [*Invited*]

Cost and Technology Roadmap for Multi-GW CIGS Production

Dong Seop Kim*, Vichai Meemongkolkiat, Jeong Min Lee (PV Business Team, Wonik IPS)

CIS-O-21 (15:55~16:10)

The effects of alkali-doping on $Cu(In,Ga)Se_2$ thin film solar cells

Dong Hyeop Shin (Mechanical Eng. and Materials Science, Duke Univ., USA), Je Kyung Kim, Byungha Shin*, Byung Tae Ahn (Materials Science and Eng., KAIST)

CIS-O-22 (16:10~16:25)

CdS segregation and its effect in $Cu_2ZnSnSe_4$ and $Cu(In,Ga)Se_2$ solar cells

Dahyun Nam (Dept. of Physics, Sogang Univ.), Dae-Ho Son, Jun-Hyoung Sim, Dong-Hwan Jeon, Byoung-Soo Ko, Dae-Hwan Kim, Kee-Jeong Yang, Dae-Kue Hwang, Jin-Kyu Kang (Advanced Convergence Technology Center, Daegu Gyeongbuk Institute of Science & Technology), Hyeonsik Cheong* (Dept. of Physics, Sogang Univ.)

CIS-O-23 (16:25~16:40)

Peeled-off flexible $Cu(In,Ga)Cu_2$ solar cells and Na diffusion effects on cell performances

Adiyudha Sadono*, Tomohiro Ogihara (Dept. of Physical Electronics Eng., Tokyo Institute of Technology, Japan), Masashi Hino, Kenji Yamamoto (Kaneka Corporation, Japan), Akira Yamada (Dept. of Physical Electronics Eng., Tokyo Institute of Technology, Japan)

CIS-O-24 (16:40~16:55)

Carbon-impurity affected depth elemental distribution in solution-processed inorganic thin films for solar cell application

SeJin Ahn* (Photovoltaic Laboratory, KIER), Shanza Rehan, Jeong Hyeob Han (Dept. of Renewable Energy Eng., Korea Univ. of Science and Technology (UST)), Young-Joo Eo, Jihye Gwak, SeungKyu Ahn, Jae Ho Yun, Kyunghoon Yoon, Ara Cho (Photovoltaic Laboratory, KIER)

Nov. 19 (Thu), 15:30~16:55 #101~2, Convention Hall, BEXCO

Organic, Dye Sensitized Solar Cells and Materials(OSC) 4

Chair Songyuan Dai (NCEP Univ., China)

OSC-O-12 (15:30~15:45)

Highly Efficient Copper-Indium-Selenide Quantum Dot-Sensitized Solar Cells

Jae-Yup Kim (Photo-Electronic Hybrids Research Center, KIST), Jiwoong Yang, Taeghwan Hyeon (School of Chemical and Biological Eng., Seoul Nat'l Univ.), Min Jae Ko* (Photo-Electronic Hybrids Research Center, KIST)

OSC-O-13 (15:45~16:00)

Synthesis and Characterization of 2-cyano 3-(4-diphenylaminophenyl) prop 2-enoic acid dye for Dye Sensitized Solar Cell Applications

Kotteswaran S, Senthil Pandian M, Ramasamy P* (SSN Research Centre, SSN College of Eng., India)

OSC-I-05 (16:00~16:25) [*Invited*]

Challenges to Harvesting NIR Region Light in Dye-sensitized Solar Cells Employing Facet Engineering as a Key

Yuji Wada*, Masato Maitani (Dept. of Applied Chemistry, Tokyo Institute of Technology, Japan)

OSC-O-14 (16:25~16:40)

Solution Processable Small Molecules for High Performance Organic Solar Cells

Sachin Badgujar, Chang Eun Song, Won Suk Shin (Advance material, KRICT), Jong Cheol Lee, Sang Jin Moon (Advance material, Korea Research Institute of Chemical Technolog), Sang Kyu Lee* (Advance materia, Korea Research Institute of Chemical Technolog)

OSC-O-15 (16:40~16:55)

Enhanced thermal stability of transparent AZO electrode by depositing an oxygen barrier for dye-sensitized or perovskite solar cells

Hee Sang Lee (Dept. of Chemical and Biomolecular Eng., KAIST), Seong Ihl Woo* (Graduate School of EEWS, KAIST)

OSC-O-16 (16:55~17:10)

Design and Synthesis of New Organic Dyes to Construct Multi-Dye Based Dye-Sensitized Solar Cells for Indoor Light Harvesting Applications

Towhid H. Chowdhury, Mohd Aizat Bin Abdul Wadi, A. K. Mahmud Hasan (Solar Energy Research Institute (SERI), The Nat'l Univ. of Malaysia, Malaysia), Ashraful Islam (Photovoltaic Materials Unit, Nat'l Institute for Materials Science, Japan), Idriss M. (CRC, Optometry Dept., College of Applied Medical Sciences, King Saud Univ., Saudi Arabia), Mohd Hafidz Ruslan, Kamaruzzaman Sopian (Solar Energy Research Institute (SERI), The Nat'l Univ. of Malaysia, Malaysia), Nowshad Amin (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), Md. Akhtaruzzaman* (Solar Energy Research Institute (SERI), The Nat'l Univ. of Malaysia, Malaysia)

Nov. 19 (Thu), 10:40~12:00 #205, Convention Hall, BEXCO

Perovskite Solar Cells and Materials(PRV) 4

Chair Seunghyup Yoo / KAIST

PRV-I-05 (10:40~11:05) [*Invited*]

Organo-lead halide perovskite Solar Cells on Inorganic Materials (CuSCN, NiO, SnO_2, and c-Si)

Seigo Ito* (Graduate School of Eng., Univ. of Hyogo, Japan)

PRV-O-11 (11:05~11:20)

A spectroscopic TCSPC lifetime measurement setup with 6 degrees of freedom

Henner Kampwerth* (School of Photovoltaic and Renewable Energy Eng., The Univ. of New South Wales, Australia)

PRV-O-12 (11:20~11:35)

Effects of Crystalline Facet of Oxide Scaffold on $CH_3NH_3PbI_3$ in Perovskite Solar Cells

Masato Maitani, Akito Tateyama, Yuji Wada* (Dept. of Applied Chemistry, Tokyo Institute of Technology, Japan)

PRV-I-06 (11:35~12:00) [*Invited*]

Alternating Precursor Layer Deposition for Highly Stable Perovskite Films Towards Efficient Solar Cells Using Vacuum Deposition

Frank (Shengzhong) Liu* (Dalian Institute of Chemical Physics, Shaanxi Normal Univ., China), Dong Yang (Shaanxi Normal Univ., China)

Nov. 19 (Thu), 15:30~17:05 #205, Convention Hall, BEXCO

Perovskite Solar Cells and Materials(PRV) 5

Chair Seigo Ito (Hyogo Univ., Japan)

PRV-I-07 (15:30~15:55) [*Invited*]

The Adjustable Volume Expansion and Shrinkage in Perovskite Film Deposition

Yixin Zhao* (School of Environmental Science and Eng., Shanghai Jiao Tong Univ., China)

PRV-O-13 (15:55~16:10)

Surface and local electrical properties of organic－inorganic lead halide perovskite solar cells

Bich Phuong Nguyen, Gee Yeong Kim, William Jo* (Physics, Ewha Womans Univ., 120-750, Seoul, Korea)

PRV-I-08 (16:10~16:35) [*Invited*]

Improving Charge Extraction in Organic-Inorganic Hybrid Solar Cells

Taiho Park* (Chemical Eng., POSTECH (POSTECH))

PRV-O-14 (16:35~16:50)

An Effective Tool for Anticipating I-V Hysteresis of Perovskite Solar Cell

Hui-Seon Kim, In-Hyuk Jang (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ.), Namyoung Ahn (Dept. of Mechanical and Aerospace Eng., Seoul Nat'l Univ.), In-Hwey Heo (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ.), Mansoo Choi (Dept. of Mechanical and Aerospace Eng., Seoul Nat'l Univ.), Nam-Gyu Park* (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ.)

PRV-O-15 (16:50~17:05)

Role of defects and light management on performance of an organic-inorganic lead halide perovskite based solar cell

S M Iftiquar*, Junsin Yi (College of Information and Communication Eng., Sungkyunkwan Univ.)

Nov. 19 (Thu), 10:40~12:05 #104~5, Convention Hall, BEXCO

III-V Compound based Concentrator and Space PV Systems(GAS) 3

Chair Won-Kyu Park (KANC)

GAS-O-09 (10:40~11:05)

Design of High-concentrator PV Modules with 1,130x Concentration Ratio for Achieving More Than 30% AC System Efficiencies

Sungbin Kim, Jangkyun Kim*, Chankyu Park, Kunwoong Ko (AnyCasting Co., Ltd.)

GAS-O-10 (11:05~11:20)

Off-axis characteristics of CPV modules result from lens-cell misalignment - Measurement and Monte-Carlo simulation

Kenji Araki* (Toyota Technological Institute, Japan), Hirokazu Nagai (New Business Development, Daido Steel, Japan), Rebeca Herrero, Steve Askins, Ignacio Antón, Gabriel Sala (Instituto de Energía Solar, Universidad Politécnica de Madrid, Spain)

GAS-O-11 (11:20~11:35)

Design and Development of Dome-shaped Fresnel Lens

Kenji Araki* (Toyota Technological Institute, Japan), Hirokazu Nagai (New Business Development, Daido Steel, Japan), Kan-Hua Lee, Kazuma Ikeda (Toyota Technological Institute, Japan)

GAS-O-12 (11:35~11:50)

Optical performance of linear partitioned Fresnel lens and 6×6 lens parquet for medium CPV modules

Wongun Jang*, Wongun Jang (3D Convergence R&D Center, KOPTI (KOPTI))

GAS-O-13 (11:50~12:05)

Development of Smart Stacking Technology for Multi-junction Solar Cells

Kikuo Makita* (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Hidenori Mizuno (Renewable Energy Research Center, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Ryuji Oshima, Hitoshi Sai (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Syoichiro Nonaka, Akio Furukawa (Tokyo Univ. of Science, Japan), Hidetaka Takato (Renewable Energy Research Center, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Takeyoshi Sugaya (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan)

Nov. 19 (Thu), 10:40~12:10 #101~2, Convention Hall, BEXCO

PV Components, Modules and System(MSI) 3

Chair Namsu Kim (KETI)

MSI-I-03 (10:40~11:10) [*Invited*]

The performance evaluation of a BIPV case in Korea

Jun-Tae Kim* (Architectural Eng., Kongju national Univ.)

MSI-O-08 (11:10~11:25)

Outdoor characterization of spectral-splitting low concentrating PV system for InGaP solar cell and GaAs solar cell

Yuya Masuda (Dept. of Physical Electronics, Tokyo Institute of Technology, Japan), Yuzuru Ueda* (Dept. of Electrical Eng., Tokyo Univ. of Science, Japan), Tamotsu Okamoto* (Dept. of Electrical and Electronic Eng., Nat'l Institute of Technology, Kisarazu College, Japan), Shinsuke Miyajima* (Dept. of Physical Electronics, Tokyo Institute of Technology, Japan), Makoto Konagai* (Advanced Research Laboratories, Tokyo City Univ., Japan)

MSI-O-09 (11:25~11:40)

Very short-term irradiance forecasting at unobserved locations using spatio-temporal kriging with polynomial anisotropy fitting

Aloysius Aryaputera* (Solar Energy Research Institute of Singapore (SERIS), Singapore), Dazhi Yang (Singapore Institute of Manufacturing Technology (SIMTech), Agency for Science, Technology and Research (A*STAR), Singapore), Lu Zhao, Wilfred Walsh (Solar Energy Research Institute of Singapore (SERIS), Singapore)

MSI-O-10 (11:40~11:55)

Modeling and simulation of BIPV system in EnergyPlus and PVsyst building energy performance programs

FRED EDMOND BOAFO, HARYEON KIM (ENERGY SYSTEMS ENGINEERING, KONGJU NATIONAL UNIVERSITY), JUNTAE KIM* (DEPARTMENT OF ARCHITECTURE ENGINEERING, KONGJU NATIONAL UNIVERSITY)

MSI-O-11 (11:55~12:10)

ON THE EFFECTS OF HIGH EFFICIENCY SOLAR CELLS AND THEIR TEMPERATURE COEFFICIENTS ON PVT SYSTEMS

Jose I Bilbao* (SPREE, UNSW, Australia), Olivier Dupré (CNRS, INSA, Université de Lyon, France), Craig Johnson (SPREE, UNSW, Australia)

Nov. 19 (Thu), 10:40~11:50 #203~4, Convention Hall, BEXCO

PV Reliability and Standardization(RES) 3

Chair Jae Ho Yun (KIER)

RES-I-04 (10:40~11:05) [*Invited*]

Reference Solar Cell Calibration Activities in the Korea Institute of Energy Research (KIER)

Seungkyu Ahn*, Sejin Ahn, Jae Ho Yun, Keeshik Shin, Kyunghoon Yoon (Solar Energy Laboratory, KIER)

RES-O-08 (11:05~11:20)

A new method to characterize conventional bifacial solar cells

Yong Bae Kim*, Sang Hoon Jung, Hae-won Choi (Energy Technology Research Center, Gumi Electronics & Information Technology Research Institute)

RES-O-09 (11:20~11:35)

Optimization of Crystalline PV Module's Certificate Method Based on Experience Results

Kyung Soo Kim* (Photovoltaic Laboratory, KIERe)

RES-O-10 (11:35~11:50)

Evaluation of Backsheet Endurance by [UV & Water Cooking Test] and Module Reliability by Sequential Test

Maoyi Chang*, Haomin Chen, Chienyu Chen, C. H. Hsueh, W. J. Hsieh (AU Optronics, Taiwan)

Nov. 19 (Thu), 15:30~16:55 #203~4, Convention Hall, BEXCO

PV Reliability and Standardization(RES) 4

Chair Jonghwa Song (KCL)

RES-I-05 (15:30~15:50) [*Invited*]

A Study on the Leaching Test of the PV module and standardization of EH&S Risk Assessment for PV

Chang-Ho Lim* (Material technology center, Korea Testing Laboratory)

RES-I-06 (15:50~16:10) [*Invited*]

Performance Analysis of Air type Photovoltaic-Thermal System

Jin-Hee Kim (Green Energy Technology Research Center, Kongju Nat'l Univ.), Jun-Tae Kim* (Dept. of Architectural Eng., Kongju Nat'l Univ.), Jong-Gwon Ahn (Dept. of Energy System Eng., Graduate School, Kongju Nat'l Univ.)

RES-O-11 (16:10~16:25)

The Present State of Standardization for Building Integrated Photovoltaic Roof

Hyun-A Kim* (Advanced Materials Reliability Center, Korea Conformity Laboratories)

RES-O-12 (16:25~16:40)

Optimization of Photovoltaic System Design based on Physical Characteristics Model

Min Su Kim, Jae Hak Jung*, Soo Young Oh, Wonshoup So (School of Chemical Eng., Yeungnam Univ.)

RES-O-13 (16:40~16:55)

Accurate performance measurement procedure for Perovskite solar cells

Yoshihiro HISHIKAWA*, Ayumi SASAKI, Haruya SHIMURA, Takashi UEDA, Yuuki ISHII (RCPV, AIST, Japan)

Nov. 19 (Thu), 15:30~16:35 #104~5, Convention Hall, BEXCO

PV Markets and Policy(PMP) 1

Chair Changsik Son (Silla Univ.)

PMP-I-01 (15:30~15:55) [*Invited*]

Potential of Large Scale PV for Power Supply in the Northeast Asia

Keiichi Komoto* (Environment and Energy Division 2, Mizuho Information & Research Institute, Inc., Japan), Christian Breyer, Dmitrii Bogdanov (Lappeenranta Univ. of Technology, Finland), Sicheng Wang (Energy Research Institute, Nat'l Development and Reform Commission, China), Namjil Enebish (Nat'l Univ. of Mongolia, Mongolia), Jinsoo Song (Silla Univ.)

PMP-I-02 (15:55~16:20) [*Invited*]

Overview of Photovoltaic R&D in Japan

Masafumi Yamaguchi* (Toyota Technological Institute, Japan), Hiroyuki Yamada (NEDO, Japan), Yasuhiro Katsumata (JST, Japan)

PMP-O-01 (16:20~16:35)

Evolution of the PV incentive scheme in Thailand: from adder to feed-in tariff

Tanokkorn Chenvidhya*, Krissanapong Kirtikara, Dhirayut Chenvidhya, Wilawan Seekaew (CES Solar Cells Testing Center, Pilot Plant Development and Training Institute, King Mongkut's Univ. of Technology Thonburi, Thailand), Roongrojana Songprakorp (School of Energy, Environment and Materials, King Mongkut's Univ. of Technology Thonburi, Thailand), Anawach Sangswang (Dept. of Electrical Eng., Faculty of Eng., King Mongkut's Univ. of Technology Thonburi, Thailand)

Nov. 20 (Fri), 09:00~10:25 #205, Convention Hall, BEXCO

Wafer-based Crystalline Silicon Cells and Materials(CSi) 7

Chair Woojun Yoon (NRL)

CSi-I-07 (09:00~09:25) [*Invited*]

Advanced Materials Help Make Solar Panels More Powerful

Mike Barker* (DuPont Microcircuit Materials, DuPont, Japan)

CSi-O-28 (09:25~09:40)

Mono Crystalline Si PERC using Less Than 100 μm-thick Wafer by MWS Slicing

Kyotaro Nakamura* (Meiji Univ., Japan), Akira Tanizaki (Komatsu NTC Ltd., Japan), Keitarou Okamoto (Mitsuboshi Diamond Industrial Co., Japan), Yusuke Kawamoto (Noritake Co., Japan), Yoshio Ohshita (Toyota Technological Institute, Japan)

CSi-O-29 (09:40~09:55)

3-stage-process of emitter layer for industrial high efficiency SHJ solar cell with 100μm-thick silicon wafer

Fanying Meng*, Leilei Shen, Jianhua Shi, Liping Zhang, Jinning Liu, Yucheng Liu, Zhengxin Liu (Research center for new energy technologies, Shanghai institute of microsystem and information technology, Chinese academy of sciences, China), Jian Bao, Wanwu Guo, Dongliang Wang, Zhiqiang Feng (State Key Laboratory of PV science and technology, Changzhou Trina solar energy Co., Ltd., China)

CSi-O-30 (09:55~10:10)

Surface passivation and light management for thin-wafer based crystalline silicon solar cells with <120μm thickness

Seung-Yoon Lee*, Kwangsun Ji, Tae-Young Lee, Hong-Cheol Lee, Seh-Won Ahn, Heon-Min Lee (Energy & Environment Materials & Devices Team, LG Electronics Materials & Devices Advanced Research Institute)

CSi-O-31 (10:10~10:25)

High work function MoO_x buffer layer for silicon heterojunction solar cell applications

Jianhua Shi*, Leilei Shen, Fanying Meng*, Liping Zhang, Jinning Liu, Yucheng Liu, Zhengxin Liu (Research Center for New Energy Technology, Shanghai Institute of Microsystem and Information Technology (SIMIT), Chinese Academy of Sciences (CAS), China)

Nov. 20 (Fri), 09:00~10:40 #104~5, Convention Hall, BEXCO

II-VI & Chalcogenide Compound based Cells and Materials(CIS) 7

Chair Kihwan Kim (KIER)

CIS-I-07 (09:00~09:25) [*Invited*]

Sequential Processing of CIGSSe Thin Films Using Elemental Se and S – Modification of the In-Depth Sulfur Gradient

Christian A. Kaufmann*, Sebastian S. Schmidt, Christian Wolf, Humberto Rodriguez-Alvarez, Dieter Greiner, Jan-Peter Bäcker (PVcomB, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany), Manuel Hartig (PVcomB, Technische Universität Berlin, HFT-5-2, Germany), Tim Kodalle, Henry Ehrhardt, Hans-Werner Schock, Rutger Schlatmann (PVcomB, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany)

CIS-O-25 (09:25~09:40)

Fabrication and Characterization of $Zn_xCd_{1-x}S$/CdTe Thin Film Solar Cells on ITO and FTO Coated Glass Substrates

M. S. Hossain (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), N. A. Khan, M. Akhtaruzzaman (Solar Energy Research Institute (SERI), The Nat'l Univ. of Malaysia, Malaysia), A. R. M. Alamoud (Electrical Eng. Dept., College of Eng., King Saud Univ., Saudi Arabia), N. Amin* (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

CIS-O-26 (09:40~09:55)

Growth Optimization of CdTe Thin Films by Sputtering for CdS:O/CdTe Solar Cells

M. A. Islam, N. A. Khan (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), A. M. O. Sulaiman (Dept. of Electrical, Electronic and System Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), M. Akhtaruzzaman (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), A. R. M. Alamoud (Electrical Eng. Dept., College of Eng., King Saud Univ., Saudi Arabia), K. Sopian (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), N. Amin* (Dept. of Electrical, Electronic and System Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

CIS-O-27 (09:55~10:10)

Transparent and p-type conductive BaCuSF, SrCuSeF and SrCuSF for polycrystalline thin film tandem-type solar cell applications

Tsuyoshi Maeda*, Toshiyuki Kawabe, Shuya Kitabayashi, Ako Yamamori, Mikihiko Nishitani, Hiroshi Sakakima, Takahiro Wada (Dept. of Materials Chemistry, Ryukoku Univ., Japan)

CIS-O-28 (10:10~10:25)

Atmospheric Pressure CVD of ZnS Thin Films – An Alternative and Potential Deposition Method for PV Applications

Yulisa Yusoff, Aisha M. O. Sulaiman (Dept. of Electrical, Electronic and System Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), Ameen A. Ali (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), M. Mezbaul Alam (Advanced Materials Research Chair, Chemistry Dept., King Saud Univ., Saudi Arabia), Abdulrahman A. Alamoud (Electrical Eng., College of Eng., King Saud Univ., Saudi Arabia), Md. Akhtaruzzaman (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), Nowshad Amin* (Dept. of Electrical, Electronic and System Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

CIS-O-29 (10:25~10:40)

RF- Sputtered Zn(O,S) Buffer Layer for Sufurized SnS Photovoltaic Devices

Vasudeva Reddy Minnam Reddy, Myeungho Kim (School of Chemical Eng., School of Chemical Eng., Yeungnam Univ., Gyeongsan 712-749, Republic of Korea.), Ramakrishna Reddy K.T. (Dept. of Physics, Solar Energy Laboratory, Dept. of Physics, Sri Venkateswasra Univ., Tirupati 517 502, India., India), Chinho Park* (School of Chemical Eng., School of Chemical Eng., Yeungnam Univ., Gyeongsan 712-749, Republic of Korea.)

Nov. 20 (Fri), 09:00~10:25 #101~2, Convention Hall, BEXCO

Organic, Dye Sensitized Solar Cells and Materials(OSC) 5

Chair Sung-Ho Jin (Pusan Univ.)

OSC-O-17 (09:00~09:15)

Inverted small molecular organic solar cells with high efficiency and stability using a p-doped optical spacer

Sang-Hoon Lee, Ji-Won Seo, Jung-Yong Lee* (Energy, Environment, Water and Sustainability (EEWS), Korea Advanced Institute of Science and Eng. (KAIST))

OSC-O-18 (09:15~09:30)

Symmetric Study of benzo[1,2-b:4,5-b'] dithiophene for use in high-efficiency bulk heterojunction polymer solar cells

Quoc viet Hoang, Chang Eun Song, Sang-Jin Moon, Sang Kyu Lee, Jong-Cheol Lee (Energy Materials Research Center, KRICT (KRICT)), Bumjoon J. Kim (Dept. of Chemical and Biomolecular Eng., KAIST), Won Suk Shin* (Energy Materials Research Center, KRICT (KRICT))

OSC-I-06 (09:30~09:55) [*Invited*]

Flexible OPV Module Development

Geunsang Cho, Jungseok Hahn* (Future Technology Research Group, Kolon Central Research Park)

OSC-O-19 (09:55~10:10)

Design of blazed type asymmetric texturing for efficient light trapping in building integrated photovoltaics

Juhoon Kang, Changsoon Cho, Jung-Yong Lee* (Graduate School of Energy, Environment, Water, and Sustainability (EEWS), KAIST)

OSC-O-20 (10:10~10:25)

Importance of noncovalent Coulomb interactions in PPDT2FBT polymer for organic solar cells

Mohammad Afsar Uddin (Dept. of Nanofusion Eng., Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Tack Ho Lee (School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST)), Thanh Luan Nguyen (Dept. of Nanofusion Eng., Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Jin Young Kim* (School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST)), Han Young Woo* (Dept. of Nanofusion Eng., Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.)

Nov. 20 (Fri), 09:00~10:45 #201~2, Convention Hall, BEXCO

New Concepts, Novel Materials and Devices(NMD) 5

Chair Jung-Yong Lee (KAIST) & Joondong Kim (Incheon Univ.)

NMD-I-05 (09:00~09:25) [*Invited*]

Efficient design of Si nanostructure based solar cell

Jin-Young Jung (Dept.s of Materials and Chemical Eng., Hanyang Univ.), Han-Don Um (Dept. of Energy Eng., Ulsan Nat'l Institute of Science and Technology), Min-Joon Park, Jae-Won Song, Yoon-Ho Nam, Jung-Ho Lee* (Dept.s of Materials and Chemical Eng., Hanyang Univ.)

NMD-O-18 (09:25~09:40)

Spectral Response Measurements of Photovoltaic Modules using a Flash Solar Simulator

Husyira Al Husna*, Alex Smith, Michal Krawczynski, Tom Betts, Ralph Gottschalg (Centre for Renewable Energy Systems Technology (CREST), Loughborough Univ., UK)

NMD-O-19 (09:40~09:55)

Functional Designs for Photoelectric Devices

Joondong Kim* (Electrical Eng., Incheon Nat'l Univ.)

NMD-O-20 (09:55~10:05)

Enhancement of photo-induced electron transfer at the surface of CdS quantum dots by microwave irradiation

Fuminao Kishimoto, Takashi Imai, Satoshi Fujii, Mochizuki Dai, Masato Maitani, Eiichi Suzuki, Yuji Wada* (Applied Chemistry, Tokyo Institute of Technology, Japan)

NMD-O-21 (10:05~10:15)

Band-Gap Engineering of Si-Quantum Dot Layer and Its Application

Gyea Young Kwak*, Songwoung Hong (Dept. of Nano Science, Univ. of Science and Technology (UST)), Seong Hyun Lee, Jong Sik Jang, Ansoon Kim, Kyoung-Joong Kim (Division of Industrial Metrology, KRISS(KRISS))

NMD-O-22 (10:15~10:25)

Chemical Mist Deposition of PEDOT:PSS on Textured c-Si for Efficient c-Si/PEDOT:PSS Hetero-junction Solar Cells

Tatsuya Ohki*, Koki Ichikawa, Jaker Hossain, Qiming Liu, Ryo Ishikawa, Keiji Ueno, Hajime Shirai (Graduate School of Science and Eng., Saitama Univ., Japan)

NMD-O-23 (10:25~10:35)

Studies on highly stacked Ge/Si quantum dot heterojunction solar cells grown with up to 100 stacked layers

Kazuhiro Gotoh (Dept. of Innovative and Engineered Materials, Tokyo Institute of Technology, Japan), Ryuji Oshima*, Isao Sakata, Koji Matsubara, Takeyoshi Sugaya (Nat'l Institute of Advanced Industrial Science and Technology, Japan), Michio Kondo (Dept. of Innovative and Engineered Materials, Tokyo Institute of Technology, Japan)

NMD-O-24 (10:35~10:45)

PbS Colloidal Quantum Dot Solar Cells with Organic Hole Transport Layers

Young Jin Jeong (Dept. of Electrical, Electronic, and Control Eng., Hankyong Nat'l Univ.), Jung Hoon Song, Sohee Jeong* (Nanomechanical Systems Research Division, Korea Institute of Machinery and Materials), Seung Jae Baik* (Dept. of Electrical, Electronic, and Control Eng., Hankyong Nat'l Univ.)

Nov. 20 (Fri), 09:00~10:30 #203~4, Convention Hall, BEXCO

PV Components, Modules and System(MSI) 4

Chair Myunghun Shin (Korea Aerospace Univ.)

MSI-I-04 (09:00~09:30) [*Invited*]

PV Module Power Warranty Policy and Lifetime Prediction Technology

Changwoon Han* (Robost Components and System Research Center, Korea Electronics Technology Institute)

MSI-O-12 (09:30~09:45)

3D Simulation and Analysis of Crystalline Silicon Solar Cell-to-Module Optical Gain

Chun-Ti Lu (Graduate Institute of Photonics and Optoelectronics, Nat'l Taiwan Univ., Taiwan), Wenchao Wu (Graduate Institute of Electronics Eng., Nat'l Taiwan Univ., Taiwan), C. W. Liu* (Graduate Institute of Photonics and Optoelectronics, Nat'l Taiwan Univ., Taiwan)

MSI-O-13 (09:45~10:00)

Development of Ramp-Rate Controller to Assure Voltage Stability for Weak Distribution Grid with High Penetration of Solar PV

Tathagata Sarkar*, Sayantan Chatterjee, Hiranmay Samanta (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science and Technology, India), Konika Das Bhattacharya (Dept. of Electrical Eng., Indian Institute of Eng. Science and Technology, India), Hiranmay Saha (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science and Technology, India)

MSI-O-14 (10:00~10:15)

Mechanical stability of the solar panel and mounting structure subjected to wind loading

Kangseok Moon*, Seh-Won Ahn, Heon-Min Lee (Energy&Environment Materials&Devices Team, LG Electronics Materials & Devices Advanced Research Institute)

MSI-O-15 (10:15~10:30)

The shading effect on the performance in solar PV-cells

Jose Francisco Contero Salvadores* (Energy systems, Univ. of Gävle, Spain), Joao Santos Leite, Björn Karlsson, Mattias Gustafsson, Linkesh Diwan, Olle Olsson (Sustainable Energy Systems, Univ. of Gävle, Sweden)

Poster Sessions

Nov. 17 (Tue), 14:10~15:10 3F, Convention Hall, BEXCO

Poster A

CSi-P-01 **HeatCap solar cell module of high mechanical endurance**

Cheng-Lien Wang, Chien-Chun Hsieh, Hung-Chieh Tseng (Solar Division, Win Win Precision Technology Co., Ltd (WINAICO), Taiwan), Hsin-Hsin Hsieh*, Yu-Hsien Lee, Wei-Lun Yang, Sih-Hong Chen, Meng-Fan Lin, Kuan-Wu Lu, Shih-Jui Wu (Photovoltaic Metrology Laboratory, Center for Measurement Standards, Industrial Technology Research Institute, Taiwan)

CSi-P-02 **Improvement in amorphous/crystalline silicon interface passivation and emitter/front electrode Schottky barrier by hydrogen dilution in stacked-emitter heterojunction solar cells**

Sunbo Kim (Dept. of Energy Science, Sungkyunkwan Univ.), Jinjoo Park, Iftiquar S. M., Sungyoun Cheong, Shihyun Ahn, Junsin Yi, Vinh Ai Dao* (School of Information and Communication Eng., Sungkyunkwan Univ.)

CSi-P-03 **A Theoretical Study of the Side-wall Shunt Current of Interdigitated Back-junction Silicon Solar Cell with Micro-grooved Electrodes**

Bo Zhang, Xiaolin Dai, Chaolu Xing, Jianfeng Yang* (School of Energy Science and Eng., Univ. of Electronic Science and Technology of China, China)

CSi-P-04 **Fabrication of sub 50 μm thick- thin Si wafer using spalling technology for cost effective solar cell**

Yong Hwan Lee, Jihun Oh* (Graduate School of EEWS, KAIST)

CSi-P-05 **The Influence of Finger Line Density on Solar Cells**

Paul Kuo*, Scofield Cheng, Meng Lin Lin, Willis Chen (R&D, Motech Industries Inc., Taiwan)

CSi-P-06 **Temperature profile of Cz Method**

Kwanghun Kim* (R&D team, R&D center, Woongjin Energy), Sungsun Baik (R&D center, Woongjin Energy)

CSi-P-07 **Effects of TiO_2 Anti-Reflection Coating on Photovoltaic Characteristics of Silicon-based Solar Cells**

Keum-Soo Kim, Gil-Sung Kim, Jae-Hoon Kim, Jae Yoon Jung, Hak Young Kim, Choong Hun Lee* (Solar Cell Research Institute, RIC for Next Generation Industrial Radiation Technology, Division of Microelectronics and Display Technology, Wonkwang Univ.)

CSi-P-08 **Boron-Doped Aluminum Paste for p-type c-Si Solar Cells**

Taiki Ashikaga, Abdullah Uzum, Hiroyuki Kanda, Seigo Ito* (Graduate School of engineering, Univ. of Hyogo, Japan)

CSi-P-09 **Non-vacuum processes antireflection coating composite films for Si solar cells**

Masashi Kuriyama, Abdullah Uzum, Hiroyuki Kanda, Seigo Ito* (Graduate School of Eng., Univ. of Hyogo, Japan)

CSi-P-10 **Impact of light illumination on surface passivation of crystalline silicon by SiNx:H capped oxide layers**

Hyunju Lee*, Takefumi Kamioka, Mari Aoki (Toyota Technological Institute, Japan), Tomohiro Fujii, Koji Arafune, Haruhiko Yoshida (School of Eng., Univ. of Hyogo, Japan), Naomi Sawamoto, Atsushi Ogura (School of Science and Technology, Meiji Univ., Japan), Yoshio Ohshita (Toyota Technological Institute, Japan)

CSi-P-11 **Effect of electron in metal-silicon contact on p-type and n-type Screen-Printed Silicon Solar Cell**

Jae-Wook Choi, Chanseok Kim, Soohyun Bae (Dept. of Materials Science and Eng., SERC, Korea Univ.), Yoonmook Kang (KU·KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-seok Lee, Donghwan Kim* (Dept. of Materials Science and Eng., SERC, Korea Univ.)

CSi-P-12 **Effect of Gas Mixture Ratio on Silicon Nitride deposited by PECVD**

Jae Eun Kim, Yoon Chung Nam, Kyung Dong Lee (Materials Science and Eng., Korea Univ.), Yoonmook Kang (KU·KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-seok Lee, Donghwan Kim* (Materials Science and Eng., Korea Univ.)

CSi-P-13 **Influence of PSG composition, concentration, thickness on emitter formation during POCl3 diffusion process**

HyunJung Park, Hyomin Park (Dept. of Materials Science and Eng., Korea Univ.), Yoonmook Kang (KU·KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-Seok Lee*, Donghwan Kim* (Dept. of Materials Science and Eng., Korea Univ.)

CSi-P-14 **Theoretically Investigation on Linearly Graded Bandgap of Passivation Layer for Amorphous/crystalline Heterojunction Solar Cell**

Lei Zhao*, Guanghong Wang, Hongwei Diao, Wenjing Wang (Institute of Electrical Eng., the Chinese Academy of Sciences, China)

CSi-P-15 **Effect of post-deposition thermal annealing on passivation quality of AlO_x film deposited by atomic layer deposition**

Sho Kitano*, Hiroki Imaeda, Shohei Miki (Dept. of Chemical Eng., Univ. of Hyogo, Japan), Atsushi Ogura (Dept. of Electronics and Bioinformatics, Meiji Univ., Japan), Yasushi Hotta, Haruhiko Yoshida, Shin-ichi Satoh (Dept. of Electrical Materials and Eng., Univ. of Hyogo, Japan), Koji Arafune (Dept. of Chemical Eng., Univ. of Hyogo, Japan)

CSi-P-16 **High quality IWO film of device grade and its electrical contact with metal grid for SHJ solar cell**

Leilei Shen, Fanying Meng*, Jianhua Shi, Liping Zhang, Zhengxin Liu (Research Center for New Energy Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China)

CSi-P-17 **Evaluation of emitter saturation current density in n-type emitter formed by phosphorus thermal diffusion**

Yuki Miki*, Hiroki Imaeda, Kou Urushibata, Ippei Nakagoshi, Shohei Miki (Dept. of Chemical Eng., Univ. of Hyogo, Japan), Atsushi Ogura (Dept. of Electronics and Bioinformatics, Meiji Univ., Japan), Yasushi Hotta, Haruhiko Yoshida, Shin-ichi Satoh (Dept. of Electrical Materials and Eng., Univ. of Hyogo, Japan), Koji Arafune (Dept. of Chemical Eng., Univ. of Hyogo, Japan)

CSi-P-18 **Study on surface potential distribution and minority-carrier lifetime of $BaSi_2$ formed on multicrystalline Si substrates**

Yunpeng Li, Masakazu Baba* (Institute of Applied Physics, Univ. of Tsukuba, Japan), Trinh Cham* (Graduate School of Eng., Nagoya Univ., Japan), Kaoru Toko* (Institute of Applied Physics, Univ. of Tsukuba, Japan), Takashi Sekiguchi* (MANA, Nat'l Institute for Materials Science, Japan), Noritaka Usami* (Graduate School of Eng., Nagoya Univ., Japan), Takashi Suemasu* (Institute of Applied Physics, Univ. of Tsukuba, Japan)

CSi-P-19 **Optimization of ARC for Si concentrator cells used to wide aperture reflector concentrators**

Shimako Naito, Kenji Araki*, Kan-Hua Lee, Kazuma Ikeda, Masafumi Yamaguchi (Toyota Technological Institute, Japan)

CSi-P-20 **Enhanced tunable light trapping from tin oxide scattering nanoparticles array at rear side of grid contact crystalline silicon solar cell**

Suchismita Mitra, Sukanta Dhar, Hemanta Ghosh, Chandan Banerjee*, Swapan K Datta, Hiranmoy Saha (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science & Technology, India)

CSi-P-21 **Development of low band gap intrinsic amorphous silicon layer by helium dilution at low frequency (13.56 MHz) and its application in HIT solar cells to improve open circuit voltage**

Sukanto Dhar, Sourav Mandal, Gourab Das (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science & Technology, India), Partha Pratim Ray (Dept. of Physics, Jadavpur Univ., India), Chandan Banerjee*, Asok Kumar Barua (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science & Technology, India)

CSi-P-22 **Epitaxial Growth management During a-Si:H Film Formation Monitored by Spectroscopic Ellipsometry for the Application of Heterojunction Solar Cell**

Sang Ho Kim (Dept. of Energy Science, Sungkyunkwan Univ.), Vinh Ai Dao (School of Information and Communication Eng., Sungkyunkwan Univ.), Chonghoon Shin (Dept. of Energy Science, Sungkyunkwan Univ.), Jeahyun Cho, Sihyun Ahn (School of Information and Communication Eng., Sungkyunkwan Univ.), Junsin Yi* (Dept. of Energy Science, Sungkyunkwan Univ.)

CSi-P-23 **Combined Optical and Electrical Modeling of Silicon Bifacial Solar Cells**

Shihyun Ahn (College of Information and Communication Eng., Sungkyunkwan Univ.), Cheolmin Park (Dept. of Energy Science, Sungkyunkwan Univ.), Chang-soon Han (Laser Advanced System Industrialization Center, Jeonnam Technopark), Byoung June Kim, In Taek Jeong, Sangjun Woo (R & D center, OCI), Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.)

CSi-P-24 **Light Trapping in a-Si / c-Si Heterojunction Solar Cells by Embedded ITO Nanoparticles at the Rear Surface**

Sukanta Dhar, Sourav Mandal, Suchismita Mitra, Hemanta Ghosh, Chandan Banerjee*, Swapan K Datta, Hiranmoy Saha (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science & Technology, India)

CSi-P-25 **Simultaneous n+ and p+ Layer Diffusion from Spin on Dopant for Low Cost and Simplified Industrial Crystalline Silicon Solar Cells**

Cheolmin Park (Dept. of Energy Science, Sungkyunkwan Univ.), Sungyoun Chung, Donghyun Oh, Minhan Jeon, Jiyoon Kang (College of Information and Communication Eng., Sungkyunkwan Univ.), Nagarajan Balaji (Dept. of Energy Science, Sungkyunkwan Univ.), Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.)

CSi-P-26 **Effect of reducing metal impurities in front emitter doping process for n-type crystalline silicon solar cells**

Jiyoon Kang, Minhan Jeon, Donghyun Oh, Sungyoun Chung (College of Information and Communication Eng., Sungkyunkwan Univ.), Cheolmin Park, Balaji Nagarajan (Dept. of Energy Science, Sungkyunkwan Univ.), Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.)

CSi-P-27 **A research on double layer passivation with SiO_2/SiNx for high efficiency n-type c-Si solar cell**

Minhan Jeon, Jiyoon Kang, Donghyun Oh, Sungyoon Jung (College of Information and Communication Eng., Sungkyunkwan Univ.), Cheolmin Park (Dept. of Energy Science, Sungkyunkwan Univ.), Jinsoo Song (Energy Environmental Eng., Silla Univ.), Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.)

CSi-P-28 **Morphology of contact formation between the Si substrate surface and Ag, Al ion in n-type c-Si Solar Cell**

Donghyun Oh (Dept. of Energy System,, Sungkyunkwan Univ.), Minhan Jeon, Jiyoon Kang, Sungyoun Chung (College of Information and Communication Eng., Sungkyunkwan Univ.), Cheolmin Park (Dept. of Energy Science, Sungkyunkwan Univ.), Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.), Hyunhoo Kim (Display Eng. School, Doowon Technical Univ.)

CSi-P-29 **The study of Cell-To-Module conversion loss in dual printing solar cell**

Je-Min Yeon*, Chang-sub Park, Chang Youn Yoo, Jong-Youb Lim, Jisun Kim, Keunkee Hong, Eunjoo Lee, Young Hyun Cho (Technical Research Center, Shinsung Solar Energy Co., Ltd.)

CSi-P-30 **Exceeding 19.8% Efficient Industrial Screen-printed Silicon Solar Cells with SiO_xN_y/SiN_x Double Layer Anti-reflection Coatings**

Jisun Kim*, Je-Min Yeon, Chang Youn Yoo, Jong-Youb Lim, Chang-sub Park, Eunjoo Lee, Keunkee Hong, Young Hyun Cho (Technical Research Center, Shinsung Solar Energy)

CSi-P-31 **A Study on Blister Formation and Electrical Properties with Various Annealing Condition of P-doped a-Si/SiO_2/c-Si structure**

Sungjin Choi (Dept. of Energy Environment Policy and Technology, Green School, Graduate School of Energy and Environment, Korea Univ.), Ka-Hyun Kim (KIER-UNIST Advanced Center for Energy, KIER), Min Gu Kang, Jeong In Lee (Photovoltaic Laboratory, KIER), Donghwan Kim (Dept. of Materials Science and Eng., Korea Univ.), Hee-eun Song* (Photovoltaic Laboratory, KIER)

CSi-P-32 **Electrode formation using light induced plating in the crystalline silicon solar cells with various anti-reflection layers**

Myeong Sang Jeong (Dept. Materials Science and Eng., Korea Univ.), Min Gu Kang, Jeong In Lee (Photovoltaic Laboratory, KIER), Donghwan Kim (Dept. Materials Science and Eng., Korea Univ.), Hee-eun Song* (Photovoltaic Laboratory, KIER)

CSi-P-33 **$Al_2O_3/SiO_2/Si(100)$ interface properties using wet oxidation for crystalline silicon cells**

Kwan Hong Min (Advanced Materials and Science and Eng., Korea Univ.), Min Gu Kang, Jeong In Lee (Laboratory of Photovoltaic, Korea Institude of Energy Research), Donghwan Kim (Advanced Materials and Science and Eng., Korea Univ.), Hee-eun Song* (Laboratory of Photovoltaic, Korea Institude of Energy Research)

CSi-P-34 **Stability of Al_2O_3 Thin Film Deposited by Plasma-Assisted Atomic Layer Deposition in Vrystalline Si Solar Cell**

Kyoung Cheol Shin, Min Gu Kang, Jeong In Lee (Solar Energy Dept., KIER), Donghwan Kim* (Dept. of Materials Science and Eng., Korea Univ.), Hee-eun Song* (Solar Energy Dept., KIER)

SiF-P-01 **Influence of the CO_2/SiH_4 ratio on p-μc-SiO_x:H as window layer for a-Si:H thin film solar cells**

Young-Joo Lee, Dong-Ho Kim*, Jung-Dae Kwon* (Advanced Functional Thin Film Dept., Korea institute of Materials Science (KIMS))

SiF-P-02 **Performance of thin-film-silicon based solar modules under clouded and clear sky conditions in comparison to crystalline silicon modules**

Johannes Weicht*, Frank Hamelmann (FH Bielefeld - Univ. of Applied Sciences, Technical Faculty, Germany)

SiF-P-03 **Investigation of high quality passivation with hydrogenated amorphous silicon (a-Si:H) by PECVD**

Kuo Wei-Cheng (Institute of Materials Science and Eng., Nat'l Central Univ., Taiwan, Taiwan), Chang Jenq-Yang* (Dept. of Optics and Photonics, Nat'l Central Univ., Taiwan, Taiwan), Lee Chien-Chieh (Optical Science Center, Nat'l Central Univ., Taiwan, Taiwan), Li Tomi (Dept. of Mechanical Eng., Nat'l Central Univ., Taiwan, Taiwan), Chen I-Chen (Institute of Materials Science and Eng., Nat'l Central Univ., Taiwan, Taiwan)

SiF-P-04 **The mechanism of stress applied to the plating film and substrate of silicon according to the crystal orientation using simulation**

Sang-hoon Lee, Chinho Park* (Chemicarl Eng., Yeungnam Univ.)

SiF-P-05 **Studies on the effect of introducing oxide buffer layers at the TCO/p interface of single junction p-i-n structure a-Si solar cell**

Sourav Mandal*, Gourab Das, Sukanta Dhar (CEGESS, Indian Institute of Eng. Science and Technology,Shibpur, India), P.Balaji Bhargav (SSN Research Centre, SSN Institution, India), Sumita Mukhopadhyay, A.K. Barua (CEGESS, Indian Institute of Eng. Science and Technology,Shibpur, India)

SiF-P-06 **Honeycomb Structure using ICP-RIE dry etching for Improved Light Management in nip Silicon Thin-Film Solar Cell**

Sang Ho Kim (Dept. of Energy Science, Sungkyunkwan Univ.), Vinh Ai Dao, Jinjoo Park, Duy Phong Pham (School of Information and Communication Eng., Sungkyunkwan Univ.), Chonghoon Shin (Dept. of Energy Science, Sungkyunkwan Univ.), Anh Huy Tuan Le (School of Information and Communication Eng., Sungkyunkwan Univ.), Junsin Yi* (Dept. of Energy Science, Sungkyunkwan Univ.)

SiF-P-07 **Compact amorphous silicon solar module for transparent and high voltage power supply**

Jiyoon Nam, Wonjung Choi, Seunghwan Cho, Bowook Seo, Bonhee Ha (School of Architectural, Civil, Environmental and Energy Eng., Kyungpook Nat'l Univ.), Youngjoo Lee, Dongho Kim (Advanced Functional ThinFilms Dept., Korea Institute of Material Science (KIMS)), Sungjin Jo* (School of Architectural, Civil, Environmental and Energy Eng., Kyungpook Nat'l Univ.)

SiF-P-08 **Efficient light trapping schemes based on two-dimensional photonic crystal structures for a-SiGe:H solar cells**

Guofu Hou* (Institute of Electronics, Nankai Univ., China), Peizhuan Chen (Nankai Univ., China)

SiF-P-09 **Development of wide bandgap p-nc-SiC:H films by plasma-enhanced chemical vapor deposition and its application to solar cells**

Dongmin Lim, Eunseok Jang, Joo Hyung Park, Jinsu Yoo, Seungkyu Ahn, Kyung Hoon Yoon (Photovoltaic Laboratory, KIER), Bo-Hun Choi (Dept. of Materials Physics, Dong-A Univ.), Jun-Sik Cho* (Photovoltaic Laboratory, KIER)

SiF-P-10 **Fabrication of highly efficient flexible silicon thin-film solar cells by plasma-enhanced chemical vapor deposition**

Dongmin Lim, Eunseok Jang, Joo Hyung Park, Jinsu Yoo, Seungkyu Ahn, Kyung Hoon Yoon (Photovoltaic Laboratory, KIER), Bo-Hun Choi (Dept. of Materials Physics, Dong-A Univ.), Jun-Sik Cho* (Photovoltaic Laboratory, KIER)

SiF-P-11 **Solid Phase Crystallization of Germanium Films on Crystal Silicon**

Kyota Kuroiwa*, Tetsuya Kaneko, Masao Isomura (Course of Electrical and Electric System Eng., Graduate school of Eng., Tokai Univ., Japan)

SiF-P-12 **Evaluation of Polycrystalline Silicon Germanium Thin Films by Conductive-AFM**

Yuuki Sawa* (Course of Electrical and Electronic System Eng., Graduate School of Eng., Tokai Univ., Japan), Seiya Sakakibara (Dept. of Electrical and Electronic Eng., Tokai Univ., Japan), Tetsuya Kaneko, Masao Isomura (Course of Electrical and Electronic System Eng., Graduate School of Eng., Tokai Univ., Japan)

SiF-P-13 **Preparation and evaluation of a-SiN thin film by the RF sputtering system assisted by inductively coupled plasma**

Yuki Ishii*, Tetsuya Kaneko, Kunio Okimura, Haruo Shindo, Masao Isomura (Course of Electrical and Electronic System, Graduate School of Eng., Tokai Univ., Japan)

SiF-P-14 **Effects of AC cathode bias voltage in reactive sputtering of microcrystalline silicon**

Takahiro Akimoto*, Haruo Shindo, Tetsuya Kaneko, Masao Isomura (Course of Electrical and Electronic System, Graduate School of Eng., Tokai Univ., Japan)

SiF-P-15 Determination process of i-lyer defect density in amorphous silicon solar cells

Yasushi Sobajima, Akihisa Matsuda*, Hiroaki Okamoto* (Graduate School of Eng. Science, Osaka Univ., Japan)

SiF-P-16 Local photovoltaic characterization for Si thin film solar cells

Takashi Itoh*, Hiroshi Kuriyama, Takumi Kawaguchi (Dept. of Electrical, Electronic and Computer Eng., Gifu Univ., Japan), Shuichi Nonomura (Environment Renewable Energy System Division, Gifu Univ., Japan)

SiF-P-17 Microstructural, electrical and optical properties of LPCVD-grown boron-doped zinc oxide thin films

Eunseok Jang, Dongmin Lim, Seungkyu Ahn, Joo Hyung Park, Jinsu Yoo, Kyung Hoon Yoon, Jun-Sik Cho* (Photovoltaic Laboratory, KIER)

SiF-P-18 Optimization of surface morphology for enhanced NIR reflection of back surface reflector in amorphous Si thin-film solar cell by using random-texturing aluminum anodization

Joo Hyung Park, Eunseok Jang, Jin-Su Yoo, Keeshik Shin, Jae Ho Yun, Young-Joo Eo, Kihwan Kim, Sejin Ahn, Ara Cho, Jihye Gwak, Seung Kyu Ahn, Kyunghoon Yoon, Jun-Sik Cho* (KIER)

CIS-P-01 Effects of Secondary Phase and Defects in CZTS Solar Cell

Kee-Jeong Yang*, Jun-Hyoung Sim, Dae-Ho Son, Dae-Hwan Kim, Jin-Kyu Kang (Convergence Research Center for Solar Energy, DGIST), Gee Yeong Kim, William Jo (Dept. of Physics, Ewha Womans Univ.), JunHo Kim (Dept. of Physics, Incheon Nat'l Univ.), Dahyun Nam, Hyeonsik Cheong (Dept. of Physics, Sogang Univ.)

CIS-P-02 Low-temperature synthesis of high-quality CIGS thin film by co-evaporation process for CIGS solar cells

Seung Tae Kim, Gwang Sun Jung, R. B. V. Chalapathy, Gyu Charn Park, Byung Tae Ahn* (MSE, KAIST)

CIS-P-03 Printed CZTS films from microwave-processed micro and nanoparticles ink

Prashant Ghediya*, Tapas Chaudhuri, Jaymin Ray (Dr. K. C. Patel Research and Development Centre, Charotar Univ. of Science and Technology, Changa, India)

CIS-P-04 Studies on Ag-Doped SnS Films Grown by Chemical Bath Deposition for Solar Cell Absorbers

Sreedevi Gedi, Vasudeva Reddy Minnam Reddy (School of Chemical Eng., Yeungnam Univ.), Ramakrishna Reddy Kotte Tulasi (Dept. of Physics, Sri Venkateswasra Univ., India), Min-Su Kwon, Chan-Wook Jeon* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-05 $Cu_2ZnSn(S,Se)_4$ Thin Film Solar Cells with Zn(O,S) Buffer Layers Grown by Atomic Layer Deposition

Hee Kyeung Hong, In Young Kim, Gwang Yeom Song, Jin Hyeok Kim, Jaeyeong Heo* (Dept. of Materials Science and Eng., and Optoelectronics Convergence Research Center, Chonnam Nat'l Univ.)

CIS-P-06 Effects of Growth Temperature on Tin Sulfide Thin Films by Electron-Beam Evaporation

Gwang Yeom Song, Hui Kyung Park, Hee Kyeung Hong, Jaeseung Jo, Jae Yu Cho, Jaeyeong Heo* (Dept. of Materials Science and Eng., and Optoelectronics Convergence Research Center, Chonnam Nat'l Univ.)

CIS-P-07 **Defect formation in $Cu(In,Ga)Se_2$ thin films by high energy proton irradiation**

Bonhyeong Koo (Materials science and engineering, KAIST), June Hyuk Lee (Korea Atomic Energy Research Institute), Donghyeop Shin, Byung Tae Ahn, Byungha Shin* (Materials science and engineering, KAIST)

CIS-P-08 **Effects of H2S annealing for Sn thin films deposited by a thermal evaporation method**

Yoji Akaki*, Kazuya Iwasaki (Nat'l Institute of Technology, Miyakonojo College, Japan), Shigeyuki Nakamura (Nat'l Institute of Technology, Tsuyama College, Japan), Hideaki Araki (Nat'l Institute of Technology, Nagaoka College, Japan)

CIS-P-09 **Defect-chemical action of sulfur in $CuInSe_2$ thin films prepared by single bath electrochemical deposition**

Byung-Seok Lee, Doh-Kwon Lee* (Photo-electronic Hybrids Research Center, KIST)

CIS-P-10 **In-situ formation of a Mo/MoN/Mo back contact layer in $Cu_2ZnSnSe_4$ solar cells for suppressing $MoSe_2$ layer formation**

Byung-Seok Lee, Sung-yul Park, Doh-Kwon Lee* (Photo-electronic Hybrids Research Center, KIST)

CIS-P-11 **$CuInSe_2$ solar cells prepared from intermetallic nanocrystal inks with efficiencies exceeding 11%**

Hong Nhung Pham, Doh-Kwon Lee* (Photo-electronic Hybrids Research Center, KIST)

CIS-P-12 **Preparation of single phase SnSe light absorbing layers via control of growth and annealing conditions**

Giuk Jeong, Byungha Shin* (Material Science & Eng., KAIST)

CIS-P-13 **Annealing of In_2O_3:Zr Thin Films Grown on a Sapphire Substrate by Sputtering Method and Variations in the Electrical Properties as a Function of the Zr-Contents**

Yuichi Sato*, Minoru Hatakeyama, Yuhei Muraki, Kazuki Sonoda, Yoshifumi Murakami (Dept. of Electrical and Electronic Eng., Akita Univ., Japan)

CIS-P-14 **Integration of $CdSe/CdSe_xTe_{1-x}$ Type-II Heterojunction Nanorods into Hierarchically Porous TiO_2 Electrode for Efficient Solar Energy Conversion**

Sangheon Lee (Materials Science and Eng., Seoul Nat'l Univ.), Joseph C. Flanagan (Materials Science and Eng., Univ. of Illinois at Urbana-Champaign, USA), Joonhyeon Kang, Jinhyun Kim (Materials Science and Eng., Seoul Nat'l Univ.), Moonsub Shim (Materials Science and Eng., Univ. of Illinois at Urbana-Champaign, USA), Byungwoo Park* (Materials Science and Eng., Seoul Nat'l Univ.)

CIS-P-15 **Performance improvement in CdTe solar cell with Cu-solution back contact process**

Eun Seok Cha, Young Min Ko, Gyu Chan Park, Byung Tae Ahn* (MSE, KAIST)

CIS-P-16 **Characterization of secondary phases in $Cu_2InGa(S,Se)_4$ thin film solar cells using conductive atomic force microscopy**

Jyun-Ting Huang (Dept. of Mechatronics Eng., Nat'l Changhua Univ. of Education, Taiwan), Hung-Ru Hsu (Green Energy & Environment Research Laboratories, Industrial Technology Research Institute, Taiwan), Yi-Cheng Lin*, Li-Ching Wang (Dept. of Mechatronics Eng., Nat'l Changhua Univ. of Education, Taiwan)

CIS-P-17 Fabrication of Cu_2SnS_3 thin film solar cells by sulfurization process from NaF addition precursor

Mitsuki Nakashima* (Nat'l Institute of Technology, Wakayama College, Japan)

CIS-P-18 $Cu_2ZnSnSe_4$ thin film solar cells prepared by evaporation of $Cu_2ZnSnSe_4$ compound and effect of annealing

Mitsuki Nakashima* (Nat'l Institute of Technology, Wakayama College, Japan)

CIS-P-19 Fabrication of $Cu_2ZnSn(S,Se)_4$ thin film solar cells by thermal crystallization using $Cu_2ZnSnSe_4$ compound in S/Se atmosphere

Mitsuki Nakashima* (Nat'l Institute of Technology, Wakayama College, Japan)

CIS-P-20 Characterization of CBD-CdS buffer layers with different thinkness for CZTSSe solar cells

JungSik Kim, Kee-Jeong Yang* (Convergence Research Center for Solar Energy, Daegu Gyeongbuk Institute of Science & Technology (DGIST))

CIS-P-21 Influence on recombination process of CIGS solar cells induced by air exposure

Jiro Nishinaga*, Yukiko Kamikawa, Hajime Shibata (Research Center for Photovoltaics, Advanced Industrial Science and Technology, Japan), Shigeru Niki (Renewable Energy Research Center, Advanced Industrial Science and Technology, Japan)

CIS-P-22 Processing of ultra-thin films for solar cells based on SnO_2, CdS and CdTe

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CIS-P-23 Dependence of the thickness and vacuum post-treatment of Cd_2SnO_4 thin films grown by the sol-gel technique on the efficiency of Au/Cu_2Te/CdTe/CdS/Cd_2SnO_4/glass solar cell

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CIS-P-24 Chemical Bath Deposited ZnO Transparent Electrode for CIGS Solar Cells

Hyun Jun Jang, Yesol Choi, Ki-Ha Hong, Choong-Heui Chung* (Dept. of Materials Science and Eng., Hanbat Nat'l Univ.)

CIS-P-25 CBD Grown $ZnIn_2Se_4$ Buffer Layers for SnS-based Solar Cells

Babu Pejjai, Vasudeva Reddy Minnam Reddy (School of Chemical Eng., School of Chemical Eng., Yeungnam Univ., Gyeongsan 712-749, Republic of Korea.), Ramakrishna Reddy K.T. (Dept. of Physics, Solar Energy Laboratory, Dept. of Physics, Sri Venkateswasra Univ., Tirupati 517 502, India., India), Chinho Park* (School of Chemical Eng., School of Chemical Eng., Yeungnam Univ., Gyeongsan 712-749, Republic of Korea.)

CIS-P-26 Measurement of $SnSe/Zn_{1-x}Mg_xO$ heterojunction band discontinuities by PYS

Haeyun Cho, Vasudeva Reddy Minnam Reddy, Dong-seob Jeong, Chinho Park* (School of Chemical Eng., School of Chemical Eng., Yeungnam Univ., Gyeongsan 712-749, Republic of Korea.)

CIS-P-27 Effect of selenization temperature on the properties of Cu-Sn-Se films for solar cell applications

Dong-seob Jeong, Vasudeva Reddy Minnam Reddy, Haeyun Cho, Chinho Park* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-28 Sulfurized Cu-Sn-S films for applications solar cells

Myeungho Kim, Vasudeva Reddy Minnam Reddy, Dong-seob Jeong, Chinho Park* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-29 Effect of temperature on Cu_2ZnSnS_4 (CZTS) films formed using an electro-spray technique

Liping Chen, Hongtak Kim, Chinho Park* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-30 Shape Control to Pure Phase of Iron Pyrite (FeS_2) by using Trioctylamine as Solvent in Hot Injection Method

Thanh Kieu Trinh, Viet Thanh Hau Pham, Hai Ha T. Hoang, Nguyen Tam Nguyen Truong, Chinho Park* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-31 Effect of Selenization Temperature on Sputtering-Processed CZTSSe Thin Films

Jun-Hyoung Sim, Kee-Jeong Yang, Dae-Ho Son, Jung-Sik Kim, Young-ill Kim, Dae-Hwan Kim, Jin-Kyu Kang* (Convergence Research Center for Solar Energy, Daegu Gyeongbuk Institute of Science & Technology (DGIST))

CIS-P-32 Characterization of Cu_2SnS_3 thin films synthesized from a stacked Cu/SnS_2 precursor in N_2 atmosphere

Young Min Ko, Eun Seok Cha, Joong Geun Park*, Byung Tae Ahn* (MSE, KAIST)

CIS-P-33 $Cu_2ZnSnSe_4$ solar cells prepared from stacked $ZnSe/Cu_2SnSe_3$ precursors

Kang Min Kim*, Hitoshi Tampo, Hajime Shibata, Koji Matsubara, Shigeru Niki (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan)

CIS-P-34 Two approaches to improving the quality of the $CuInSe_2$ absorption layer by electrochemical deposition

Kangju Park (Dept. of Nano Fusion Technology, Pusan Nat'l Univ.), Jieun Park (Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Sangmin Shin, Yangdo Kim (School of Materials Science and Eng., Pusan Nat'l Univ.), Dongyun Lee* (Dept. of Nano Fusion Technology, Pusan Nat'l Univ.)

CIS-P-35 Electrodeposition Characteristics of by Cyclic Voltammetry of Cu-Zn-Sn Precursors for Cu_2ZnSnS_4(CZTS) solar cell application

Sangmin Shin, Chansoo Park, Taewoo Koo, Jaewook Jung, Yangdo Kim* (Material Science and Eng., Busan Nat'l Univ.)

CIS-P-36 Electrodeposition methods for fabrication of CIGS Films

Hyunsoo Jin, Chiho Kim, Jaecheol Yun (Material Science and Eng., Busan Nat'l Univ.), Cheolmin Kim (Advanced Circuit Interconnection, Busan Nat'l Univ.), Hyunju Lee (CK for Ocean Resource Development with Fusion Materials and Smart Manufacturing, Busan Nat'l Univ.), Dongyun Lee (Nano Energy Eng., Busan Nat'l Univ.), Yangdo Kim* (Material Science and Eng., Busan Nat'l Univ.)

CIS-P-37 **Effect of metallic element addition to $Zn_{1-x}Mg_xO$ buffer window layer on the performance of $Cu(In,Ga)Se_2$ thin-film solar cells**

Sun Young Kim, Jeung-hyun Jeong* (Center of Electronic Materials, KIST (KIST)), In-Gyu Lee* (Division of Materials Science and Eng., Korea Aerospace Univ.), Won Mok Kim* (Center of Electronic Materials, KIST (KIST))

CIS-P-38 **Capacitance profiling of $Cu(In, Ga)Se_2$ Thin-Film Solar Cells with Chemical-Bath-Deposited ZnS Buffer layer**

Hye-Jung Yu, Woo-Jung Lee, Dae-Hyung Cho, Jae-Hyung Wi, Won Seok Han, Yong-Duck Chung (Components & Materials Research Laboratory, ETRI), Jung-Hoon Song* (Dept.s of physics, Kongju Nat'l Univ.)

CIS-P-39 **The effects of symmetric stacking precursors on properties of CZTSSe thin film solar cells**

Young-Ill Kim, Dae-Ho Son, Dae-Hwan Kim*, Kee-Jeong Yang, Si-Nae Park, Jun-Hyoung Sim, Jung-Sik Kim, Jin-Kyu Kang* (Convergence Research Center for Solar Energy, DGIST)

CIS-P-40 **Phase Formation in the Hydrazine Solution Processed $CuInSe_2$ Thin Films**

Choong-Heui Chung* (Dept. of Materials Science and Eng., Hanbat Nat'l Univ.)

CIS-P-41 **Distributed circuit model for CIGS solar cells for local shaded operation analysis**

Myunghun Shin*, Jeonghoo Jo*, Jaewon Choi, Seungman Jang (Energy & Photonics Lab, Korea Aerospace Univ.)

CIS-P-42 **Mechanism study on formation of Cu_2SnS_3(CTS) thin films by increasing temperature of sulfurization process**

Ju Yeon Lee, Mahesh P. Suryawansh (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), In Young Kim (GIST, Information and communications), Jong Ha Moon (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), Jae Ho Yun (Photovoltaic Research Group, KIER), Jin Hyeok Kim* (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.)

CIS-P-43 **Characterization Of ZnS Buffer Layer Using Chemical Bath Deposition For Cd-Free $Cu_2ZnSn(S_xSe_{1-x})_4$ (CZTSSe) Thin Film Solar Cells**

Eunjin Jo, Chang Woo Hong, Soo Jeong Yeo (Optoelectronic(s) Convergence Research Center and Dept. of Materials Science & Eng., Chonnam Nat'l Univ.), Jihye Gwak, Jae Ho Yun (Photovoltaic Laboratory, KIER), Jong-Ha Moon, Jin Hyoek Kim* (Optoelectronic(s) Convergence Research Center and Dept. of Materials Science & Eng., Chonnam Nat'l Univ.)

CIS-P-44 **Preperation of CZTSSe films by sulfoselenization of stacked Cu/Sn/Zn stacked metallic layers**

Yoon Jin Kim, K.V. Gurav, A.S. Kamble, Uma Ghorpade (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), Jae Ho Yun (Photovoltaic Laboratory, KIER), Jong Ha Moon, Jin Hyeok Kim* (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.)

CIS-P-45 **Studies on effect of S/Se ratio on the properties of $Cu_2ZnSn(S_xSe_{1-x})_4$ (CZTSSe) thin films by sulfo-selenization of stacked precursor thin films**

Myung-Gil Gang, Chang-Woo Hong (Optoelectronic Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), Jae-Ho Yun, Ji-hye Gwak, Seung-Kyu Ahn, Ji-hye Son (Photovoltaic Laboratory, KIER), Jong-Ha Moon, Jin-Hyeok Kim* (Optoelectronic Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.)

CIS-P-46 **Variation of working pressure on characteristics of Mg and Ga co-doped ZnO thin films**

Jun Sung Jang (Materials Science and Eng., Chonnam Nat'l Univ.), In Young Kim (School of information and communications, Gwang Ju Institute of Science and Technology), Chae Hwan Jeong (Solar city center, Korea Institute of Industrial Technology), Jong Ha Moon, Jin Hyoek Kim* (Materials Science and Eng., Chonnam Nat'l Univ.)

CIS-P-47 **Growth and Characterization of RF-Sputtered Tungsten (W) Thin Films Deposited at Various Substrate Temperatures**

K. S. Rahman, H. Rashid (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), M. I. Hossain (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), N. Tabet, F. H. Alharbi (Qatar Environment and Energy Research Institute, Qatar Foundation, Qatar), N. Amin* (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

CIS-P-48 **Effect of Na incorporation on the properties of CZTSSe Photovoltaic Cells**

In Young Kim (School of Information and Communications, GIST), Chang Woo Hong, Hong Jae Sim (Dept. of Material Science and Eng., Chonnam Nat'l Univ.), Dong Seon Lee* (School of Information and Communications, GIST), Jin Hyeok Kim* (Dept. of Material Science and Eng., Chonnam Nat'l Univ.)

CIS-P-49 **Deposition and Characterization of ultra-thin layer of Molybdenum by DC Magnetron Sputtering for Photovoltaic Applications**

Haroon Rashid, Kazi Sajedur Rahman (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), Mohammad Istiaque Hossain (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), Fahhad H. Alharbi, Nouar Tabet (Qatar Environment and Energy Research Institute, Qatar Foundation, Qatar), Nowshad Amin* (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

PRV-P-01 **Morphology control of inorganic-organic hybrid lead halide perovskite films and its effect on final device performance**

Seong Ryul Pae, Byungha Shin* (KAIST)

PRV-P-02 **Effect of an hole extraction layer in inverted perovskite solar cells**

Seunghyun Rhee, Hyunho Lee, Yongwon Kwon, Changhee Lee* (Electrical and Computer Eng., Seoul Nat'l Univ. Organic Semiconductor Laboratory)

PRV-P-03 Evaluation of various electron and hole transporting layers for $MAPbI_3$ perovskite solar cells

Daehan KIM, Byungha Shin* (Materials science & engineering, KAIST)

PRV-P-04 The effects of humidity and temperature to the perovskite film and its photovoltaic performances

Hyunho Lee, Seunghyun Rhee, Jiyun Song, Jaehoon Kim, Changhee Lee* (Electrical Eng., Seoul Nat'l Univeristy)

PRV-P-05 Stability investigation of perovskite solar cells based on various solvents

Zeguo Tang* (Ritsumeikan Global Innovation Research Organization, Ritsumeikan Univ., Japan), Seigo Ito (Graduate School of Eng., Univ. of Hyogo, Japan), Shigaru Ikeda (Research Center for Solar Energy Chemistry, Osaka Univ., Japan), Kozo Taguchi, Takashi Minemoto (Dept. of Electrical and Electronic Eng., Ritsumeikan Univ., Japan)

PRV-P-06 Crystal Variation of $CH_3NH_3PbI_3$ Perovskite by Deposition of Inorganic CuSCN Hole Conductor for Mesoscopic Solar Cell

Shusaku Kanaya, Seigo Ito* (Graduate School of engineering, Univ. of Hyogo, Japan), Hitoshi Nishino (Energy Technology Laboratries, Osaka Gas Co., Ltd., Japan)

PRV-P-07 Perovskite solar cells using NiO Inorganic Hole-Conductor Material Fabricated by Spin-Coating method

Tomoya Nishina, Shusaku Kanaya, Gai Mizuta, Hiroyuki Kanda (Dept. of Electric Eng. and Computer Science, School of Eng., Univ. of Hyogo, Japan), Hitoshi Nishino (Energy Technology Laboratories, Osaka Gas Co., Ltd, Japan), Seigo Ito* (Dept. of Electric Eng. and Computer Science, School of Eng., Univ. of Hyogo, Japan)

PRV-P-08 Optical properties of perovskite solar cell depending on mesoporous TiO_2 solution

Sang-won Lee, Taewon Chung, Seongtak Kim, Seunghun Lee (Material Science & Eng. SERC, Korea Univ.), Yoonmook Kang (KU·KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-seok Lee, Donghwan Kim* (Material Science & Eng. SERC, Korea Univ.)

PRV-P-09 Sandwitch-Structured $CH_3NH_3PbI_3$ perovskite solar cells using NiO and TiO_2 electrodes

Shota Fukumoto (Dept. of Electric Eng. and Computer Science, School of Eng., Univ. of Hyogo, Japan), Shusaku Kanaya, Gai Mizuta, Hiroyuki Kanda (Dept. of Electric Eng. and Computer Science, Graduate School of Eng., Univ. of Hyogo, Japan), Hitoshi Nishino (Energy Technology Laboratories, Osaka Gas Co., Ltd, Japan), Seigo Ito* (Dept. of Electric Eng. and Computer Science, School of Eng., Univ. of Hyogo, Japan)

PRV-P-10 Enhancing the Performance of Lead Sulfide Quantum dots as Hole Transport Materials in Perovskite Solar Cells

Seung Ho Lee, Jung Hyun Park (Energy Systems Eng., Daegu Gyeongbuk Institute of Science & Technology), Hee Soo Kim, Jung Hyun Park, Hyung Woo Choi, Ji Sung Hwang (Daegu Science High School), Seigo Ito* (Electric Eng. and Computer Science, Univ. of Hyogo, Japan), Jong-Soo Lee* (Energy Systems Eng., Daegu Gyeongbuk Institute of Science & Technology)

PRV-P-11 Low-Temperature Fabrication of Pb Perovskite Solar Cells on ITO Transparent Conducting Substrate

Gai Mizuta (Univercity of Hyogo, Japan), Toshiyoshi Urano (CEREBA, Japan), Tomokazu Umeyama (Kyoto Univercity, Japan), Hiroshi Imahori (WPI-iCeMS Kyoto Univ, Japan), Seigo Ito* (Graduate School of Eng., Univercity of Hyogo, Japan)

PRV-P-12 Highly efficient and shape recoverable perovskite solar cells

Minwoo Park, Inyoung Jeong, Min Jae Ko* (Photo-Electronic Hybrids Research Center, KIST)

PRV-P-13 Noble metal-free perovskite solar cells with high efficiency and mechanical durability

Inyoung Jeong (Photo-Electronic Hybrids Research Center, KIST), Jinwoo Lee* (Chemical Eng., POSTECH), Min Jae Ko* (Photo-Electronic Hybrids Research Center, KIST)

PRV-P-14 The tailored inner space of TiO_2 electrodes via a 30 second wet etching process: high efficiency solid-state perovskite solar cells

Jeong Kwon (Dept. of Chemical engineering, Sungkyunkwan Univ.), Sung June Kim (School of Chemical Eng. and SKKU Advanced Institute of Nanotechnology(SAINT), Sungkyunkwan Univ.), Jong Hyeok Park* (Dept. of Chemical and Biomolecular Eng., Yonsei Univ.)

PRV-P-15 Organic-Inorganic Hybrid Perovskite Solar Cells with Ag Nanowires as a Top Electrode

Ji-Hye Choe, A-Yeon Jang, Choong-Heui Chung, Ki-Ha Hong* (Advanced Materials Eng., Hanbat Nat'l Univ.)

PRV-P-16 Multi-Functionality of Macroporous TiO_2 Spheres in Dye-Sensitized and Perovskite Solar Cells

Jeong Kwon (Dept. of Chemical engineering, Sungkyunkwan Univ.), Dae-Woong Jung, Gi-Ra Yi* (Dept. of Chemical Eng., Sungkyunkwan Univ.), Jong Hyeok Park* (Dept. of Chemical and Biomolecular Eng., Yonsei Univ.)

PRV-P-17 A Highly Efficient Perovskite Solar Cell employing a Novel Donor-Acceptor Type Random Copolymer as a HTM

Guan-Woo Kim, Gang-Young Lee, Gyeongho Kang, Taiho Park* (Chemical Eng., POSTECH)

PRV-P-18 The Study on the thickness of Hole Transport Layer in Solar Cells Using Mixed Halide Perovskite

Guan-Woo Kim, Taiho Park* (Chemical Eng., POSTECH)

PRV-P-19 Inverted Planner Formamidinium Lead Trihalide Perovskite Solar Cells Processed at Low Temperatures

An-Zhe Liu, Chie Gau* (Institute of Aeronautics and Astronautics/Research Center for Energy Technology and Strategy, Nat'l Cheng Kung Univ., Taiwan)

PRV-P-20 Inverted Lead Iodide Perovskite Solar Cells by Fast Deposition-Crystallization

Yi Tzu Chuang, Chie Gau* (Institute of Aeronautics and Astronautics/Research Center for Energy Technology and Strategy, Nat'l Cheng Kung Univ., Taiwan)

PRV-P-21 Effect of Mesoporous TiO_2 Particle Size and Shape on Photovoltaic Properties of Perovskite Solar Cells

Dong Geon Lee, Byeong Jo Kim, Hyun Suk Jung* (School of Advanced Materials Science & Eng., Sungkyunkwan Univ.)

PRV-P-22 **Hysteresis-free inverted $CH_3NH_3PbI_3$ planar perovskite hybrid solar cells**
Jin Hyuck Heo, Sang Hyuk Im* (Functional Crystallization Center (ERC), Dept. of Chemical Eng., Kyung Hee Univ.)

GAS-P-01 **Study of the recombination center in GaAsN grown by chemical beam epitaxy**
Omar Elleuch*, Li Wang, Hiroyuki Kowaki, Kan-Hua Lee, Kazuma Ikeda, Taketo Aihara, Nobuaki Kojima, Yoshio Ohshita, Masafumi Yamaguchi (Toyota Technological Institute, Japan)

GAS-P-02 **Optical Properties of Layered $(In_xGa_{1-x})_2Se_3$ Buffer Material deposited on GaAs(111) Substrate for III-V/Silicon Solar Cell**
Li Wang*, Nobuaki Kojima, Hiroya Nakamura, Yoshio Ohshita, Masafumi Yamaguchi (semiconductor lab., Toyota Technological Institute, Japan)

GAS-P-03 **Temperature-dependent photovoltaic properties of 54 μm-thick InGaP/InGaAs/Ge triple-junction solar cell on flexible substrate**
Eun Hye Lee*, Jae Seong Yeo, Jung Hun Lee, Dong Ik Cheong (Defense Materials and Power Sources Directorate, Agency for Defense Development)

GAS-P-04 **Criteria of 1-eV InGaAsN Solar Cell for Achieving over 45% Multi-Junction Solar Cells**
Kan-Hua Lee*, Kazuma Ikeda, Omar Elleuch, Li Wang, Kenji Araki, Nobuaki Kojima, Yoshio Ohshita, Masafumi Yamaguchi (Toyota Technological Institute, Japan)

GAS-P-05 **Epitaxial growth and characterization of high performance AlInP window layer in the InGaP/InGaAs/Ge triple-junction solar cells using MOCVD**
Kangho Kim, Youngjo Kim, Sang Hyun Jung, Chang Zoo Kim, Dong Hwan Jun, Hyun-Beom Shin (Korea Advanced Nano Fab. Center), Jaejin Lee* (Dept. of Electrical and Computer Eng., Ajou Univ.), Ho Kwan Kang* (Korea Advanced Nano Fab. Center)

MSI-P-01 **Manufacturing Cost Analysis of CIGS PV module**
Tsung Hsin Wu*, Chia Wen Chang, Tung-Po Hsieh, Jen-Chuan Chang, Chien-Rong Huang (Compound Thin Film Photovoltaic Research Dept., Green Energy and Environment Laboratory, Industrial Technology Research Institute, Taiwan)

MSI-P-02 **The novel method for vulnerability evaluation of potential induced degradation at the solar cell level**
Wonwook Oh*, Byungjun Kang, Sung-Il Chan (Robust Components and System Research Center, Korea Electronic Technology Institute)

MSI-P-03 **60kWp Photovoltaic System Performance at North Mexico City**
Yasuhiro MATSUMOTO*, José Antonio Urbano (Electrical Eng., Research Center for Advanced Studies, Mexico), Carlos Norberto (DCTS, Research Center for Advanced Studies (CINVESTAV-IPN), Mexico), Claudia Lopez (Solar Electronic Div., Fronius Mexico, Mexico), Ruben Dorantes (Energy, Metropolitan Authonomous Univ., Azcapotzalco, Mexico), Rene Asomoza, Ramón Peña, Gabriela Lopez (Electrical Eng., Research Center for Advanced Studies, Mexico)

MSI-P-04 Configurable Impedance Matching to Maximize Power Extraction for Enabling Self-Powered System Based-on Photovoltaic Cells

Airul Azha Abd Rahman*, Wan Adil Wan Jamil (ICD and R&D, MIMOS Bhd, Malaysia), Akrajas Ali Umar (IMEN, UKM, Malaysia)

MSI-P-05 Investigation of shading effect a different type of photovoltaic modules with bypass diodeInvestigation of shading effect a different type of photovoltaic modules with bypass diode

Ji Eun Lee, Soohyun Bae, Wonwook Oh (Dept. of Material Science and Eng., Korea Univ.), Dongho Lee, Junggyu Nam, JungYup Yang, Dongseop Kim (Solar Energy Development Group, Samsung SDI), Yoonmook Kang* (KU-KIST GreenSchool, Graduate School of Energy and Environment, Korea Univ.), Hae-seok Lee*, Donghwan Kim* (Dept. of Material Science and Eng., Korea Univ.)

MSI-P-06 Impact of average photon energy on short circuit current of Si photovoltaic modules from calculation

Hiroyuki Mano*, Aika Kamei (College of Science and Eng., Ritsumeikan Univ., Japan), Daisuke Hironiwa (Ritsumeikan Global Innovation Research Organization (R-GIRO),, Ritsumeikan Univ., Japan), Takashi Minemoto (College of Science and Eng., Ritsumeikan Univ., Japan)

MSI-P-07 Synthesis and Characterization of Vertical Alignment-ZnO rods For 1-Dimensional-Bulk Hetero-Junction Solar Cells Application

Hai Ha T. Hoang, Thanh Kieu Trinh, Nguyen Tam Nguyen Truong, Chinho Park* (Information Materials Lab, School of Chemical Eng., Yeungnam Univ.)

MSI-P-08 A Structure Analysis on Shapes of the Frame for PV Modules by using the FE-method

Yongki Min, Jong-Hyeok Moon, Kwang-Hyun Kim, Chung-Hyun Kim, Sehwan Ryu*, Young-Hyun Cho (PV module Development Team, R&D center, Shinsung Solar Energy Co., Ltd.)

MSI-P-09 A maintenance, diagnosis, repairing for Hybrid PV wind system of paleuy green island, Thailand

Nopporn Patcharaprakiti* (Electrical engineering, Rajamangala Univ. of technology lanna, Thailand), Jeerawan Saelao (Mathematics, Maejo Univ., Thailand), Worrajak Muangjai (Electrical engineering, Rajamangala Univ. of technology lanna, Thailand), Pakorn Sereepulvong (Computer engineering, Rajamangala Univ. oftechnology lanna, Thailand)

MSI-P-10 The effect of cross-linking of EVA on optical properties in photovoltaic module by damp-heat exposure

Hansol Chang, Taehee Juung (Photovoltaic Laboratory, KIER), Donghwan Kim (Materials science and engineering, Korea Univ.), Gihwan Kang* (Photovoltaic Laboratory, KIER)

MSI-P-11 The comparison of spectral response measurement of PV module under different bias voltage methods

Chen-Wei Chen, Heng-Hsin Wu, Chi-Chin Lin (Enlitech, Taiwan), Hai-Yan Qin (China General Certification Center, China), Hua-Hsien Liao* (Enlitech, Taiwan)

MSI-P-12 Analysis of Heat Radiating Mechanism of PV Considering the Module Components

Young-Eun Park, Tae-Hee Jung, Young-Chul Ju (Solar Energy Center, KIER), Jun-Tae Kim* (Energy System Eng. + nZEB Lab, Kongju Nat'l Univ.), Gi-Hwan Kang* (Solar Energy Center, KIER)

MSI-P-13 **Analysis of the thermal & electrical characteristics change of module by the bypass diode damage**

Woo Gyun Shin, Tae Hee Jung, Seok Hwan Go, Young Chul Ju (Solar Energy Center, Koera Institute of Energy Research), Hyo Sik Chang* (Semiconductor Energy Lab, Chungnam Nat'l Univ.), Gi Hwan Kang* (Solar Energy Center, Koera Institute of Energy Research)

MSI-P-14 **Analysis of damage to the solar cell deformation**

Ju Ho Choi, Tea Hee Jung, Yeong Cheol Ju, Seok Hwan Go (Solar Energy Dept., KIER), Hyo Sik Chang* (Graduate School of Energy Science and Technology, Chungnam Nat'l Univ.), Gi Hwan Kang* (Solar Energy Dept., KIER)

MSI-P-15 **An experimental analysis of dust accumulation at a bottom of PV module considering various conditions as glass type, solution and installation angle**

Ga Eon Jin, Tae Hee Jung, Yeong Cheol Ju, Seok Hwan Go (Solar Energy Dept., KIER), Hyo Sik Chang* (Graduate School of Energy Science and Technology, Chungnam Nat'l Univ.), Gi Hwan Kang* (Solar Energy Dept., KIER)

MSI-P-16 **Study on dynamic Maximum Power Point Tracking Method**

Gwui Han Lee, Suk Whan K0*, Young Seok Jung, Hye Mi Hwang (Solar Energy Dept., KIER), Hanju Cha (Electrical Eng., Chungnam Nat'l Univ.)

MSI-P-17 **Study on Methods for Detection of the Most Degraded Module in a Photovoltaic String**

Hyeonseok Lee, Changwoon Han* (Robust Components and System Research Center, Korea Electronics Technology Institute), Sangsoon Bae (McScience Inc.)

MSI-P-18 **Environmental aging effects of the photovoltaic modules fabricated with EVA and POE encapsulants**

Jihyun Shim, Tingjian Huang, Jeha Kim* (Energy Conversion Eng., Cheongju Univ.)

MSI-P-19 **An analysis of the Recovery characteristic according to the temperature change of Photovoltaic modules**

Eun Suk Lee, Tae Hee Jung, Seok Hwan Go, Young Chul Joo (Photovoltaic Laboratory, KIER), Hyo Sik Chang* (Graduate school of energy science and technology, Chungnam Nat'l Univ.), Gi Hwan Kang* (Photovoltaic Laboratory, KIER)

MSI-P-20 **Photovoltaic Systems in Zero Energy Building Cases**

Jin-Hee Kim (Green Energy Technology Research Center, Kongju Nat'l Univ.), Jun-Tae Kim* (Dept. of Architectural Eng., Kongju Nat'l Univ.), Ha-Ryeon Kim (Dept. of Energy Systems Eng., Graduate School, Kongju Nat'l Univ.)

Nov. 18 (Wed), 14:10~15:10 3F, Convention Hall, BEXCO

Poster B

CSi-P-35 Two terminal Si-Ge/Si tandem junction solar cells for a high efficiency

Jinjoo Park (College of Information and Communication Eng., Sungkyunkwan Univ.), Sangho Kim (Dept. of Energy Science, Sungkyunkwan Univ.), Pham duy phong, Sunbo Kim, Junyoung Kang, Youn-Jung Lee, Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.)

CSi-P-36 Efficiency enhancement of HIT solar cell by optimizing n - doped μc-Si:H BSF layer

Hyeonsung kim (School of Electronic Electrical Eng., College of Information and Communication, Sungkyunkwan Univ.), Sangho Kim (Dept. of Energy Science, Sungkyunkwan Univ.), Junsin Yi* (School of Electronic Electrical Eng., College of Information and Communication, Sungkyunkwan Univ.)

CSi-P-37 Quantitative analysis of electrical activity of grain boundaries through high spatial resolution photoluminescence imaging

Kentaro Kutsukake*, Shunya Ninomiya, Shota Sugioka, Momoko Deura, Yutaka Ohno (Institute for Materials Research, Tohoku Univ., Japan), Noritaka Usami (Graduate School of Eng., Nagoya Univ., Japan), Ichiro Yonenaga (Institute for Materials Research, Tohoku Univ., Japan)

CSi-P-38 Influence of ARC patterning method on adhesion of Ni/Cu plated contact solar cells

Jong Uk Paek, Sang Hee Lee, Soo Hong Lee* (Green Strategic Energy Research Institute, Dept. of Electronics Eng., Sejong Univ.)

CSi-P-39 Characterization of rear contact according to the BSF formation for Ni/Cu plated solar cells

Eun Gu Shin, Soo Hong Lee* (Electronics Eng., Sejong Univ.)

CSi-P-40 Application of Atmospheric DBD(Dielectric Barrier Discharge) Plasma to Solar Cell Doping Process

Sang Hyuk Hwang, Woo Jae Kim, Hye Jin Park, Jin woo Choi, Tae Hoon Jo, Gi-Chung Kwon* (Dept. of Electrical & Biological Physics, Kwangwoon Univ.)

CSi-P-41 pn junction-less c-Si solar cells with MoO_3 Hole-contact deposited by ALD

YongWoo Choi* (Materials Science & Eng., KAIST), Jin-Seong Park (Advanced Materials Science and Eng., HanYang Univ.)

CSi-P-42 Investigated structural and optical properties of Indium Tin Film for Shallow Emitter Crystalline Solar Cell

Donghyun Oh (Dept. of Energy System, Sungkyunkwan Univ.), Minhan Jeon, Jiwoon Kang, Sungyoun Chung, Shihyun Ahn (College of Information and Communication Eng., Sungkyunkwan Univ.), Cheolmin Park (Dept. of Energy Science, Sungkyunkwan Univ.), Junsin Yi* (College of Information and Communication Eng., Sungkyunkwan Univ.), Hyunhoo Kim (Display Eng. School, Doowon Technical Univ.)

CSi-P-43 **Study of using atmospheric plasma texturing in crystalline silicone wafer**

Tae Hoon Jo, Ye seul Lee, Hee Tae Kwon, Woo Jae Kim, JinWoo Choi, Sang Hyuk Hwang, Hye Jin Park, Myoung Soo Yun (KwangWoon Univ.), Bu Sung Kim, Chang-Sil Yang (BIEMT), Gi-Chung Kwon* (KwangWoon Univ.)

CSi-P-44 **Study on dislocations in Si ingots grown by noncontact crucible method**

Ryota Murai*, Kazuo Nakajima, Satoshi Ono, Yuzuru Kaneko (Japan Science and Technology Agency, Japan)

CSi-P-45 **Influence of rear-side passivation on solar cell performance in N-type silicon solar cells**

Seok Cheol Choi, Han Sang Kim, Dae Chuel Kim, Chang Jik Hong* (Solar Process Eng. Group, LG Electronics)

CSi-P-46 **Influence of IWO with various work functin on Voc of silicon heterojunction solar cell**

Leilei Shen, Fanying Meng*, Jianhua Shi, Zhengxin Liu (Research Center for New Energy Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China)

CSi-P-47 **Studies of reduction metal impurity in residual melt by Czochralski method**

Jaemin Kim*, Ilsun Pang (R&D Team, Woongjin Energy), Yongrae Cho (R&D Plan Team, Woongjin Energy), Kwanghun Kim (R&D Team, Woongjin Energy), Sungsun Baik (R&D Center, Woongjin Energy)

CSi-P-48 **Etching paste process for Recycling Degraded Crystalline Silicon Solar wafers from End-life Photovoltaic Modules**

Jeongeun Shin, Jae-seong Jeong* (Robust Components and System Research Center, Korea Electronics Technology Institute)

CSi-P-49 **Conductive gallium doped ZnO films deposited by ultrafast spatial atomic layer deposition for photovoltaic applications**

Naomi Nandakumar (Solar Energy Research Institute of Singapore (SERIS), Nat'l Univ. of Singapore (NUS), Singapore), Bram Hoex (School of Photovoltaic Research and Eng. (SPREE), UNSW Australia, Australia), Bas Dielissen (SoLayTec B. V., Netherlands), Diana Garcia-Alonso (Dept. of Applied Physics, Eindhoven Univ. of Technology, Netherlands), Roger Gortzen (SoLayTec B. V., Netherlands), Wilhelmus (Erwin) M. M. Kessels (Dept. of Applied Physics, Eindhoven Univ. of Technology, Netherlands), Lin Fen, Armin G. Aberle, Thomas Mueller* (Solar Energy Research Institute of Singapore (SERIS), Nat'l Univ. of Singapore (NUS), Singapore)

CSi-P-50 **Improving productivity by suppress back-diffusion effect during anneal process**

ShiKai Tzeng*, JP Wu, Ken Hao, Jumo Yang, yuchung chen, Titan cheng (Wafer technology development dept., Motech Industries, Inc. Science Park Branch, Taiwan)

CSi-P-51 **The effect of brick surface roughness on edge defect and fracture strength of wafer**

Cheng-Fung Yeh* (Wafering Technology Section, Motech Industries,Inc. Science Park Branch, Taiwan)

CSi-P-52 **Developing a High-Throughput Plasma-Less Dry Etching Process to Reach Conversion Efficiencies Beyond 18% for Multicrystalline Silicon Solar Cells Using Industrially Feasible Solar Cell Process Steps**

Bishal Kafle*, Timo Freund, Abdul Mannan (Fraunhofer Institute for Solar Energy Systems ISE, Germany), Laurent Clochard, Edward Duffy (Nines Photovoltaics, Ireland), Marc Hofmann, Jochen Rentsch, Ralf Preu (Fraunhofer Institute for Solar Energy Systems ISE, Germany)

CSi-P-53 **Study in poly-crystalline with sandblast process**

Ting Chun Wang* (Wafering Technology Section, Motech Industries, Inc., Tainan City, 74145, Taiwan (ROC), Taiwan)

CSi-P-54 **Low density of dislocation clusters in high performance multicrystalline silicon ingots using novel seeding technique**

Anandha babu Govindan*, Isao Takahashi, Satoru Matsushima, Noritaka Usami (Graduate School of Eng., Nagoya Univ., Japan)

CSi-P-55 **Optimization of S/L interface and flow convection by thermal gradient for G6 ingot growth**

Jui-Pin Wu*, Chen Hao Yang, Lung Sheng Liao, Shi Kai Tzeng, Wei Lun Chang, Titan Cheng (Wafer technology development, Motech Industries, Inc. Science Park Branch, Taiwan)

CSi-P-56 **Realizing interface properties enhancement and process-period reduction in solar cell fabrication via inorganic–organic hybrid alkaline liquor texturing**

Fengyou Wang, Yuanjian Jiang, Jia Fang, Dekun Zhang, Changchun Wei, Ying Zhao, Xiaodan Zhang* (Institute of Photo-Electronic Thin Film Devices and Technology of Nankai Univ., Key Laboratory of Photo-electronic Thin Film Devices and Technology, China)

CSi-P-57 **Extraction of pure silicon for solar grade silicon feedstock from aluminum die casting scrap**

Je Beom Jeon, Suk Jun Kim*, Ji Won Youn, Ki Young Kim, Kum Hee Seo (School of Energy, Materials and Chemical Eng., KOREATECH)

CSi-P-58 **Improved Field Effect of Surface Passviation by Optimized Oxide Layer for Industrial c-Si Solar Cell**

Chang Youn Yoo*, Chang-sub Park, Je-Min Yeon, Jong-Youb Lim, Jisun Kim, Keunkee Hong, Eunjoo Lee, Young Hyun Cho (Technical Research Center, Shinsung Solar Energy Co Ltd)

CSi-P-59 **Microstructural surface analysis of Ni/Cu front contact after peel force test to improve contact adhesion**

Sang Hee Lee, Eun Gu Shin, Atteq ur Rehman, Soo Hong Lee* (Green Strategic Energy Research Institute, Dept. of Electronics Eng., Sejong Univ.)

CSi-P-60 **Analysis of Cell to Module Optical Loss in N-type Silicon Solar Cell Module**

Sung-yong Cho*, Yong-Duk Jin, Kyung-Jin Shim, Hwa-Nyeon Kim, Young-Ho Choe (Solar R&D Lab, Solar Business Division, LG Electronics)

CSi-P-61 Electrical Characteristics of c-Si Solar Cell with Various $POCl_3$ Diffused Emitter

Jeong Eun Park, Dae Sung Kim, Sung Kyun Byeon, June Seok Park, Young Min Lee, Donggun Lim* (IT Convergence, Korea Nat'l Univ. of Transportation)

SiF-P-19 Development of large area nanostructured silicon-hydrogen alloy material with improved stability for solar cell application by argon dilution method

Arka Dey, Mrinmay Das, Joydeep Datta, Rajkumar Jana (Dept. of Physics, Jadavpur Univ., India), Chandan Banerjee (CEGESS, Indian Institute of Eng. Science and Technology, India), Partha Pratim Ray* (Dept. of Physics, Jadavpur Univ., India)

SiF-P-20 Study on the conversion efficiency of radial junction amorphous silicon solar cells with partially aligned and randomly oriented ZnO nanorods

Arpita Jana*, Sukanta Bose, Gourab Das, Sourav Mandal, Jayasree Roy Sharma, Sukanta Dhar, Sumita Mukhopadhyay, Asok Kumar Barua (Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Eng. Science and Technology (IIEST), India)

SiF-P-21 Synthesis of ITO nanoparticle with Ar plasma in room temperature and its application in flexible thin film solar cell

Gourab Das*, Sourav Mandal, Sukanta Dhar, Sukanta Bose (CEGESS, IIEST, India), P Balaji Bhargav (SSN research center, SSN Institutions, India), Sumita Mukhopadhyay, Chandan Banerjee, Ashok Kumar Barua (CEGESS, IIEST, India)

SiF-P-22 Effect of annealing on indium tin oxide (ITO) thin-film on graphite substrate prepared using e-beam evaporator

Muhammad Fahad Bhopal, Doo Won Lee, Soo Hong Lee* (Green Strategic Energy Research Institute, Dept. of Electronics engineering, Sejong Univ.)

SiF-P-23 The influences of amorphous silicon thickness on aluminum induced crystallization

Doo Won Lee, Muhammad Fahad Bhopal, Soo Hong Lee* (Green Strategic Energy Research Institute, Electronics engineering, Sejong Univ.)

SiF-P-24 Influence of Laser Annealing on Amorphous SiGe Thin Film Deposited by RF Magnetron Co-sputtering Technique for Solar Cell Application

Ahmad Aizan Zulkefle, Maslan Zainon, Zaihasraf Zakaria (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), Nurul Huda Abdul Razak (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), Kamaruzzaman Sopian (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), Nowshad Amin* (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

SiF-P-25 Formation of high-density Si quantum dot structure using amorphous Si layers for heterojunction Si quantum dot solar cell

Ansoon Kim*, Songwoung Hong, Gyea Young Kwak, Seong Hyun Lee, Jong Shik Jang, Kyung Joong Kim* (Division of Industrial Metrology, Korea Research Institute of Science and Standards)

SiF-P-26 Effect of Vanadium Oxide Interfacial Layer for Electrical Contact on P-type Silicon

Gyujin Oh, Eun Kyu Kim* (Dept. of Physics, Hanyang Univ.)

SiF-P-27 Fabrication of n-i-p type amorphous silicon solar cell with high doped - low doped p-type double layer structure

Sangho Kim (Dept. of Energy Science, Sungkyunkwan Univ.), S M Iftiquar*, Jinjoo Park, Duy Phong Pham (College of Information and Communication Eng., Sungkyunkwan Univ.), Chonghoon Shin, Junsin Yi (Dept. of Energy Science, Sungkyunkwan Univ.)

SiF-P-28 Uniform deposition of transparent conductive oxides using position-dependent and pressure-controlled sputtering

Stella Maris Van Eek*, Stefan Hornik, Sascha Kreher (FHR Anlagenbau GmbH, Germany), Xia Yan, Weimin Li, Selvaraj Venkataraj (Solar Energy Research Institute of Singapore, Nat'l Univ. of Singapore, Singapore)

SiF-P-29 Crystalline germanium multilayers formed in hydrogenated amorphous silicon

Hikaru Kaitsu*, Masao Isomura (Course of Electrical and Electric System Eng., Graduate school of Eng., Tokai Univ., Japan)

SiF-P-30 Simulation Studies of Thin-film a-Si:H Solar Cells on ZnO:Al Substrates with Different Textured Interfaces

Xia Yan*, Weimin Li, Armin G. Aberle, Selvaraj Venkataraj* (Solar Energy Research Institute of Singapore (SERIS), NUS, Singapore)

SiF-P-31 Transparent Electrodes for Stretchable and Transparent Solar Window Using ultra-thin Transparent Multilayered Structures

Tae Yoon Kim, Jung Wook Lim*, Da Jung Lee, Sun Jin Yun (Solar Cell Technology Research Laboratory, ETRI), Chan Woo Park, Jae Bon Koo (Wearable device research section, ETRI)

SiF-P-32 Improvement of the performance of p-i-n structure a-Si solar cell by using n-μc-Si:H/ n-a-Si:H bilayer as the n-layer

Sourav Mandal*, Sukanta Dhar, Gourab Das (CEGESS, Indian Institute of Eng. Science and Technology, Shibpur, India), P. Balaji Bhargav (SSN Research Centre, SSN Institution, India), Sumita Mukhopadhyay, A.K. Barua (CEGESS, Indian Institute of Eng. Science and Technology,Shibpur, India)

SiF-P-33 Development of Wider Bandgap n-type a-SiO_x:H and μc-SiO_x:H as Both Doped and Intermediate Reflecting Layer for High Efficiency a-Si:H/a-$Si_{1-x}Ge_x$:H Tandem Solar Cells

Po-Wei Chen*, Pei-Ling Chen, Li-Hung Lai, Shin-Wei Liang, Cheng-Hang Hsu, Chuang-Chuang Tsai (Dept. of Photonics, Nat'l Chiao Tung Univ., Taiwan)

SiF-P-34 Balance the electro-optical and light trapping characteristics of hydrogen doped ZnO with temperature gradient deposition

Junhui Liang, Xiaodan Zhang*, Jieming Liu, Xinliang Chen, Qian Huang, Dekun Zhang, Jian Sun, Ying Zhao (Institute of Photo Electronics thin Film Devices and Technology of Nankai Univ., Key Laboratory of Photoelectronic Thin Film Devices and Technology, China)

SiF-P-35 Poly-crystalline thin-film by aluminum induced crystallization on Aluminum nitride substrate
Muhammad Fahad Bhopal, Doo Won Lee, Soo Hong Lee* (Green Strategic Energy Research Institute, Dept. of Electronics engineering, Sejong Univ.)

SiF-P-36 Effects of O_2 Exposure on the Electrical Properties of Zinc Oxide Thin Films Grown by Atomic Layer Deposition
Jaeseung Jo, Hee Kyeung Hong, JaeYu Cho, Gwang Yeom Song, Jaeyeong Heo* (Dept. of Materials Science and Eng., and Optoelectronics Convergence Research Center, Chonnam Nat'l Univ.)

SiF-P-37 Control of Pulse Sequence for Improved Al doping in Atomic-layer-deposited ZnO Thin Films
Jae Yu Cho, Jaeseung Jo, Gwang Yeom Song, Hee Kyeung Hong, Jeayeong Heo* (Dept. of Materials Science and Eng., and Optoelectronics Convergence Research Center, Chonnam Nat'l Univ., Gwangju 500-757, Republic of Korea, Chonnam Nat'l Univ.)

SiF-P-38 Morphology control of sol-gel $Zn_{1-x}Mg_xO$ transparent conductive layer for improving optical confinement of thin-film solar cells
Lei Meng*, Shinsuke Miyajima (Dept. of Physical Electronics, Graduate School of Science and Eng., Tokyo Institute of Technology, Japan)

OSC-P-01 Plasmonic Effect of Gold Nanoparticles on Light Management in Organic Solar Cells
Se Yun Oh, Jaeyoon Jung, Jae-Hoon Kim, Kang Jea Lee, Hyun Suk Kim, Gil-Sung Kim, Choong Hun Lee* (Solar Cell Research Institute, RIC for Next Generation Industrial Radiation Technology, Division of Microelectronics and Display Technology, Wonkwang Univ.), Quang Trung Tran, Vinh Son Tran, Tran Viet Cuong (Dept. of Solid State Physics, Faculty of Physics, Univ. of Science, Vietnam Nat'l Univ. in Ho Chi Minh City, Vietnam)

OSC-P-02 Cytop encapsulation and stability characterization of organic photovoltaic cells
Jaehoon Kim, Jiyun Song, Hyunho Lee, Seunghyun Rhee, Changhee Lee* (Dept. of Electrical and Computer Eng., Seoul Nat'l Univ.)

OSC-P-03 Interfacial charge behavior analysis of organic solar cells using photoconductive atomic force microscope
Kunsik An, Ik-Su Byun, Jaehoon Kim, Jiyun Song, Myeongjin Park, Hyunho Lee, Seunghyun Rhee, Jaeyeol Kim, Changhee Lee* (Dept. of Electrical and Computer Eng., Seoul Nat'l Univ.)

OSC-P-04 PEG-Functionalized Graphene Quantum Dots for High-Efficiency Organic Solar Cells
Travis Novak*, Jungmo Kim, Sung Ho Song, Gwang Hoon Jung, Seokwoo Jeon (Material Science and Eng., KAIST)

OSC-P-05 Design of organic dyes and cobalt based redox couples for high efficiency dye-sensitized solar cells
Hyo Jeong Jo, Jung Eun Nam, Dae-Hwan Kim, Dae-Kue Hwang, Jin-Kyu Kang* (Convergence Research Center for Solar Energy, DGIST)

OSC-P-06 Systematic Investigation of Non-Ionic Phosphonate Chains onto Isoindigo-Based Polymers Toward Control of Charge Dynamics for Optoelectronic Devices
Shanshan Chen, Gyoungsik Kim, Seyeong Song, Jungho Lee, Taehyo Kim, Tack Ho Lee, Bright Walker, Jin Young Kim*, Changduk Yang* (Dept. of Energy Eng., School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST))

OSC-P-07 Synthesis and Photovoltaic Properties of Indacenodithiophene-Based Polymers with Fluorinated Alkoxyphenyl Side Chain

Shanshan Chen (Dept. of Energy Eng., School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST)), Zhi-Guo Zhang, Yongfang Li* (Beijing Nat'l Laboratory for Molecular Sciences, CAS Key Laboratory of Organic Solids, Institute of Chemistry, Chinese Academy of Sciences, China), Changduk Yang* (Dept. of Energy Eng., School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST))

OSC-P-08 Regioregular Low band gap Terpolymer based on Dithienosilole and Benzodithiophene with Controlled Thienothiophene Orientation for Photovoltaic applications

Hyojung Heo, Honggi Kim, Youngu Lee* (Dept. of Energy Systems Eng., Daegu Gyeongbuk Institute of Science and Technology (DGIST))

OSC-P-09 Tin disulfide nanocrystals: synthesis and apply to hybrid bulk hetero-junction solar cells

Nguyen Tam Nguyen Truong (School of Chemical Eng., Yeungnam Univ), Ha Hai Thi Hoang, Kieu Thanh Trinh, Viet Thanh Hau Pham, Chinho Park* (School of Chemical Eng., Yeungnam Univ.)

OSC-P-10 Ultra-Transparent Polymer/Semi-Transparent Silver Grid Hybrid Electrodes for Small-Molecule Organic Solar Cells

Yong Hyun Kim* (Dept. of Display Eng., Pukyong Nat'l Univ.), Lars Mueller-Meskamp, Karl Leo (Institut für Angewandte Photophysik, Technische Universität Dresden, Germany)

OSC-P-11 New hybrid interfacial layer for performance enhancement in polymer solar cells

Sai-Anand Gopalan, Binrui Xue, Shin-Won Kang* (School of Electronics Eng., Kyungpook Nat'l Univ.)

OSC-P-12 Addition of garphene dope NiO to enhance performance of bulk heterojunction PCPDTBT:PCBM solar cells

Viet Thanh Hau Pham, Chang Duk Kim, Kieu Thanh Trinh, Nguyen Tam Nguyen Truong, Chinho Park* (School of Chemical Eng., Yeungnam Univ.)

OSC-P-13 Enhancement on Photocatalytic and Photovoltaic Properties of Dye-sensitized Solar Cells by S doped TiO_2

Hyunwoong Seo*, Shinji Hashimoto, Sota Tanami, Naho Itagaki, Kazunori Koga, Masaharu Shiratani (Graduate School of Information Science and Electrical Eng., Kyushu Univ., Japan), Sang-Hun Nam, Jin-Hyo Boo (Dept. of Chemistry, Sungkyunkwan Univ.)

OSC-P-14 High-Efficiency Polymer Solar Cell based on Regioregular Low Bandgap Polymer with Controlled Thieno[3,4-b]thiophene Orientation

Honggi Kim, Youngu Lee* (Dept. of Energy Systems Eng., Daegu Gyeongbuk Institute of Science and Technology (DGIST))

OSC-P-15 Side Chain Engineering of Naphthalenediimide-Bithiophene Based n-Type Conjugated Polymers for High Performance All-Polymer Solar Cells

Wonho Lee, Changyeon Lee (Dept. of Chemical and Biomolecular Eng., KAIST), Hojeong Yu, Joon Hak Oh (Dept. of Chemical Eng., POSTECH (POSTECH)), Bumjoon J. Kim* (Dept. of Chemical and Biomolecular Eng., KAIST)

OSC-P-16 Quantifying electromagnetic nanoparticle geometry for solar cell application

Kumarasamy Gunasekar, Kakaraparthi Kranthiraja (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

OSC-P-17 Mixed dimensionality with TiO_2 nanostructure and carbon nanotube for photoelectrode in dye-sensitized solar cells

Tae-Hwan Hwang, Wan-Tae Kim, Won-Youl Choi* (Dept. of Advanced Materials Eng., Gangneung-Wonju Nat'l Univ.)

OSC-P-18 TiO_2-CNT core/shell nanofibers as a photoelectrode for a dye-sensitized solar cell

Yeon-Bin Jeong, Wan-Tae Kim, Won-Youl Choi* (Dept. of Advanced Materials Eng., Gangneung-Wonju Nat'l Univ.)

OSC-P-19 Synthesis and Photovoltaic Properties of New Bulky Side Chain Linked Benzodithiophene Based Conjugated Polymers

Kumarasamy Gunasekar, Kakaraparthi Kranthiraja (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

OSC-P-20 Poly(benzodithiophene) Based Homopolymer for High-Performance Polymer Solar Cells with High Open-Circuit Voltage

Tae Eui Kang, Wonho Lee, Taesu Kim (Dept. of Chemical and Biomolecular Eng., KAIST), Cheng Wang (Advanced Light Source, Lawrence Berkeley Nat'l Laboratory, USA), Seunghyup Yoo (Dept. of Electrical Eng., KAIST), Bumjoon J. Kim* (Dept. of Chemical and Biomolecular Eng., KAIST)

OSC-P-21 Determining the Role of Polymer Molecular Weight for High-Performance All-Polymer Solar Cells: Its Effect on Polymer Aggregation and Phase Separation

Changyeon Lee, Hyunbum Kang (Dept. of Chemical and Biomolecular Eng., KAIST), Mohammad Afsar Uddin, Han Young Woo* (Dept. of Cogno-Mechatronics Eng., PNU), Bumjoon Kim* (Dept. of Chemical and Biomolecular Eng., KAIST)

OSC-P-22 Fluorenylthiophene Linked Benzodithiophene Based Semiconducting Polymers for Organic Solar Cells

Taeik Kim, Chakravathi Nallan (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

OSC-P-23 Highly Efficient All-Polymer Solar Cells: Better Flexible Photovoltaic Devices Than Polymer-Fullerene Ones

Changyeon Lee, Taesu Kim (Dept. of Chemical and Biomolecular Eng., KAIST), Jae-Han Kim, Taek-Soo Kim* (Dept. of Mechanical Eng., KAIST), Bumjoon Kim* (Dept. of Chemical and Biomolecular Eng., KAIST)

OSC-P-24 Synthesis and Photovoltaic Properties of 4,8-Dithienylbenzo[1,2-b:4,5-b']dithiophene Based Donor–Acceptor Polymers with New Polymerization and 2D Conjugation Extension Pathways for Organic Solar Cell Application

Taeik Kim, Chakravathi Nallan (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

OSC-P-25 **Synthesis and characterization of novel semi-crystalline A1-D-A2 polymers with non-covalent interactions for highly efficient polymer solar cells**

Thanh Luan Nquyen, Bomee Jang (Dept. of Nanofusion Eng., Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Hyosung Choi (Center for Polymers and Organic Solids, Univ. of California Santa Barbara (UCSB), USA), Seo-Jin Ko, Taehyo Kim (School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST)), Mohammad Afsar Uddin, Sungu Hwang (Dept. of Nanofusion Eng., Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Jin Young Kim* (School of Energy and Chemical Eng., Ulsan Nat'l Institute of Science and Technology (UNIST)), Alan J. Heeger* (Center for Polymers and Organic Solids, Univ. of California Santa Barbara (UCSB), USA), Han Young Woo* (Dept. of Nanofusion Eng., Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.)

OSC-P-26 **Quinacridone-based donor–acceptor conjugated polymers with a broad absorption in the visible range**

Doohun Kim, Eui jin Lee, Dookyung Moon* (Materials Chemistry and Eng., Konkuk Univ.)

OSC-P-27 **Modification of electron extraction layer in inverted organic photovoltaics by introducing water/alcohol soluble organic materials**

Eui Jin Lee, Doo Hun Kim, Doo Kyung Moon* (Dept. of Materials Chemistry and Eng., Konkuk Univ.)

OSC-P-28 **π-conjugated polymers with different polymeric backbone curvatures and self-assemble behaviors for the application in Photovoltaic cells and Organic field effect transistors**

Yuxiang Li*, Ji-Hyeon Kim (Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Tack Ho Lee, Jin Young Kim (Dept. of Energy Eng., Ulsan Nat'l Institute of Science and Technology (UNIST)), Han Young Woo (Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.)

OSC-P-29 **Novel co-solvent system for efficient organic photovoltaics printed in ambient condition**

Seongyu Lee (School of material science, Gwangju institute of science and technology), Jeamin Kong (Research institute for solar and sustainable energy), Jong-Hoon Lee, Kwanghee Lee* (School of material science, Gwangju institute of science and technology)

OSC-P-30 **p-Type conjugated polyelectrolyte as an anode interlayer for efficient organic solar cells**

Jong-Hoon Lee (School of Materials Science and Eng., GIST), Byoung Hoon Lee (Univ. of California, Santa Barbara, USA), Song Yi Jeong, Sae Byeol Park (Research Institute for Solar and Sustainable Energies, GIST), Seoung Ho Lee (Dept. of Chemistry, Daegu Univ.), Kwanghee lee* (School of Materials Science and Eng., Research Institute for Solar and Sustainable Energies, GIST)

OSC-P-31 **A Highly Efficient Dye-Sensitized Solar Cells Based on Graphene/Nickel Composite Counter Electrode**

Chuangye Ge (applied chemistry, Nanotechnology Research Center & Dept. of Applied Life Science, College of Biomedical and Health Science, Konkuk Univ., Chungju 380-701, Korea), Md. Mahbubur Rahman, Jia Wang, Jae-Joon Lee* (Nanotechnology Research Center & Dept. of Applied Life Science, College of Biomedical and Health Science, Konkuk Univ., Chungju 380-701, Korea)

OSC-P-32 **Electrodeposition of CuS Nanoparticles on Fluorine-Doped Tin Oxide as Counter Electrode for Quantum Dot Sensitized Solar Cells**

Jia Wang (Dept. of Applied Chemistry, Nanotechnology Research Center & Dept. of Applied Chemistry, College of Biomedical and Health Science, Konkuk Univ., Chungju 380-701), Md. Mahbubur Rahman (Dept. of Applied Life Science, Nanotechnology Research Center & Dept. of Applied Life Science, College of Biomedical and Health Science, Konkuk Univ., Chungju 380-701, Korea), Chuangye Ge (Dept. of Applied Chemistry, Nanotechnology Research Center & Dept. of Applied Chemistry, College of Biomedical and Health Science, Konkuk Univ., Chungju 380-701), Jae-Joon Lee* (Dept. of Applied Life Science, Dept. of Applied Life Science, Nanotechnology Research Center & Dept. of Applied Life Science, College of Biomedical and Health Science, Konkuk Univ., Chungju 380-701)

OSC-P-33 **Photon management by nanostructures for improving photoelectric conversion efficiency of dye-sensitized solar cell**

Md Ashraf Hossain (Dept. of Nanofusion Technology, Pusan Nat'l Univ.), Jiun Park (Dept. of Cogno-Mechatronics Eng., Pusan Nat'l Univ.), Yangdo Kim (School of Materials Science and Eng., Pusan Nat'l Univ.), Dongyun Lee* (Dept. of Nanofusion Technology, Pusan Nat'l Univ.)

OSC-P-34 **Alkoxyphenylthiophene Substitued Benzodithiophene and Diketopyrrolopyrrole Based Low-Bandgap Polymers for Polymer Solar Cells**

Sang Ho Park, Kakaraparthi Kranthiraja (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

OSC-P-35 **Synthesis and Photovoltaic Properties of New Donor-Acceptor Polymers Containing with and without fluorine atoms in the conjugated side chain of Benzodithiophene Donor Unit for Organic Solar Cell Application**

Sang Ho Park, Chakravathi Nallan (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

OSC-P-36 **Fabrication of Disk-Shaped TiO_2 Light Scattering Layer via One-Step Calcination Process for Dye-Sensitized Solar cells**

Chang Soo Lee, Jung Yup Lim, Do Hyun Kim, Jong Hak Kim* (Dept. of Chemical and Biomolecular Eng., Yonsei Univ.)

OSC-P-37 **Enhanced Light Harvesting of Dye-Sensitized Solar Cells Using Nanopatterned Pt Counter Electrodes**

Jin Kyu Kim, Dong Jun Kim, Jae Hun Lee, Jong Hak Kim* (Dept. of Chemical and Biomolecular Eng., Yonsei Univ.)

OSC-P-38 **Massive Preparation of Micron-Sized Mesoporous TiO_2 Spheres via Non-hydrothermal Method for Dye-Sensitized Solar Cells**

Chang Soo Lee, Jung Pyo Jung, Cheol Hun Park, Min Su Park, Jong Hak Kim* (Dept. of Chemical and Biomolecular Eng., Yonsei Univ.)

OSC-P-39 Highly Effective CoS Nanoparticles on a Mesoporous SnO_2 Film as a Pt-Free Counter Electrode for Dye-Sensitized Solar Cells
Jin Kyu Kim, Sang Jin Kim, Harim Jeon, Jong Hak Kim* (Dept. of Chemical and Biomolecular Eng., Yonsei Univ.)

OSC-P-40 Effect of thieno[3,2-b]thiophene Conjugated Bridges of Medium Bandgap Conjugated Copolymers for Efficient Tandem Organic Photovoltaic Cells
Ji-Hoon Kim, Do-Hoon Hwang* (Dept. of Chemistry, Pusan Nat'l Univ.)

OSC-P-41 Enhanced and Controllable Open-Circuit Voltage Using 2D-Conjugated Benzodithiophene (BDT) Homopolymers
Ji-Hoon Kim, Do-Hoon Hwang* (Dept. of Chemistry, Pusan Nat'l Univ.)

OSC-P-42 Electrocatalytic $NiCo_2S_4$ counter electrode for quantum dot-sensitized solar cells
Vu Hong Vinh Quy, Kwang-Soon Ahn* (School of Chemical Eng., Yeungnam Univ.)

OSC-P-43 Effect of the thickness of $Cu_{2-x}S$ as a counter electrode on the performance of quantum dot-sensitized solar cells
Vu Hong Vinh Quy, Kwang-Soon Ahn* (School of Chemical Eng., Yeungnam Univ.)

OSC-P-44 Improved photovoltaic performance and long-term stability in plasmonic dye-sensitized solar cells via noncorrosive redox mediator
Minwoo Park, Heesuk Jung, Min Jae Ko* (Photo-Electronic Hybrids Research Center, KIST)

PRV-P-23 Stable semi-transparent $CH_3NH_3PbI_3$ planar sandwich solar cells
Jin Hyuck Heo, Sang Hyuk Im* (Functional Crystallization Center (ERC), Dept. of Chemical Eng., Kyung Hee Univ.)

PRV-P-24 Study on Temperature effect of the Photovoltaic Performance of Planar- Heterojunction Perovskite Solar Cells
Eun-Seon Jeong, Mi-Kyoung Kim, Jae-Wook Kang* (Dept. of flexible and printable electronics, Jeonbuk Nat'l Univ.)

PRV-P-25 Efficient hysteresis-less bi-layer type $CH_3NH_3PbI_3$ perovskite hybrid solar cells
Jin Kyoung Park, Jin Hyuck Heo, Sang Hyuk Im* (Chemical Eng., Kyung Hee Univ.)

PRV-P-26 Paper-based crumpleable $CH_3NH_3PbI_3$ perovskite hybrid solar cells
Hye Ji Han, Jin Hyuck Heo, Sang Hyuk Im* (Chemical Eng., Kyung Hee Univ.)

PRV-P-27 Realization of Nozzle-Jet Printing Technique for Perovskite Solar Cells
Yousheng Wang, Seul-Ki Lee, Won-Yeop Rho, Hwa-Yong Yang, Yoon-Bong Hahn* (School of Semiconductor and Chemical Eng., Chonbuk Nat'l Univ.)

PRV-P-28 Nanopatterning mesoporous TiO_2 thin film as high-transmittance layers in perovskite solar cells
Hwa-Young Yang, Won-Yeop Rho, Yousheng Wang, Seul-Ki Lee, Yoon-Bong Hahn* (School of Semiconductor and Chemical engineering, Chonbuk Nat'l Univ.)

PRV-P-29 TiO_2 composite films with nanoparticles and nanotubes to improve energy conversion efficiency in perovskite solar cells

Won-Yeop Rho, Seul-Ki Lee, Hwa-Young Yang, Tahmineh Mahmoudi, Yoon-Bong Hahn* (School of Semiconductor and Chemical Eng., Chonbuk Nat'l Univ.)

PRV-P-30 Simultaneous Enhancement of Mechanical and Moisture Stability of Perovskite Solar Cells Incorporating Ionic Polymer

Jae Hoon Yun (Photoelectronic Hybrid Research Center, KIST), Inhwa Lee, Taek-Soo Kim (Dept. of Mechanical Eng., KAIST), Hae Jung Son* (Photoelectronic Hybrid Research Center, KIST)

PRV-P-31 19% Efficiency of Formamidinium Lead Iodide Perovskite Solar Cell by Stabilization of Cesium Ion in Trigonal Lattice

Deok-Hwan Kim, Jin-Wook Lee, Hui-Seon Kim, Nam-Gyu Park* (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ. (SKKU))

PRV-P-32 High Efficiency Perovskite Solar Cell via Low-Temperature Processable Colloidal TiO_2

In-Hwey Ho, Jin-Wook Lee, Nam-Gyu Park* (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ. (SKKU))

PRV-P-33 Retarding Photodegradation of Perovskite Absorber for MgO Ultrathin Layer in Mesoscopic Perovskite Solar Cells

Young Un Jin (School of Advanced Materials Science & Eng., Sungkyunkwan Univ.), Gill Sang Han (Dept. of Mechanical Eng. & Materials Science, Univ. of Pittsburgh, USA), Hyun Suk Jung* (School of Advanced Materials Science & Eng., Sungkyunkwan Univ., Suwon 440-746, Republic of Korea, Sungkyunkwan Univ.)

PRV-P-34 Development of flexible planar heterojunction perovskite solar cells by simple bar-coating method

Hobeom Kim, Jin-Woo Byun, Tae-Woo Lee* (Dept. of Materials Science and Eng., POSTECH)

PRV-P-35 The Lewis base and acid adduct influence on organic lead halide perovskite solar cell

Ji-Woon Kweon, Hui-Sun Kim, Nam-Gyu Park* (School of Chemical Eng. and Dept. of Energy Science, Sungkyunkwan Univ.)

PRV-P-36 Formation of $CH_3NH_3PbI_{3-x}Cl_x$ mixed halide perovskite thin-film via single step spin-coating method

Dae Ho Song (Chemical Eng., Kyungh Hee Univ.), Jin Hyuck Heo, Sang Hyuk Im* (Chemical Eng., Kyung Hee Univ.), (,)

PRV-P-37 Synthesis and characterization of perovskite semiconductor $CsSnI_3$ thin films

Rajendra kumar Gunasekaran, A.Dennyson Savariraj (School of Electrical Eng., Laser and Sensor Laboratory,Pusan Nat'l Univ.), Prabakar Kandasamy* (School of Electrical Eng., Laser and Sensor laboratory,Pusan Nat'l Univ.)

PRV-P-38 Efficient hybrid perovskite solar cell using mixed lead halide precursor

Md. Abdul Kuddus Sheikh, Rahim Abdur, Daekyun Jeong (Dept. of Advanced Materials Eng., Kookmin Univ.), Ki-Ha Hong (Dept. of Materials Science and Eng., Hanbat Nat'l Univ.), Bhabani Sankar Swain, Jaegab Lee* (Dept. of Advanced Materials Eng., Kookmin Univ.)

PRV-P-39 Morphology effect on perovskite solar cells by printing process

Yeonkyeong Ju (School of Advanced Materials Science & Eng., Sungkyunkwan Univ.), Jung Tae Park (School of Dept. of Flexible and Printable Electronics, Chonbuk Nat'l Univ.), Hanul Jung (IT Application Research Center, Korea Electronics Technology Institute (KETI)), Hyun Suk Jung* (School of Advanced Materials Science & Eng., Sungkyunkwan Univ.)

PRV-P-40 Efficiency enhancement of perovskite based solar cells via interfacial charge transfer complex in PCBM layer

Jun-Ho Bae, Eun-Soo Choi (Professional Graduate school of Flexible and printable Electronics, Chonbuk Nat'l Univ.), Jin-Mun Yun* (Radiation Research Division for Industry and Environment, Korea Atomic Energy Research Institute(KAERI)), Seok-In Na* (Professional Graduate school of Flexible and printable Electronics, Chonbuk Nat'l Univ.)

PRV-P-41 Improved Electron Interfacial Layer for High Performance Planar Perovskite Solar Cells

You-Hyun Seo (School of Flexible and Printable Electronics, Chonbuk Nat'l Univ.), Jun-Seok Yeo, Dong-Yu Kim (School of Material Science and Eng., GIST), Seok-In Na* (School of Flexible and Printable Electronics, Chonbuk Nat'l Univ.)

PRV-P-42 Efficient Charge Collectable Leaf Vein-Like Silver Grid and Silver Nanowire Composite Electrode for Perovskite Solar Cells

Areum Kim, Zhaoyang Zhong, Hongseuk Lee, Hyeok-Chan Kwon (Dept. of Materials Science and Eng., Yonsei Univ.), Kyoohee Woo (Advanced Manufacturing Systems Research Division, Korea Institute of Machinery and Materials), Jooho Moon* (Dept. of Materials Science and Eng., Yonsei Univ.)

PRV-P-43 1-D Nano-Structuring of Organometal Halide Perovskite Solar Cells using Anodized Aluminum Oxide Scaffold

Hyeok-Chan Kwon, Areum Kim, Hongseuk Lee, Da-Eun Lee, Jooho Moon* (Dept. of Materials Science and Eng., Yonsei Univ.)

PRV-P-44 Influence of Alkali Metal Halide Additive on Highly Covered Uniform Organic-Inorganic Hybrid Perovskite Solar Cells

Hongseuk Lee, Areum Kim, Hyeok-Chan Kwon, Da-Eun Lee, Jooho Moon* (Dept. of Materials Science and Eng., Yonsei Univ.)

PRV-P-45 The tailored inner space of TiO_2 electrodes via a 30 second wet etching process: high efficiency solid-state perovskite solar cells

Jeong Kwon (Chemical Eng., Sungkyunkwan Univ.), Sung June Kim (SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan Univ.), Jong Hyoek Park* (Chemical and Biomolecular Eng., Yonsei Univ.)

PRV-P-46 Novel application of uniform thin film $BaTiO_3$ nanoparticle in the fabrication of efficient perovskite solar cells

Esther Mgbemeje (Energy Eng., Chonbuk Nat'l Univ.), M Shaheer Akhtar* (New and Renewable Energy Research Center, Chonbuk Nat'l Univ.), O-Bong Yang* (Chemical Eng., Chonbuk Nat'l Univ.), Dae Kue Choi* (Advanced Materials, Chonbuk Nat'l Univ.)

NMD-P-01 **Increasing depletion region width in colloidal quantum dot solar cells by doping the metal oxide layer**

Min-Jae Choi, Suncheul Kim, Hunhee Lim, Byung Tae Ahn (Dept. of Materials Science and Eng., KAIST), Jin Young Kim* (Fuel Cell Research Center, KIST), Yeon Sik Jung* (Dept. of Materials Science and Eng., KAIST)

NMD-P-02 **Enhanced light trapping of surface periodic nanocone arrays for high efficiency Si solar cell applications**

Eunah Kim, Yunae Cho, Ahrum Sohn (Dept. of Physics, Ewha Womans Univ.), Hyeong-Ho Park (Patterning Process Dept., Korea Advanced Nano Fab Center), Joondong Kim (Dept. of Electrical Eng., Incheon Nat'l Univ.), Dong-Wook Kim* (Dept. of Physics, Ewha Womans Univ.)

NMD-P-03 **Simple reflectance measurements as wetting state inspection of Si nanopillar arrays: influences of diameter and pitch**

Sujung Kim, Minji Gwon (Dept. of Physics, Ewha Womans Univ.), Jiaqi Li, Xiumei Xu, Chang Chen (IMEC, Belgium), Dong-Wook Kim* (Dept. of Physics, Ewha Womans Univ.)

NMD-P-04 **Binary chalcogenides (Sb_2Se_3) for the photovoltaic applications**

Yong Hun Kwon, Hyun Woo Do, Hyung Koun Cho* (School of Advanced Materials Science and Eng., Sungkyunkwan Univ.)

NMD-P-05 **Efficiency enhancement of solar cell by using light converting plasmonic structure**

Kyu-Tae Lee (Nanophotonics Research Center, KIST), Jong-Hyun Park (Dept. of Chemistry, Korea Univ.), Joon-Suh Park, Shin-Young Jeong, Il-Ki Han* (Nanophotonics Research Center, KIST), Doo-Hyun Ko* (Dept. of Applied Chemistry, Kyung Hee Univ.)

NMD-P-06 **Fabrication of GaP Nanocones by Metal-assisted Chemical Etching for Efficient Solar Energy Conversion**

Jaehoon Kim, Jihun Oh* (Graduate School of Energy, Environment, Water and Sustainability (EEWS), KAIST)

NMD-P-07 **Organic electron blocking layer for improving the photovoltaic performance of colloidal PbS quantum dot solar cells**

Jiyun Song, Jaehoon Kim, Myeongjin Park (Dept. of Electrical and Computer Eng., Inter-Univ. Semiconductor Research Center, Seoul Nat'l Univ.), Byeong Guk Jeong (Dept. of Chemical and Biomolecular Eng., KAIST), Hyunho Lee, Seunghyun Rhee (Dept. of Electrical and Computer Eng., Inter-Univ. Semiconductor Research Center, Seoul Nat'l Univ.), Wan Ki Bae (Photo-Electronic Hybrids Research Center, KIST (KIST)), Changhee Lee* (Dept. of Electrical and Computer Eng., Inter-Univ. Semiconductor Research Center, Seoul Nat'l Univ.)

NMD-P-08 **Non-radiative energy transfer between quantum dots and bulk semiconductor in near proximity**

Joon-Suh Park (Nanophotonics Research Center, KIST), Jihoon Kyhm (Center for Opto-Electronic Materials and Devices, KIST), JoonHyun Kang, Shin-young Jeong, Kyu-Tae Lee (Nanophotonics Research Center, KIST), Jin Dong Song (Center for Opto-Electronic Materials and Devices, KIST), Il Ki Han* (Nanophotonics Research Center, KIST)

NMD-P-09 **Novel PV-structure based on GaAs and semiconductor nitrides**

M. López-López, Y.L. Casallas-Moreno, S. Gallardo-Hernández, A. Piedra (Centro de Investigación y Estudios Avanzados-IPN, Mexico), D. Cardona (Physics, Escuela Superior de Física y Matemáticas-IPN, Mexico), C. A. Hernández-Gutierrez (Centro de Investigación y Estudios Avanzados-IPN, Mexico), G. Santana-Rodríguez (Instituto de Investigación en Materiales-UNAM, Mexico), K. Gutierrez Z-B (Physics, Escuela Superior de Física y Matemáticas-IPN, Mexico), O. de Melo (Facultad de Física, Universidad de La Habana, Mexico), A. M. Salomón-Preciado, L.A. Hernández-Hernández (Physics, Escuela Superior de Física y Matemáticas-IPN, Mexico), L. Zamora (Centro de Investigaciones en Micro-y Nanotecnologías-Universidad Veracruzana, Mexico), R. Mendoza-Pérez (Universidad Autónoma de la Ciudad de México, Mexico), F. de Moure-Flores (Facultad de Química, Universidad Autónoma de Querétaro, Mexico), G. Contreras-Puente* (Physics, Escuela Superior de Física y Matemáticas-IPN, Mexico)

NMD-P-10 **In_2S_3-PbS-ZnS Multilayered Architecture based Quantum dot Sensitized Solar Cell**

Abdul Basit Muhammad, Tae Joo Park* (Dept. of Materials Science & Eng., Hanyang Univ.)

NMD-P-11 **Self-correcting Solar Tacking Driven by Solar Thermal for Compact Solar-Pumped Lasers Combimed with Photovoltaic Cells for Electricity Generation**

Natsumi Hara*, Hidetaka Terazawa, Daiki Kano (Dept. of Materials Science and Eng., Nagoya Univ., Japan), Tadashi Ichikawa (Toyota Central Research and Development Laboratories,Inc., Japan), Hiroshi Ito (Green Mobility Collaborative Research Center, Nagoya Univ., Japan), Kazuo Hasegawa (Toyota Central Research and Development Laboratories,Inc., Japan), Akihisa Ichiki, Tomoyoshi Motohiro (Green Mobility Collaborative Research Center, Nagoya Univ., Japan)

NMD-P-12 **Assessment of Optical Energy Transfer from Compact Solar-Pumped Lasers on a Roof Terrace to Photovoltaic Cells in a Laboratory via 100m Long Optical Fiber**

Hidetaka Terazawa*, Natsumi Hara, Daiki Kano (Dept. of Materials Science and Eng., Nagoya Univ., Japan), Hiroshi Ito (Green Mobility Collaborative Research Center, Nagoya Univ., Japan), Kazuo Hasegawa, Tadashi Ichikawa (Toyota Central Research and Development Laboratories, Inc., Japan), Akihisa Ichiki, Tomoyoshi Motohiro (Green Mobility Collaborative Research Center, Nagoya Univ., Japan)

NMD-P-13 **Photovoltaic Energy Conversion by using Light Guide Plates and Perpendicular Branching of Light Rays from Compact Solar-Pumped Lasers**

Daiki Kano (Dept. of Materials Science and Eng., Nagoya Univ., Japan), Hiroshi Ito (Green Mobility Collaborative Research Center, Nagoya Univ., Japan), Hidetaka Terazawa, Natsumi Hara (Dept. of Materials Science and Eng., Nagoya Univ., Japan), Akihisa Ichiki (Green Mobility Collaborative Research Center, Nagoya Univ., Japan), Kazuo Higuchi, Yasuhiko Takeda (Toyota Central Research and Development Laboratories, Japan), Tomoyoshi Motohiro* (Green Mobility Collaborative Research Center, Nagoya Univ., Japan)

NMD-P-14 **Enhanced field-effect passivation performance of atomic-layer-deposited Al_2O_3 layer for Si nanostructured solar cells using interface S incorporation**

Daewoong Kim (Dept. of Materials Science and Eng., Hanyang Univ.), Jaewon Song, Jung-Ho Lee (Dept. of Chemical Eng., Hanyang Univ.), Tae Joo Park* (Dept. of Materials Science and Eng., Hanyang Univ.)

NMD-P-15 **Atomic layer deposition of Tin monosulfide for thin-film solar cell application**
Hanjin Lee, Daewoong Kim, Tae Joo Park* (Dept. of Materials Science and Eng., Hanyang Univ.)

NMD-P-16 **A double beam wavelength modulation spectroscopy using two lock-in amplifiers**
Xiaoqi Xu*, Henner Kampwerth, Binesh Puthen-Veettil, Martin. A Green (School of Photovoltaics and Renewable Energy Eng., Univ. of New South Wales, Australia)

NMD-P-17 **Efficiency improvement in planar hybrid n-Si/PEDOT:PSS solar cells using ALD-Al_2O_3 interlayer**
Yoon-Ho Nam, Jae-Won Song, Min-Joon Park, Jung-Ho Lee* (Dept. of Chemical Eng., Hanyang Univ.)

NMD-P-18 **Silver nanowire-embedded semiconductor thin films on flexible substrates for flexible transparent electrodes**
Kwanwoo Nam, Sunmin Lee (Research Institute of Solar and Sustainable Energy (RISE), GIST (GIST)), Jaehyung Jang* (Research Institute of Solar and Sustainable Energy (RISE), School of Information and Communications, WCU Dept. of Nanobio Materials and Electronics, GIST (GIST))

NMD-P-19 **Modification of the electrical properties of $BaSi_2$ films by alkali-metal-fluoride treatment**
Kosuke O. Hara* (Center for Crystal Science and Technology, Univ. of Yamanashi, Japan), Weijie Du (Institute of Applied Physics, Univ. of Tsukuba, Japan), Keisuke Arimoto, Junji Yamanaka, Kiyokazu Nakagawa (Center for Crystal Science and Technology, Univ. of Yamanashi, Japan), Kaoru Toko (Institute of Applied Physics, Univ. of Tsukuba, Japan), Takashi Suemasu, Noritaka Usami (Core Research for Evolutional Science and Technology, Japan Science and Technology Agency, Japan)

NMD-P-20 **The Effect of Metal Nanoparticle on the Performance of Hybrid n-Si/PEDOT:PSS Planar Heterojunction Solar Cells**
Sungho Woo*, Wook Hyun Kim (Solar Energy Convergence Research Center, DGIST)

NMD-P-21 **Type-II GaSb/GaAs Quantum Dots on Ge (001) Substrate and their Fundamental Optical Properties**
Zon -, Thanavorn Poempool (Dept. of Electrical Eng., Semiconductor Device Research Laboratory (SDRL), Faculty of Eng., Chulalongkorn Univ., Thailand), Suwit Kiravittaya (Dept. of Electrical and Computer Eng., Faculty of Eng., Naresuan Univ., Thailand), Supachok Thainoi, Songphol Kanjanachuchai, Somchai Ratanathammaphan, Somsak Panyakeow* (Dept. of Electrical Eng., Semiconductor Device Research Laboratory (SDRL), Faculty of Eng., Chulalongkorn Univ., Thailand)

NMD-P-22 **$CuInSe_2$ solar cells fabricated by electrodeposited Cu/In multi-stacked precursors and post-selenization process**
Hyun Woo Do, Yong Hun Kwon (School of Advanced Materials Science and Eng., Sungkyunkwan Univ.), Young Il Park (Photo-electronic Hybrids Research Center, KIST), Hyung Koun Cho* (School of Advanced Materials Science and Eng., Sungkyunkwan Univ.)

NMD-P-23 **Color Tunable Orange-Red Heteroleptic Iridium Complex for Solution Processed Organic Light-Emitting Diodes**
Sudhaker Reddy Saripally (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

GAS-P-06 Fabrication of 22.08% n-on-p GaAs single-junction thin film solar cell on polymer substrate

Sunghyun Moon, Kangho Kim, Youngjo Kim, Junseok Heo*, Jaejin Lee* (Electrical and Computer Eng., Ajou Univ.)

GAS-P-07 Selective growth of GaAs on Patterned Si(001) substrates by using Chemical Beam Epitaxy

Taketo Aihara*, Omar Elleuch, Kazuma Ikeda (Eight Building, Toyota Technological Institute, Japan), Hidetoshi Suzuki (Faculty of Eng., Univ. of Miyazaki, Japan), Yoshio Ohshita, Nobuaki Kojima, Masafumi Yamaguchi (Eight Building, Toyota Technological Institute, Japan)

GAS-P-08 Development of high efficiency silicon based solar cells for concentrated photovoltaic system

Hongjae Lee*, Jonghwan Kim (SND Biz. team, TES Co., Ltd), Sunbo Kim, Vinh Ai Dao, Junsin Yi (Dept. of Energy Science, Sungkyunkwan Univ.), Donhee Lee (SND Biz. team, TES Co., Ltd)

GAS-P-09 Study of Nano-texturing on Crystalline Silicon using Ag Nano Particle for Heterojunction Solar Cell Application

Ho-Jin Yun (Dept. of Electronics Eng., Chungnam Nat'l Univ.), Young-Uk Ko (Samsung Electro-mechanics Co.,Ltd,), Seung-Dong Yang, Hi-Deok Leez (Chungnam Nat'l Univ.), Ga-Won Lee* (Dept. of Electronics Eng., Chungnam Nat'l Univ.)

GAS-P-10 Study of medium concentrated Photovoltaic module system

sungwon kang, sungwon kang* (R&BD Center, BJ POWER)

Nov. 19 (Thu), 14:10~15:10 3F, Convention Hall, BEXCO

Poster C

CIS-P-50 **Cu(In,Ga)Se_2 and $Cu_2ZnSnSe_4$ Solar Cells made from Non-vacuum Spray Pyrolysis**
SeongYeon Kim, JunHo Kim* (Dept. of Physics, Incheon Nat'l Univ.)

CIS-P-51 **Band-gap Tuned $Cu_2Zn(Sn_{1-x}Ge_x)(S,Se)_4$ Nanocrystals Thin Film fabrication for Solution Processed Solar Cell**
Manjeet Singh, Tanka R. Rana, Dhruba B. Khadka, JunHo Kim* (Dept. of Physics, Incheon Nat'l Univ.)

CIS-P-52 **Fabrication of Cu(In,Al)Se_2 solar cells by using solution process**
Prativendra Singh, Tanka R. Rana, SeongYeon Kim, JunHo Kim* (Dept. of Physics, Incheon Nat'l Univ.)

CIS-P-53 **Optimization of submodules process in $Cu_2ZnSn(S,Se)_4$ based solar cells**
changwoo hong (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), In young Kim (school of imformation and communications, Gwangju Institute od Science and Technology), Minhao Wu (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), Jae Ho Yun (Photovoltaic Laboratory, KIER (KIER)), Jong-Ha Moon, Jin Hyoek Kim* (Optoelectronics Convergence Research Center, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.)

CIS-P-54 **Study of annealing effects on tin sulfide thin films**
Tanka R. Rana, SeongYeon Kim, JunHo Kim* (Dept. of Physics, Incheon Nat'l Univ.)

CIS-P-55 **Fabrication of Ge-alloyed CZTSe Thin Film Solar Cells Adopting Solution Approach**
Dhruba B. Khadka, JunHo Kim* (Dept. of Physics, Incheon Nat'l Univ.)

CIS-P-56 **Fabrication of Cu(In,Ga)Se_2 Solar Cells with Thermal Evaporated In_2S_3 Buffer Layers**
SeongYeon Kim, JunHo Kim* (Dept. of Physics, Incheon Nat'l Univ.), JiHye Gwak, JaeHo Yun, KiHwan Kim (Photovoltaic Laboratory, KIER)

CIS-P-57 **Surface and interface analysis of highly transparent sputtered Zn(O,S)/In_2O_3:H window layer stacks for CIGS solar cells**
A. Steigert*, I. Lauermann, M. Ch. Lux-Steiner (Institute for Heterogeneous Material Systems, Helmholtz-Zentrum Berlin, Germany), C. A. Kaufmann (PVcomB, Helmholtz-Zentrum Berlin, Germany), H. Scherg-Kurmes, B. Szyszka (Institute for High-Frequency and Semiconductor System Technologies, TU Berlin, Germany), R. Klenk (Institute for Heterogeneous Material Systems, Helmholtz-Zentrum Berlin, Germany)

CIS-P-58 **Platinum-electrodeposited CIGS/CdS electrodes for photoelectrochemical solar water splitting**
Hyun Yoon (School of Mechanical Eng., Korea Univ.), Dong Chan Lim (Surface Technology Division, Korea Institute of Materials Science), SeJin Ahn (Photovoltaic Laboratory, KIER), Sukgoo Yoon* (School of Mechanical Eng., Korea Univ.)

CIS-P-59 Ultra-thin CIGS solar cells for windows application

Muhammad Saif Ullah, SeJin Ahn, Jihye Gwak, Jae Ho Yun* (Photovoltaic Leboratory, KIER (KIER))

CIS-P-60 Study of Na and K Effect on CIGS Solar Cell

Soomin Song (Photovoltaics Laboratory, KIER), Jung-Jae Park (Mechanical Eng., Korea Univ.), SeungKyu Ahn, Jihye Gwak, Jun-Sik Cho, Keeshik Shin, Jae Ho Yun* (Photovoltaics Laboratory, KIER)

CIS-P-61 Low cost Hybrid Process for CIGS Solar Cell Fabrication Using Cu-based Precursor

Na Kuoung Youn, Soomin song, Se Jin Ahn, Young-Joo Eo, Jihye Gwak, Ara Cho, Kyunghoon Yoon (Photovoltaic Laboratory, KIER(KIER)), Dong Hwan Kim (Dept. of Materials Science and Eng., Korea Univ.), Jae Ho Yun* (Photovoltaic Laboratory, KIER(KIER))

CIS-P-62 Effect of Se flux CGS/ITO back contact in 3-three stage for the application of tandem solar cells

Jang Hun Choi, Jae-Ho yun, Joowan Park, Ki-hwan Kim (Photovoltaic Laboratory, KIER), Seong Ho Kong (Micro & Nano Transducers Lab., Kyungpook Nat'l Univ.), Jin-su Yoo* (Photovoltaic Laboratory, KIER)

CIS-P-63 CdTe thin film solar cells on flexible substrates

Eun Woo Cho*, Younghun Jung (Chemical&Biological engineering, Korea Univ.), Donghwan Kim (Materials Science and engineering, Korea Univ.), Jihyun Kim* (Chemical&Biological engineering, Korea Univ.)

CIS-P-64 Effects of Mo annealing on local surface potential and current near grain boundaries in Cu_2ZnSnS_4 thin-film solar cells

Juran Kim, Gee Yeong Kim, William Jo* (Dept. of Physics, Ewha Womans Univ.), Kee-Jeong Yang, Jun-Hyoung Sim, Jin-Kyu Kang (Daegu Gyeongbuk Institute of Science and Technology)

CIS-P-65 Impurity-Free $Cu(InGa)Se_2$ Thin Film Produced at Room Temperature by Supersonic Kinetic Spray

Jung-Jae Park, Jong-Gun Lee, Do-Yeon Kim (Mechanical Eng., Korea Univ.), Sejin Ahn (Photovoltaic Research Center, KIER), Sam S. Yoon* (Mechanical Eng., Korea Univ.)

CIS-P-66 Influence of Thickness of Cu-Precursor on the Performance of CZTSe Thin Film Solar Cell

Min-Su Kwon, Chan-Wook Jeon* (Chemical Eng., Yeungnam Univ.)

CIS-P-67 Chalcogenide-based solar cells for space application

Jihye Gwak, Jihyun Moon, Seung Kyu Ahn, Kihwan Kim, Hee-eun Song, Kyung-soo Kim, Jae Ho Yun*, Jun-Sik Cho, SeJin Ahn, Kee Shik Shin, Kyung Hoon Yoon (Photovoltaic Laboratory, KIER)

CIS-P-68 Tin sulfide thin film fabrication via co-evaporation processes

Jihye Son, Jihye Gwak*, SeJin Ahn, Jae Ho Yun, Young Joo Eo, Ara Cho, Jun-Sik Cho, Seung Kyu Ahn, Kihwan Kim, Joo Hyung Park, Jin Su You, Kee Shik Shin (Photovoltaic Laboratory, KIER), Kyuseung Han (Dept. of Industrial Chemistry, Chungnam Nat'l Univ.), Kyung Hoon Yoon (Photovoltaic Laboratory, KIER)

CIS-P-69 Comparative Studies of TCO Window Layers Grown by MOCVD and Sputtering for CIGS Thin Film Solar Cells

Sangmok Kim (Chemical engineering, 712-749 Yeongnam Univ., Dae-dong), Jung-hwa Cha (Chemical engineering, 712-749 Yeoungnam Univ.), Sreedevi Gedi, Chan-wook Jeon* (Chemical Eng., 712-749 Yeongnam Univ., Dae-dong)

CIS-P-70 Influence of i-ZnO Layer on the Performance of CIGS-Based Solar Cells Grown From Thermal Evaporation and Two-Step Process

Jung-Hwa Cha, Qian Sun, Chan-Wook Jeon* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-71 Effect of Bath Temperature of CBD Deposited CdS buffer on the Performance of CIGS Solar Cells

Soo-Min Kwon (School of Chemical Eng., Yeung Nam Univ.), Chan-Wook Jeon*, Qian Sun (School of Chemical Eng., Yeungnam Univ.)

CIS-P-72 Systematic Study on the Growth of SnS Films via Two-Step Process

Jeong-yoon Kang, Chan-Wook Jeon* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-73 Effect of Post-Deposition KF Treatment on Efficiency of CIGSe Solar Cells by Three-Stage Evaporation

Qian Sun, Chan-Wook Jeon* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-74 RTP temperature dependence of CZTSSe absorber layer

Soyeon Cho, Dahyun Nam, Soo Yeon Lim (Dept. of Physics, Sogang Univ.), Byoung Soo Ko, Dea-Kue Hwang, Dae-Hwan Kim, Jin-Kyu Kang (Advanced Convergence Technology Center, Daegu Gyeongbuk Institute of Science & Technology), Hyeonsik Cheong* (Dept. of Physics, Sogang Univ.)

CIS-P-75 Growth behavior of CZTS thin films formed by metallic precursor with H2S gas and its solar cell application

Seong Man Yu, Kwang-Su Lim, Ji-Beom Yoo* (SKKU Advanced Institute of Nanotechnology, Sungkyunkwan Univ.)

CIS-P-76 A Study on the Performance of Zn(O,S) Thin Films synthesized by Solution-based CFR Process for CIGS Solar Cells

Ho Young Jun (School of Chemical Eng., Yeungnam Univ.), Chang-Ho Choi, Chih-hung Chang (School of Chemical, Biological & Environmental Eng., Oregon State Univ., USA), Si Ok Ryu* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-77 Na effect for SnS Thin Films and Related Solar Cells

Satoru Aihara, Tsubasa Yokoi, Ishwor Khatri, Mutsumi Sugiyama* (Research Institute for Science and Technology / Faculty of Science & Technology, Tokyo Univ. of Science, Japan)

CIS-P-78 Characteristics of CZTS thin film sputtered from a single target

Minha Kim, Donguk Kim, Jaehyeong Lee* (School of Electronic and Electrical Eng., Sungkyunkwan Univ.)

CIS-P-79 Fabrication of Solution-Processed Wide-Band Gap Chalcopyrite $CuGa(S,Se)_2$ Thin Films and Their Photovoltaic Characteristics

Gi Soon Park, Se Jin Park, Byoung Koun Min* (Clean Energy Research Center, KIST)

CIS-P-80 Effect of reaction temperature and time during 2-step selenization and sulfurization of Se-coated CuGa/In precursors

Jaseok Koo, Soonmo Kwon (School of Chemical Eng., Yeungnam Univ.), Yong-Suk Roh, Seok-Jin Lee, Ki-Young Jung (Dept. of R&D Center, Advanced VAcuum& Clean equipment Optimizer (AVACO)), William N. Shafarman (Institute of Energy Conversion, Univ. of Delaware, USA), Woo Kyoung Kim* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-81 Synthesis of Hierarchical Cu_2ZnSnS_4 (CZTS) Nanocrystals for Photovoltaic Application

Tahmineh Mahmoudi, Seung-hui Soe, Yoon-Bong Hahn* (Semiconductor and Chemical Eng., Chonbuk Nat'l Univ.)

CIS-P-82 Preparation of photovoltaic device quality-$CuInSe_2$ thin films by electrodeposition and rapid thermal annealing

Young-il Park (Graduate School of Energy and Environment, Korea Univ.), Dong-Hwan Kim (Dept. of Material Eng., Korea Univ.), Honggon Kim* (Nat'l Agenda Research Division, KIST)

CIS-P-83 Influence of Experimental Parameters on Synthesis of $CuIn_{1-x}Ga_xSe_2$ thin films under a modified sprayprocess

MINGYANG ZHU, Ho Young Jun, Tae Hoon Kang, Do Hee Park, Si OK Ryu* (School of Chemical Eng., Yeungnam Univ.)

CIS-P-84 A Study of CdS on CIGS Solar Cells

Ara Cho*, Sol Lee, SeJin Ahn, Jae Ho Yun, Jihye Gwak, Seung Hyu Ahn, Young-Joo Eo, Jun Sik Cho, Ju Hyung Park, Jin Su Yu, Kihwan Kim, Keeshik Shin, Kyunghoon Yoon (KIER)

CIS-P-85 The properties of Cl-doped zinc oxides prepared by electrodeposition

Ming-Jer Jeng* (Dept. of Electronic Eng., Chang Gung Univ., Taiwan), Rui Fu (Institute of Photoelectronic Thin Film Devices and Technology and Tianjin Key Laboratory of Thin film Devices and Technology, NanKai Univ., China), Jianping Ao, Jinlian Bi, Liyong Yao, Shoushuai Gao, Guozhong Sun, Yun Sun (Institute of Photoelectronic Thin Film Devices and Technology and Tianjin Key Laboratory of Thin film Devices and Technology, Nankai Univ., China), Liann-Be Chang (Dept. of Electronic Eng. and Green Technology Research Center, Chang Gung Univ., Taiwan)

CIS-P-86 Fabrication of $Cu_2Zn(Ge,Sn)(S,Se)_4$ solar cells by slit coating and sintering process

Chiyuan Zhao*, Katsumasa Nakamura, Kensuke Tsuji, Tsuyoshi Maeda, Mikihiko Nishitani, Takahiro Wada (Dept. of Materials Chemistry, Ryukoku Univ., Japan)

CIS-P-87 $CuSbS_2$: a p-type Absorber for Photovoltaic Solar Cells

Ara Cho*, SeJin Ahn, Shahara Banu, Jihye Gwak, Seung Kyu Ahn (KIER)

CIS-P-88 Effects of Mo back contact aging on CIGS thin film growth and its photovoltaic conversion efficiency

Ahrum Jeong, Yu-Seung Son* (Photoelectronic hybrid research center, Korea institute of science and technology), Won Mok Kim*, Jong-Keuk Park* (Electronic materials research center, Korea institute of science and technology), Jeung-hyun Jeong* (Photoelectronic hybrid research center, Korea institute of science and technology)

CIS-P-89 Low-temperature growth of $Cu(In,Ga)Se_2$ thin film on the back contact employing Na-contained Mo (Mo:Na)

Yu-seung Son (Photoelectronic Hybrid Research Center, KIST), Won Mok Kim*, Jong-Keuk Park* (Electronic Materials Research Center, KIST), Donghwan Kim* (Advanced Materials Eng., Korea Univ.), Jeung-hyun Jeong* (Photoelectronic Hybrid Research Center, KIST)

CIS-P-90 **Low-temperature synthesis of high-quality CIGS thin films using CuGa/InSe stacked precursor**

Seonhong Mun, Gwangsun Jung (MSE, KAIST), Jinhyeong Ahn, Jungwoo Park (Hyundai ind.), ByungTae Ahn* (MSE, KAIST)

CIS-P-91 **Preparation of SnS thin films by co-evaporation for solar cell application**

Aimi Yago (Dept. of Materials Eng., Nat'l Institute of Technology, Nagaoka College, Japan), Ayaka Kanai (Materials Eng. Advanced Course, Nat'l Institute of Technology, Nagaoka College, Japan), Yoji Akaki (Dept. of Electrical and Computer Eng., Nat'l Institute of Technology, Miyakonojo College, Japan), Shigeyuki Nakamura (Dept. of Electrical and Electronic Eng., Nat'l Institute of Technology, Tsuyama College, Japan), Hironori Katagiri (Dept. of Electrical and Electronic Systems Eng., Nat'l Institute of Technology, Nagaoka College, Japan), Hideaki Araki* (Dept. of Materials Eng., Nat'l Institute of Technology, Nagaoka College, Japan)

CIS-P-92 **Influence of Zn metal or sulfide target deposited by sputtering system in CZTS thin film solar cell**

Kwang Soo Lim, Seong Man Yu, Arun Khalkar (SKKU advanced Institute of Nanotechnology, Sungkyunkwan Univ.), Tea Sik Oh (Dept. of Information Display, Sunmun Univ.), Junggyu Nam (PV Development Team, SAMSUNG SDI), Dong Wook Shin*, Ji Beom Yoo* (SKKU advanced Institute of Nanotechnology, Sungkyunkwan Univ.)

CIS-P-93 **Influence of Sulphurization Process on the Structural and Optoelectronic Properties of RF-Sputtered Cu_2ZnSnS_4 Thin Films**

P. Chelvanathan, Z. Zakaria (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), Y. Yusoff (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia), M. Akhtaruzzaman (Solar Energy Research Institute, The Nat'l Univ. of Malaysia, Malaysia), N Amin* (Dept. of Electrical, Electronic and Systems Eng., Faculty of Eng. and Built Environment, The Nat'l Univ. of Malaysia, Malaysia)

CIS-P-94 **Optimization for the growth of SnS absorber formed by the rapid-thermal process of sputtered Sn layer with elemental Sulfur**

Tingjian Huang, Jihyun Shim, Jeha Kim* (Energy Conversion Eng., Cheongju Univ.)

CIS-P-95 **Fabrication of $Cu_2(Sn_{1-x}Ge_x)S_3$ solar cells using a method involving co-evaporation and annealing in the presence of germanium sulfide and sulfur**

Ayaka Kanai (Materials Eng. Advanced Course, Nat'l Institute of Technology, Nagaoka College, Japan), Aimi Yago (Dept. of Materials Eng., Nat'l Institute of Technology, Nagaoka College, Japan), Yoji Akaki (Electrical and Computer Eng., Nat'l Institute of Technology, Miyakonojo College, Japan), Shigeyuki Nakamura (Dept. of Electrical and Electronic Eng., Nat'l Institute of Technology, Tsuyama College, Japan), Toshiyuki Yamaguchi (Dept. of Electrical and Computer Eng., Nat'l Institute of Technology, Wakayama College, Japan), Hironori Katagiri (Dept. of Electrical and Electronic Systems Eng., Nat'l Institute of Technology, Nagaoka College, Japan), Hideaki Araki* (Dept. of Materials Eng., Nat'l Institute of Technology, Nagaoka College, Japan)

CIS-P-96 **Preparation of Cu_2GeS_3 thin films by annealing of Cu-based precursors with GeS2 and S for solar cells**

Hideaki Araki* (Dept. of Materials Eng., Nat'l Institute of Technology, Nagaoka College, Japan), Ayaka Kanai (Materials Eng. Advanced Course, Nat'l Institute of Technology, Nagaoka College, Japan), Aimi Yago (Dept. of Materials Eng., Nat'l Institute of Technology, Nagaoka College, Japan), Hironori Katagiri (Dept. of Electrical and Electronic Systems Eng., Nat'l Institute of Technology, Nagaoka College, Japan)

CIS-P-97 **Effects of H_2S annealing for Cu-Sn precursor thin films**

Yoji Akaki*, Yuji Miyata (Nat'l Institute of Technology, Miyakonojo College, Japan), Shigeyuki Nakamura (Nat'l Institute of Technology, Tsuyama College, Japan), Hideaki Araki (Nat'l Institute of Technology, Nagaoka College, Japan), Toshiyuki Yamaguchi (Nat'l Institute of Technology, Wakayama College, Japan)

CIS-P-98 **Numerical simulations of thin $Cu(In,Ga)Se_2$ solar cells for efficiency enhancement**

Xue Zheng, Weimin Li, Xia Yan, Wei-Lun Xu, Armin Aberle, Selvaraj Venkataraj* (Solar Energy Research Institute of Singapore, Nat'l Univ. of Singapore, Singapore)

CIS-P-99 **Growth and transport properties of CZTSSe single crystal**

Akira Nagaoka (Dept. of Materials Science and Eng., Univ. of Utah, USA), Mike Scarpulla (Dept. of Materials Science and Eng.,, Univ. of Utah, USA), Yoshitaro Nose (Dept. of Materials Science and Eng., Kyoto Univ., Japan), Kenji Yoshino* (Dept. of Applied Physics and Electronic Eng., Univ. of Miyazaki, Japan)

CIS-P-100 **Influence of Ga Contents on the Structural, Optical and Electrical Properties in CIGS Thin film**

Sang Hyeop Lee, Jun Chul Shin, Sung Hee Cho, Chan Moon Song, Donggun Lim* (IT Convergence, Korea Nat'l Univ. of Transportation)

OSC-P-45 **Characterization of inverted-type organic solar cell with Europium doped zinc oxide as an electron transport layer**

Reza Javadi (College of Information and Communication Eng., Sungkyunkwan Univ.), Jae-Hee cho (College of Information and Communication Eng., sungkyunkwan Univ.), Byoung Deog Choi* (College of Information and Communication Eng., sungkyunkwan Univ.)

OSC-P-46 **Completely TCO-free and Flexible Dye sensitized solar cells fabricated on Plastic substrates**

Kicheon Yoo, Jae-Yup Kim, Inyoung Jeong, Min Jae Ko* (Photo-Electronic Hybrids Research Center, KIST)

OSC-P-47 **Efficiency enhancement in polymer solar cell using simply diluted vanadium oxide composite as a hole transport layer**

Insoo Shin, Hoyoen Choi (Physics, Pukyong Nat'l Univ.), Vellaiappillai Tamilavan, Myung Ho Hyun (Chemistry, Pusan Nat'l Univ.), Sung Heum Park* (Physics, Pukyong Nat'l Univ.)

OSC-P-48 **Properties of polymer solar cells using new electron rich dithienosilole-based conjugated polymers**

Jihoon Lee (Dept. of Physics, Pukyong Nat'l Univ.), Vellaiappillai Tamilavan, Rajalingam Agneeswari (Dept. of Chemistry, Pusan Nat'l Univ.), Dal Yong Lee (Dept. of Physics, Pukyong Nat'l Univ.), Shinuk Cho (Dept. of Physics, Univ. of Ulsan), Youngeup Jin (Dept. of Industrial Chemistry, Pukyong Nat'l Univ.), Myung Ho Hyun (Dept. of Chemistry, Pusan Nat'l Univ.), Sung Heum Park* (Dept. of Physics, Pukyong Nat'l Univ.)

OSC-P-49 **Adhesion Improvement of PEDOT:PSS Hole Transport Layer for All-Printed Polymer Solar Cells**
Minjin Yi, Jae-Ryoung Kim* (Research Institute for Solar and Sustainable Energies, GIST), Soonil Hong (School of Materials Science and Eng., GIST), Hongkyu Kang, Jaemin Kong, Woontae Lee, Kwanghee Lee* (Research Institute for Solar and Sustainable Energies, GIST)

OSC-P-50 **Effects of the Al_2O_3/plasma polymerized ethylenediamine/Al_2O_3 multilayer encapsulation on the characteristics of organic photovoltaic cells**
WonJin Ban, Jaewon Lee, Sungruel Kwon, Jaehyun Nam, Yeji Lee, Donggeun Jung* (Dept. of Physics, Sungkyunkwan Univ.)

OSC-P-51 **Ytterbium doped zinc oxide as an electron transport layer in inverted organic solar cell**
Mina Rastegaralam, Hyunho Lee, Jiyun Song, Ashis Kumar Sarker, Jongseok Han, Heebeom Roh, Changhee Lee* (Electrical engineering, Seoul national Univ.)

OSC-P-52 **Facile Sintering of TiO_2 Photoelectrodes using Intense Pulsed White Light(IPWL) for Flexible Dye-Sensitized Solar Cells**
Hansol Jeong, Yun-Hee Park (Photo-electronic Hybrids Research Center, KIST), Jung Ah Lim (Interface Control Research Center, KIST), Min Jae Ko* (Photo-electronic Hybrids Research Center, KIST)

OSC-P-53 **A strategy for dye adsorption of dye-sensitized solar cell fabrication**
Yun-Hee Park, Hansol Jeong, Hwa-Young Jin, Min Jae Ko* (Photo-electronic Hybrids Research Center, KIST)

OSC-P-54 **Improvement of Interfacial Properties of Electron Accepting Layers for Colloidal Quantum Dot Photovoltaic Devices by Thiol Treatment**
Randi Azmi, Havid Aqoma, Dwi Fortuna Anjusa Putra, Zico Alaia Akbar, Sung-Yeon Jang* (Chemistry, Kookmin Univ.)

OSC-P-55 **Effects of Dynamic 3D-Volume of Side chains in Conjugated Polymers on Nano-scale Morphology and Solar Cell properties**
Sungmin Park (Photoelectronic Hybrid Research Center, KIST), Dongkyun Seo, Kyungwon Kwak (Dept. of Chemistry, Chung-Ang Univ.), Dae Sung Chung (School of Chemical Eng. and Material Science, Chung-Ang Univ.), Cheol Hong Cheon (Dept. of Chemistry, Korea Univ.), BongSoo Kim, Hae Jung Son* (Photoelectronic Hybrid Research Center, KIST)

OSC-P-56 **Cathode Buffer Layers for Thin-Film Photovoltaic Cells**
Zhi-Guo Zhang*, Yongfang Li (Institute of Chemistry, Chinses Academy of Sciences, China)

OSC-P-57 **Possibility to use hydrothermally synthesized $CuFeS_2$ nanocomposite as an acceptor in hybrid solar cell**
Arka Dey, Animesh Layek, Mrinmay Das, Joydeep Datta, Rajkumar Jana (Dept. of Physics, Jadavpur Univ., India), Chandan Banerjee (CEGESS, Indian Institute of Eng. Science and Technology, India), Partha Pratim Ray* (Dept. of Physics, Jadavpur Univ., India)

OSC-P-58 **Conjugated polymer incorporating fullerene compatible side-chains for efficient organic solar cells fabricated with non-halogenated solvents**
Yujeong Kim, Nara Shin, Sungmin Park, Jea Woong Jo, Hae Jung Son* (Photoelectronic Hybrid Research Center, KIST)

OSC-P-59 Hybrid Solar Cells with Polymeric Bulk Heterojunction Layers Containing Inorganic Nanoparticles
Eunjoo Kwak, Jooyeok Seo, Jaehoon Jeong, Hwajeong Kim, Youngkyoo Kim* (Organic Nanoelectronics Laboratory, Dept. of Chemical Eng., Kyungpook Nat'l Univ.)

OSC-P-60 Metal Oxide/PEDOT:PSS Composite Film as Counter Electrodes of Platinum Free Dye-Sensitized Solar Cells
SANG-HUN NAM, KI-HWAN HWANG (Institute of Basic Science, Sungkyunkwan Univ.), YONG-MIN LEE, DONG IN KIM (Dept. of Chemistry, Sungkyunkwan Univ.), HYUNWOONG SEO, MASAHARU SHIRATANI (Graduate School of Information Science and Electrical Eng., Kyushu Univ., Japan), JIN-HYO BOO* (Institute of Basic Science, Sungkyunkwan Univ.)

OSC-P-61 A Novel Electron Transport Interlayer for a Highly Charge Transportable Organic Solar Cell
Hong Il Kim, Junwoo Lee, Taiho Park* (Dept. of Chemical Eng., POSTECH)

OSC-P-62 Morphology Control of Active layer In Polymer Solar Cell via Benzene-Fullerene Interaction
Michael Ruby Raj, Hong Il Kim, Junwoo Lee, Taiho Park* (Dept. of Chemical Eng., POSTECH)

OSC-P-63 Enhanced PCE of Dye-sensitized solar cells Assisted with phosphor materials
Yong-Min Lee, Hyun Ji Choi, Yulhee Lee, Dong In Kim, Jung-Hoon Yu, Hyeon Jin Seo, Ki-Hwan Hwang (Chemistry, Sungkyunkwan Univ.), Sang Hun Nam (Institute of Basic Science, Sungkyunkwan Univ.), Jin-Hyo Boo* (Chemistry, Sungkyunkwan Univ.)

OSC-P-64 Fabrication of Tandem Organic solar cells by Lamination with a Sticky Hole Transport layer
Hsin-Chang Tsai, Chie Gau* (Institute of Aeronautics and Astronautics/Research Center for Energy Technology and Strategy, Nat'l Cheng Kung Univ., Taiwan)

OSC-P-65 Enhamced Performance of Conjugate polymer solar cells with a Better Electron Trandport Layerof PZO
Shen-Wen Tsai, Chie Gau* (Institute of Aeronautics and Astronautics/Research Center for Energy Technology and Strategy,, Nat'l Cheng Kung Univ., Taiwan)

OSC-P-66 Polymer Solar Cells with Ternary Bulk Heterojunction Layers Reinforced with Electron-Accepting Organic Components
Hyemi Han, Jooyeok Seo, Jaehoon Jeong, Hwajeong Kim, Youngkyoo Kim* (Dept. of Chemical Eng., School of Applied Chemical Eng., Kyungpook Nat'l Univ.)

OSC-P-67 High Efficiency Polymer Solar Cells with Bulk Heterojunction Nanolayers Patterned by Employing Metal Micro-Mold Technology
Sooyong Lee, Jaehoon Jeong, Jooyeok Seo, Hwajeong Kim, Youngkyoo Kim* (School of Applied Chemical Eng., Kyungpook Nat'l Univ.)

OSC-P-68 High Efficiency Inverted Polymer Solar Cells Using Binary n-Type Fullerenes
Havid Aqoma, Wisnu Tantyo Hadmojo, Sung-Yeon Jang* (Chemistry, Kookmin Univ.)

OSC-P-69 Influence of Device Treatment on the Performance and Stability of High Efficiency Polymer Solar Cells
Jaehoon Jeong, Jooyeok Seo, Hwajeong Kim, Youngkyoo Kim* (School of Applied Chemical Eng., Kyungpook Nat'l Univ.)

OSC-P-70 Novel ultra-thin silver electrodes for organic electronics

Soyeong Jeong, Suhyun Jung, Hongkyu Kang, Kwanghee Lee* (Gwangju Institute of Scienece and Technology)

OSC-P-71 Photovoltaic Performance of Graphene-Silver Nanoparticle Hybrids Prepared Using Microwave-Assisted Green Synthesis Process

Tahmineh Mahmoudi, Seung-hui Seo, Hwa-yang Yang, Won-yep Rho, Yoon Bong Hahn* (School of Semiconductor and Chemical Eng., Chonbuk Nat'l Univ.)

OSC-P-72 The Effect of Concentration of Pyrene Units on Self-Assembly in Benzo[1,2-b:4,5-b′]-Dithiophene based Random Copolymers for Organic Solar Cells

Minjun Kim (Dept. of Chemical Eng., POSTECH), Won Suk Shin, Jong-Cheol Lee, Sang Kyu Lee* (Energy Materials Research Center, KRICT), Taiho Park* (Dept. of Chemical Eng., POSTECH)

OSC-P-73 Effect of Different Ethylene Glycol Oligomer lengths Facilitating Ion-Chelating in Thiophene-Based Monomers on in Situ Photoelectrochemical Polymerization and Photovoltaic Performances for Iodine-free Dye-Sensitized Solar Cells

Minjun Kim, Taiho Park* (Dept. of Chemical Eng., POSTECH)

OSC-P-74 Fabrication of Semi-transparent and Highly Flexible Fibrous Electrodes for Inverted Organic Solar Cells Application

Won-Yong Jin, Jae-Wook Kang* (Graduate School of Flexible and Printable Electronics, Chonbuk national Univ.)

OSC-P-75 Solution-Processed PEIE layer in ZnO-nanoridges as Electron transporting layer for High Performance Inverted Type Organic Solar Cells

Riski Titian Ginting, Won-Yong Jin, Jae-Wook Kang* (Graduate School of Flexible and Printable Electronics, Chonbuk Nat'l Univ.)

OSC-P-76 A Simplified Tandem Architecture for Printable Orgainc Solar Cells Using an Ideal Self-Organized Recombination Layer

Hongkyu Kang, Seyoung Kee, Kilho Yu, Jinho Lee, Geunjin Kim, Junghwan Kim, Jae-Ryoung Kim, Jaemin Kong, Ahryun Kim, Dasol Lee, Kwanghee Lee* (GIST (GIST))

OSC-P-77 Conductive PEDOT:PSS Nanofibrils Induced by Solution-Processed Crystallization and Application for a Transparent Electrode

Seyoung Kee, Nara Kim (School of Materials Science and Eng., School of Materials Science and Eng.), Seoung Ho Lee (Heeger Center for Advanced Materials & Research Institute for Solar and Sustainable Energies, Heeger Center for Advanced Materials & Research Institute for Solar and Sustainable Energies), Kwanghee Lee* (School of Materials Science and Eng., School of Materials Science and Eng.)

OSC-P-78 Determination of electron diffusion length by stepped light induced transient measurement in DSSCs

Bo Youn Jang, Ho Phuong, Rajesh Cheruku, Kwang-Soon Ahn, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-79 Design and synthesis of carbazole-based mono and dibranched organic dyes for p-type DSSCs
Bo Youn Jang, Yong Hui Lee, Rajesh Cheruku, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-80 TiO_2 photoelectrode using UV-irradiation at low temperature treatment for flexible DSSCs
Bo Youn Jang, Ji Seon Kim, Se Hyun Kim, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-81 Effect of surfactant on the photovoltaic performance of DSSC utilizing polypyrrole and polypyrrole with multiwall carbon nanotube-based counter electrode
Noh Eul Jung, Chau Thi Thanh Thuy, Suresh Thogiti, Seung Woo Lee, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-82 W-doped TiO_2 photoelectrode : Effect on charge collection efficiency in DSSCs
Noh Eul Jung, Eun Jeong Kim (Chemical Eng., Yeungnam Univ.), Do Kyung Lee (Advanced Energy Material Science and Eng., Catholic Univ. of Daegu), Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-83 Synthesis and characterization of carbazole-based organic sensitizers for dye-sensitized solar cells
Jung Min Cho, Chang Hee Son, Suresh Thogiti, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-84 Pt-coated ZnO nanostructures for dye-sensitized solar cells as catalytic counter electrode
Jung Min Cho, Quoc Bao Le, Rajesh Cheruku, Kwang-Soon Ahn, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-85 Iodine based quasi-solid state electrolyte : Effect of temperature on the performance of DSSC
Yong Hui Lee, Dong Woo Kim, Suresh Thogiti, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-86 Phenothiazine-based of multichromophoric organic dyes for dye-sensitized solar cell application
Yong Hui Lee, Sang Min Beak, Suresh Thogiti, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-87 Ullazine and Julolidine chromophore contained novel organic sensitizers for the application of Dye-sensitized solar cells
Yong Hui Lee, Le Quoc Bao, Su Hyang Jeon, Jae Hong Kim* (Chemical Eng., Yeungnam Univ.)

OSC-P-88 Zn(II)-porphyrin Sensitizers Exceeding the World Champion Dyes for High Efficiency Dye-Sensitized Solar Cells
Sung Ho Kang, Hwan Kyu Kim* (Dept. of Advanced Materials Chemistry, Korea Univ.)

OSC-P-89 Alkylated Thieno[3,2-*b*]indole Derivatives as a p-Bridge Unit in D-p-A Organic Sensitizers for Dye-Sensitized Solar Cells
Yu Kyung Eom, Hwan Kyu Kim* (Global GET-Future Lab. and Dept. of Advanced Materials Chemistry, Korea Univ.)

OSC-P-90 Performance enhancement of polymer solar cells using Iridium Oxide (IrO_x) as Hole Transport Layer (HTL)
Rina Pandey (Materials and Life Science Division/ Dept. of Nanomaterials Science and Eng., KIST (KIST)/ Korea Univ. of Science and Technology (KUST)), Jung Hyuk Kim (Materials and Life Science Division, KIST (KIST)), Do Kyung Hwang (Post Silicon Semiconductor Institute, KIST (KIST)), Won Kook Choi* (Materials and Life Science Division, KIST (KIST))

OSC-P-91 **Highly transparent and conducting hybrid AgNW/ZnO electrode for versatile photovoltaic applications**

Myungkwan Song* (Advanced Functional Thin Films, Korea Institute of Materials Science)

OSC-P-92 **Investigations on Quantum dot sensitized solar cell through assembly of TiO_2 based CdS and CdSe photoanode**

Sachin A. Pawar, Ju-Yeon Lee (Photonic and Electronic Thin Film Laboraotry, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.), Pramod S. Patil (Thin Film Materials Laboratory, Dept. of Physics, Shivaji Univ., India), Jin-Hyeok Kim* (Photonic and Electronic Thin Film Laboraotry, Dept. of Materials Science and Eng., Chonnam Nat'l Univ.)

NMD-P-24 **Highly Efficient Non-doped Deep-Blue Fluorescent Organic Light-Emitting Diodes Based on Bipolar Transport Moieties**

Sudhaker Reddy Saripally (Graduate Dept. of Chemical Materilas, Pusan Nat'l Univ.), Sung-Ho Jin* (Dept. of Chemistry Education, Pusan Nat'l Univ.)

NMD-P-25 **Enhanced photocurrent of Porous Cuprous Oxide by Polystyrene Template Assisted Electrochemical synthesis**

Sanghwa Yoon (Materials Eng., Hanyang Univ.), Jaehong Lim (Materials Processing Division, Korea Institute of Materials Science), Bongyoung Yoo* (Materials Eng., Hanyang Univ.)

NMD-P-26 **Degradation mechanism of Al_2O_3 passivation in nanostructured Si solar cells**

Jae-Won Song, Jin-Young Jung, Han-Don Um (Materials and Chemical Eng., Hanyang Univ.), Xiaopeng Li (Mechanics of Materials IWM, Fraunhofer Institute, Germany), Minjoon Park, Yoon-Ho Nam, Sun-Mi Shin, Tae-Joo Park (Materials and Chemical Eng., Hanyang Univ.), Ralf Boris Wehrspohn (Mechanics of Materials IWM, Fraunhofer Institute, Germany), Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-27 **Hydroxyl functionalization improves the surface passivation of nanostructured silicon solar cells degraded by epitaxial regrowth**

Jae-Won Song, Yoon-Ho Nam, Min-Joon Park, Sun-Mi Shin (Materials and Chemical Eng., Hanyang Univ.), Ralf Boris Wehrspohn (Mechanics of Materials IWM, Fraunhofer Institute, Germany), Junh-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-28 **12.7% efficient 50-μm-thick crystalline silicon solar cells using back-side nanostructures passivated by ultrathin zinc oxide layer**

Jae-Won Song, Yoon-Ho Nam, Min-Joon Park, Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-29 **Enhanced photoelectrochemical water splitting performance of silicon with Al_2O_3 passivation layer**

Min-Joon Park, Jin-Young Jung, Jae-Won Song, Yoon-Ho Nam, Dong-Hyung Kim, Jin-Young Yu, Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-30 Photoelectrochemical oxygen evolution improved by a thin Al_2O_3 interlayer in a NiO_x/n-Si photoanode

Min-Joon Park, Jin-Young Jung, Jae-Won Song, Yoon-Ho Nam, Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-31 Photocatalytic water splitting using metal-free CNS:S-Se-Gr hybrid catalyst under visible light

S.S. Shinde, A Sami, Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-32 Toward Design of Synergistically Active Carbon-Based Catalysts for Electrocatalytic Hydrogen Evolution

S.S. Shinde (Materials and Chemical Eng., Hanyang Univ.), A Sami (Hanyang Univ.), Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-33 Electrocatalytic HER performance of graphitic carbon nitride coupled with nitrogen and phosphorous doped graphene

S.S. Shinde, A Sami, Jung-Ho Lee* (Hanayang Univ.)

NMD-P-34 A direct thermal oxidation method for TiO_2 thin film used in photoelectrochemical cell

Zhenfeng Zan, Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-35 Photoelectrochemical water splitting improved by a $TiSi_2$/Si heterjunction photocatlyst

Zhenfeng Zan, Jung-Ho Lee* (Materials and Chemical Eng., Hanyang Univ.)

NMD-P-36 Efficiency enhancement of hybrid solar cells based on planar, pyramidal and pyramidal nanostructured silicon with PEDOT:PSS by utilizing UVO treatments

Abdul Sami Rajput (Dept. of Materials and Chemical Eng., Hanyang Univ.), Sun-Mi Shin (Materials Science and Eng. Program, Univ. of California, USA), Sambhaji Shinde, Yoon-Ho Nam, Myung Hyun Kim, Hasan Hafeez, Jung-Ho Lee* (Dept. of Materials and Chemical Eng., Hanyang Univ.)

NMD-P-37 Tapered silicon nanohole based photocathode for photoelectrochemical hydrogen evolution reaction

Jin-Young Jung, Min-Joon Park, Jung-Ho Lee* (Dept.s of Materials and Chemical Eng., Hanyang Univ.)

NMD-P-38 A 20-um-thin Silicon photocathode for photoelectrochemical water splitting

Jin-Young Jung, Min-Joon Park, Jung-Ho Lee* (Dept.s of Materials and Chemical Eng., Hanyang Univ.)

NMD-P-39 HfO_x/SiO_x stack layer passivated Si photocathode for water splitting reaction

Jin-Young Jung (Dept.s of Materials and Chemical Eng., Hanyang Univ.), Jung-Ho Lee* (Dept.s of Materials and Chemical Eng., 55 Hanyangdaehak-ro, Sangnok-gu, Ansan, Kyeonggi-do 426-791)

NMD-P-40 Improved carrier recombination in multi-scale (hierarchical) structured silicon solar cell

Myung-Hyun Kim, Jae-Won Song, Yoon-Ho Nam, Dong-Hyung Kim, Jung-Ho Lee* (Dept. of Materials and Chemical Eng., Hanyang Univ.)

NMD-P-41 Fabrication of SnS/SnS_2 heterogeneous composite films for their photoelectrochemical applications

Dong Hyung Kim, S.S Shinde, Jin Young Jung, Min Jun Park, Jae Won Song, Yoon Hp Nam, Myung Hyun Kim, Jung Ho Lee* (Dept. of Chemical Eng., Hanyang Univ.)

NMD-P-42 **Optoelectrical device properties of polyimide having spiropyran group as a side chain**

Woong Cheol Seok, Young Jun Kwak, Ju Hyeun Park, Seung Woo Lee* (School of Chemical Eng., Yeungnam Univ.)

NMD-P-43 **Light management for mechanically stacked dual-junction solar cells with areal current matching techniques**

Masaaki Baba* (Deparment of Energy and Environment Science, Nagaoka Univ. of Technology, Japan), Kikuo Makita, Takeyoshi Sugaya (Research Center for Photovoltaics, Nat'l Institute of Advanced Industrial Science and Technology, Japan), Noboru Yamada (Deparment of Mechanical Eng., Nagaoka Univ. of Technology, Japan)

NMD-P-44 **Enhanced Photovoltaic Properties of Silicon Quantum Dot Solar Cells using Non-stoichiometric SiO_x Layers**

Songwoung Hong, Ansoon Kim, Kyung Joong Kim* (Division of Industrial Metrology, Korea Research Institute of Science and Stardards)

NMD-P-45 **The characteristics of *p-i-n* silicon quantum dot solar cells fabricated on molybdenum substrates**

Seong Hyun Lee, Gyea Young Kwak, Songwoung Hong, Jong Shik Jang, Ansoon Kim (Division of Industrial Metrology, Korea Research Institute of Science and Standards), Sun Jun Yun (Solar Cell Technology Laboratory, ETRI), Kyung Joong Kim* (Division of Industrial Metrology, Korea Research Institute of Science and Standards)

NMD-P-46 **Epi-less Ultra-thin Si Foils for a Thin Single Crystal Solar Cell**

Sanghyun Park, Jihun Oh* (Graduate School of EEWS, KAIST)

NMD-P-47 **Effect of NaF to photoluminescence intensity of Cu_2SnS_3 absorbers**

Hikaru Uegaki* (College of Science and Eng., Ritsumeikan Univ., Japan), Zeguo Tang (Ritsumeikan Global Innovation Research Organization (R-GIRO), Ritsumeikan Univ., Japan), Takanori Kondo, Kazuki Hamamura, Koichi Suzuki, Takashi Minemoto (College of Science and Eng., Ritsumeikan Univ., Japan)

NMD-P-48 **Influence of composition ratio of Zn/Sn on $ZnSnP_2$ thin films**

Noriyuki Yuzawa* (College of Science and Eng., Ritsumeikan Univ., Japan), Shigeru Nakatsuka, Yoshitaro Nose (Dept. of Materials Science and Eng., Kyoto Univ., Japan), Takashi Minemoto (College of Science and Eng., Ritsumeikan Univ., Japan)

MSI-P-21 **A Study on Energy Performance of Bifacial Solar module Applied into Building Envelope**

Jungu Kang, Sehyeon Park (Dept. of Architectural Eng., Kongju Nat'l Univ.), Jinhee Kim (Green Energy Technology Research Center, Kongju Nat'l Univ.), Juntae Kim* (Dept. of Architectural Eng., Kongju Nat'l Univ.)

MSI-P-22 **Spatially Distributed Diode Model for Moisture Induced Degradation Prediction in a Glass-to-Glass Photovoltaic Module**

Changwoon Han*, Hyeonseok Lee, Seongil Park (Robust Components and System Research Center, Korea Electronics Technology Institute), Dohyun Baek (Solar Energy Business Division, Samsung SDI)

MSI-P-23 Studies on the electrical properties of the crystalline PV module following the repeated Potential Induced Degradation (PID) and Regeneration

Woo-jun Nam (Solar Technical Support Center, Chungbuk TechnoPark (CBTP)), Jong-rok Lim, Jae-woo Ko (Dept. of Electrical Eng., Konkuk Univ.), Jin-chel Moon, Sung-min Woo (Solar Technical Support Center, Chungbuk TechnoPark (CBTP)), Hyung-keun Ahn* (Dept. of Electrical Eng., Konkuk Univ.)

MSI-P-24 Optimization of Hybrid Photovoltaic-Thermal (PVT) System on Thermal and Electrical Properties

Kisu Kim* (Solar Business Division, LG Electonics), Juhwan Yun (Solar Business Devision, LG Electonics), S.M Yun, MyungSeok Park (Production Eng. Research Institute, LG Electonics), YoungHo Choe (Solar Business Devision, LG Electonics)

MSI-P-25 The outdoor performances of passivated emitter rear totally diffused (PERT) solar module

Seung Woo Jang, Hyo Jin Kim, Seong Woo Heo, Min Pyo Kim, Kwang Gi Seok* (Solar business Division, LG Electronics)

MSI-P-26 A Study on Development of Tracking Algorithm for Floating Photovoltaic System

Young-kwan Choi (K-water), Eung-Kwon Kim (Korean Intellectual Property Office), Jae-hyeong Lee (Sungkyunkwan Univ.), Byeong-moon So* (Chonbuk Nat'l Univ.)

MSI-P-27 A Study on Corrosion Resistance Test of Ocean Photovoltaic Structure

Young-Kwan Choi (K-water), Jae-Hyeong Lee* (Sungkyunkwan Univ.)

MSI-P-28 Time Induced Degradation(TID) Characteristics of Floating Photovoltaic Module

Young-Kwan Choi (K-water), Chang-Sub Won (LSIS Corporation), Jae-Hyeong Lee* (Sungkyunkwan Univ.)

MSI-P-29 Study of optimum method of DC line fault detection for floting photovoltaic system

Hyunjae Yoo, Jae-Hyeong Lee, Myong-Chul Shin (Sungkyunkwan Univ.), Young-Kwan Choi* (K-water)

MSI-P-30 A study of the DC line fault detection algorithm for HVDC system between huge floating photovoltaic system and load site

Hyunjae Yoo, Jae-Hyeong Lee, Myong-Chul Shin (Sungkyunkwan Univ.), Young-Kwan Choi* (K-water)

MSI-P-31 Study of solar power generation and economic feasibility of 1.5MW Photovoltaic power plant in Galapagos

Sungwon Kang* (R&BD Center, BJ POWER)

MSI-P-32 Prediction of Cloud Impact on HCPV Syatem

Chih-Chieh Ma* (Nuclear Instrumentation Division, Institute of Nuclear Energy Research, Taiwan), Wan-Li Hsu (Physics Division, Institute of Nuclear Energy Research, Taiwan), I-Tao Lung (Nuclear Instrumentation Division, Institute of Nuclear Energy Research, Taiwan)

MSI-P-33 Optimization of Land Use for Multi-trackers System by Given Geometrical Site Conditions

Kenji Araki* (Toyota Technological Institute, Japan), Hirokazu Nagai (New Business Development, Daido Steel, Japan), Kazuma Ikeda, Kan-Hua Lee (Toyota Technological Institute, Japan)

MSI-P-34 Static solar concentrator based on refraction and total internal reflection

Sung Moon Han (Mechanical and Aerospace Eng., Seoul Nat'l Univ.), Minsub Han* (Mechanical Eng., Incheon Nat'l Univ.), Joon Sik Lee (Mechanical and Aerospace Eng., Seoul Nat'l Univ.)

MSI-P-35 Effects of fluctuation on Cu(In,Ga)Se_2 solar modules using 3D simulation

Xiaobo Zhu, Chee-Wee Liu* (Graduate Institute of Electronics Eng. and Dept. of Electrical Eng., Nat'l Taiwan Univ., Taiwan)

MSI-P-36 Electrical equivalent circuit model for dye-sensitized solar cells compatible with electrochemical impedance spectroscopy analysis

Myunghun Shin*, Hyeong-Seok Kim*, Jeonghoo Jo (Energy & Photonics Lab., Korea Aerospace Univ.), Joo-Cheol Lee (Research Center, Dong-Jin Semichem Inc.)

MSI-P-37 Analysis on thermal performance of ventilated curtain wall spandrel with CIGS BIPV

Sang Myung Kim (Architectural Eng., Kongju Nat'l Univ.), Ji Sook Yoo (Energy System Eng., Kongju Nat'l Univ.), Jin Hee Kim (Green Energy Technology Research Center, Kongju Nat'l Univ.), Jun Tae Kim* (Architecture, Kongju Nat'l Univ.)

MSI-P-38 Estimation Method of Characteristic Parameters of Strings in Mega Solar Power Plant

Shigeomi Hara*, Makoto Kasu (Science and Eng., Saga Univ., Japan), Noriaki Matui (Saga Yoshinogari Solar LLC, Japan)

MSI-P-39 Improvement of PV Mechanical Load Performance for the Module through the Optimization of Mounting Hole Positions

Jong-Hyeok Moon, Yongki Min, Chung-Hyun Kim, Kwang-Hyun Kim, Sehwan Ryu* (PV module development team, Shinsung Solar Energy co.,Ltd.), Young-Hyun Cho (Production Control Division, Shinsung Solar Energy co.,Ltd.)

MSI-P-40 Impacts of Environmental Factors on Si-based Photovoltaic Modules and their Time-dependent Changes by Multiple Regression Analysis

Aika Kamei*, Takashi Minemoto (College of Science and Eng., Ritsumeikan Univ., Japan)

RES-P-01 Fail modes evaluation of PV modules under different climatic regions in China

Hailing Li*, Fang Lv, Honghua Xu (Renewable energy, Institute of Electrical Eng., Chinese Academy of Science, China)

RES-P-02 Typical Mean Year Irradiance Datasets for Large Scale Photovoltaic Energy Yield Modeling in Japan

Luke Patrick Johnson* (Management, Sunpulse K.K., Japan), Phuong Nguyen (Eng., Sunpulse K.K., Japan)

RES-P-03 Potential induced degradation of crystalline silicon solar cell with emitter doping type

Soohyun Bae (Materials Science and Eng., Korea Univ.), Wonwook Oh (Robust Components and System Research Center, Korea Electronics Technology Institute), Yoonmook Kang (KU KIST Green School, Graduate School of Energy and Environment, Korea Univ.), Hae-Seok Lee, Donghwan Kim* (Materials Science and Eng., Korea Univ.)

PMP-P-01 Analysis of Patents relating to Desert Solar Photovoltaic Technology

Jeong-Gu Lee (SMB Knowledge Center, KISTI(KIST Information)), Do-Yeon Lee*, Yun-Seok Lee*, Hyun-Mu Kang* (KISTI)

Special Workshops

1. IEA-PVPS International Workshop on Evolution of Market, Industry, and New Business Model of PV Power Generation
2. Korea-Germany Collaboration Workshop on Photovoltaics
3. Workshop for National R&D Outcomes on Climate Change
4. New & Renewable Energy Hybrid System Workshop
5. KETEP Public Hearing

International Workshop on the Evolution of Market, Industry, and New Business Model of PV Power Generation

Day Nov. 16 (Mon)
Time 10:40~12:00, 15:00~17:30
Place Room 106~107, Convention hall, BEXCO

Part I: Evolution of the Global PV Market and Industry (10:40~12:00)

Chair Prof. Chinho Park (Yeungnam University)

This session will explore the current status of the PV market development and the PV industry evolution. The main conclusions will be presented from the IEA-PVPS Trends in PV Applications report.

Time	Speaker & Title
10:40	Prof. Donggun Lim, Opening remarks from IEA PVPS EXCO, Korea
10:45	Mr. Gaëtan Masson, Opening remarks from IEA PVPS, Belgium
	Presentation
10:50	Mr. Gaëtan Masson, PVPS Task 1 Operating Agent, Becquerel Institute, Belgium **"Evolution of the Global PV Market and Role of IEA PVPS"**
11:10	Ms. Izumi KAIZUKA, PVPS Task 1 Expert, RTS Corporation, Japan **"Evolution of the Global PV Industry from Trends Report"**
	Mr. Keiichi Komoto, PVPS Task 12 Expert, Mizuho Information & Research Institute, Japan **"Competitiveness of PV from Environmental Aspect"**
11:50	Q&A

Part II: Evolution of the New Business Models (15:00~17:30)

Chair: Gaëtan Masson (IEA PVPS Task 1 Operating Agent)
Izumi KAIZUKA (Task1 Expert Japan/RTS Corporation)

This session will explore the current and future roles of new business models in developing the PV market in post-FIT environments. The experiences from European countries and the US will be described before a session focusing on how new and emerging business models can unlock the PV market development.

Time	Speaker & Title
15:00	Opening Remarks by Prof. Chinho Park, PVPS Task 1 Expert, Vice President for Research, Yeungnam University, Korea
	Keynotes
15:10	Mr. Gaëtan Masson, PVPS Task 1 Operating Agent, Becquerel Institute, Belgium **"Global Landscape of New Business Model"**
15:30	Mr. Michiel Ritzen, Task 15 Operating agent, The Netherlands **"BIPV-Opportunity or Burden for the PV Community?"**
15:50	Mr. Robert Margolis, PVPS Task 1 Expert, Senior Energy Analyst, National Renewable Energy Laboratory, USA **"Emerging Business Models for Solar PV in the United States"**
16:10	Coffee Break
	Country experiences of Asian countries
16:30	Mr. Yung-Rae KIM, Director of NRE Dissemination Division, Korea Energy Agency, Korea **"PV Rental Program inKorea"**
16:45	Ms. Lv Fang, PVPS Task 1 Expert, Electrical Engineering Institute, Chinese Academy of Sciences, China **"Distributed PV and Minigrid in China"**
17:00	Ms. Izumi KAIZUKA, PVPS Task 1 Expert, RTS Corporation, Japan **"Electricity Market Reform in Japan and Emerging Business Models"**
17:15	Mr. Eddy Blokken, Solar Energy Research Institute, Singapore **"PV in Singapore and the Tiger Cub Countries"**
17:30	Q&A & Closing Remarks by Mr. Gaëtan Masson

Korea-Germany Collaboration Workshop on Photovoltaics

Day Nov. 17 (Tue)
Time 10:50~12:10, 15:20~17:25
Place Room 106~107, Convention hall, BEXCO

Part I: Welcome/Introduction & PV Cell Project (10:50~12:10)

Chair Prof. Chinho Park (Yeungnam University)

Time	Session I : Welcome & Introduction
10:50	"TBD", Opening Remarks from MOTIE, Korea
10:55	Dr. Rolf Theodor Schuster, Opening remarks from German Embassy in Korea
11:00	Dr. Jaecheon Song, KETEP, Korea **"Energy R&D Strategy of Korea" or "International Cooperation in Energy Sector"**
11:20	Mr. Gaëtan Masson, Becquerel Institute, Belgium **"PV LCOE in Europe 2014-30"**
	Session II : PV Cell Project
11:40	Dr. Stefan Glunz, Fraunhofer ISE, Germany **"Charaterization of Perovskite Solar Cells"**
11:55	Prof. Donghwan Kim, Korea University, Korea **"Effect of Morphology Control in Organic-Inorganic Perovskite Solar Cells and Their Application for Perovskite/Silicon Tandem Solar Cells"**

Part II: Kerfless/Wafering & PV Module Projects (15:20~17:30)

Chair Prof. Joerg Bagdahn, Fraunhofer CSP

Time	Session III : PV Module Project
15:20	Prof. Soo-Young Oh, Yeungnam University, Korea **"UV Degradation of EVA & Its Characterization & Simulation"**
15:35	Prof. Joerg Bagdahn, Fraunhofer CSP, Germany **"Material Characterization of EVA for UV Degradation"**
	Session IV : Kerfless & Wafering Project
15:50	Dr. Boyun Jang, KIER, Korea **"Kerfless Thin Silicon Solar Cells based on the Advanced Wafering Technology"**
16:05	Prof. Ralf Wehrspohn, Martin-Luther-University, Germerny **"Porous Silicon Technology for Smart Kerfless Wafering"**
16:20	Coffee Break
16:40	Dr. Boyun Jang, KIER Korea **"Overview of Thin Wafering Processes with Multi-Wire Sawing and Exfoliation for Photovoltaic Application"**
16:55	Dr. Lausch Dominik, Fraunhofer CSP, Germany **"Inductively Coupled Plasma(ICP) Texturization without Self-bias Formation of Kerfless Produced Wafers"**
	Session V : Summary & Outlook
17:10	All "Summary & Outlook"

Workshop for National R&D Outcomes on Climate Change

Day Nov. 18 (Wed)
Time 10:00~12:00
Place Room 106~107, Convention hall, BEXCO
Remark Korean only

Time	Speaker & Title
10:00	Ministry of Science, ICT & Future Planning **"National Technology Innovation & Commercialization Plan on Climate Change"**
10:20	**Participating Ministries** **"R&D Outcome & Investment Plan for Solar Cell of Ministries"**
11:00	Discussion

* Participating Ministries: Ministry of Science, ICT & Future Planning, Ministry of Trade, Industry and Energy

New & Renewable Energy Hybrid System Workshop

Day Nov. 18 (Wed)
Time 14:30~17:30
Place Room 106~107, Convention hall, BEXCO

Chair Prof. Chinho Park (Yeungnam University) & Dr. Jae Ho Yoon (KIER)

Time	Speaker & Title
14:30	Prof. Chinho Park, Yeungnam University "Welcoming Remark"
	Presentation
14:35	Mr. Michiel Ritzen, Task 15 Operating Agent, The Netherlands "Best Cases and Challenges of Zero Energy Remodeling in the Netherlands"
15:05	Mr. Robert Margolis, Senior Energy Analyst, National Renewable Energy Laboratory, USA "Accelerating Renewable Technologies in the US: Energy Systems Integration Research at NREL"
15:35	Seonghwan Kang, MSIP Deputy Director, Korea "Overview of the National Future Growth Engine Project in Korea"
15:55	Coffee Break
16:10	Jun-Ki Min, Director, Dasstech, Korea "New & Renewable Energy Hybrid System Operation with/without Grid"
16:30	Yong-Sik Kim, CEO, BJ Power, Korea "PV-Diesel Hybrid System Project in Galapagos Island and Southeast Asia"
16:50	Deug Young Jeong, R&D Direector, Daegyeong Solar Cell/Module RIC Yeungnam University, Korea "Driving Trend of New & Renewable Energy Hybrids System in Korea"
17:10	Q&A

KETEP Public Hearing

Day Nov. 19 (Thu)
Time 15:35~17:35
Place Room 104~105, Convention hall, BEXCO
Remark Korean only

The Korean government policies and research plans will be presented by KETEP (Korea Energy Technology Evaluation and Planning) agents. Those who are interested in finding a future research fund might attend this presentation. It wiil be presented in Korean.

Chair Prof. Changsik Son (Silla University)

Time	Speaker & Title
15:35~16:00	Jae Chun Song, KETEP **"2016 R&D program for solar PV"**
16:00~16:30	Jae In Kim, KETEP **"R&D planning system and schedule"**
16:30~17:35	Discussion

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Regional Innovation Center for Solar Cell & Module

Yeungnam University

Introduction

Name: Regional Innovation Center for Solar Cell & Module
Supported by the Korean Ministry of Knowledge Economy

Periods: 2008.07.01 ~ 2018.06.30 (10 yrs)

Participating Organizations:

RIC (Yeungnam Univ.) ⇔ Networking

Organizations	
Government	Gyeongbuk Province, Daegu Metropolitan City
TechnoPark	Gyeongbuk TechnoPark
University	POSTECH
R&D Centre	DGIST, NPAC
Funding Enterprise	21companies including Milinet Solar
Cooperative Enterprise	76 companies including SolarMetro

Goals of RIC

Globalization of regional solar cell/module enterprises

Promotion of regional industries and enterprises on solar cell/module

New grown up industries of country

Global market expansions in solar energy

Supports of quality certification and marketing

Supports of Equipments and Production technology

Supports of Core tech, and educational training

Regional strategic industry

Upbringing on IT-ET fusion of green ocean industry

Regional solar cell/module enterprises

Projects of RIC

1. Equipments construction and its practical use
   - Supports for the quality certification through solar cell/module characteristics evaluation system
   - Supports for upgrading the process and analysis technology of solar cell/module
2. R&D
   - Providing the latest technology informations
   - Providing the joint research opportunities with academic-industrial cooperation

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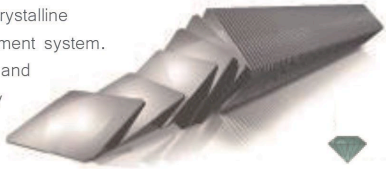

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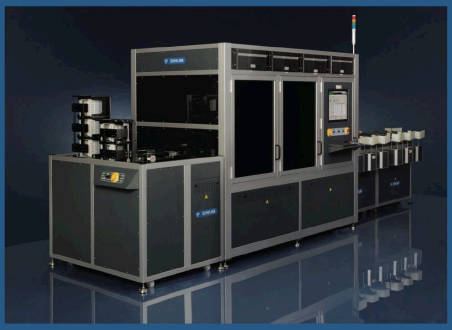
PVS-5100 Wafer Inspection and Sorter system



Application

PVS-5100 provides advanced multiparameter wafer inspection with integrated high speed sorting for quality control of production wafers. It eliminates imperfect substrates, maximize cell line output and ensures optimized efficiency.
Application area:

- Outgoing wafer inspection for wafer manufacturers
- Incoming as-cut wafer inspection for solar cell manufacturers

Highlights

- Automatic presorting of damaged wafers
- Sorting based on any parameter measured by Semilab´s metrology modules e.g. TTR, WSI, MCI, PLI, SHP
- Eliminating high thickness variation wafers (TTV, saw mark)
- Sorting potentially weak wafers (micro cracks) which could break during subsequent process steps
- Recipe use in each measuring tool for quick and easy adjustment of the parameters
- Buffer to guarantee the real 3600 Wph throughput
- On-the-fly laser marking
- Data matrix reading
- RFID for operator and batch

Specification

- Throughput: up to 3600 wafers/hour
- Wafer sizes: 156 mm (optional 125 or 160 mm)
- Wafer thickness: 130-300 µm
- Wafer input: loading from cassettes or stack
- Wafer output: Sorting in different user-defined classes, collection in coinstacks
- Uptime: >98 %
- Breakage rate: <0.05 %

Semilab Semiconductor Physics Laboratory Co. Ltd.
Prielle Kornélia u. 2., H-1117 Budapest, Hungary
Phone: 36 1 505 4690 Fax: 36 1 505 4695 Contact: semilab@semilab.hu
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- 양면 발전셀로 흐린 날씨, 저입사각의 외부환경에도 출력 우수

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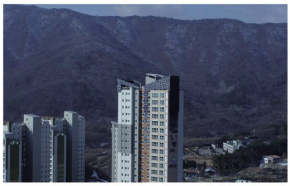

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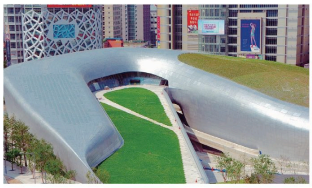
Proposal: Solar LOGO Signs



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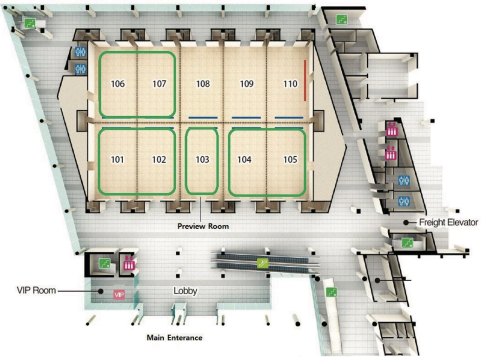

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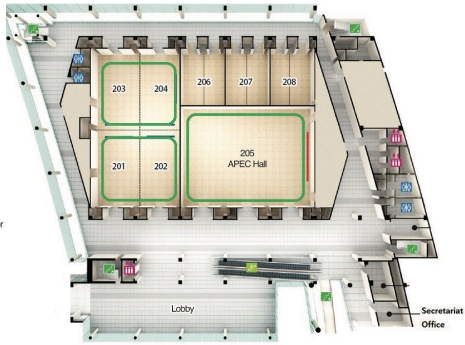

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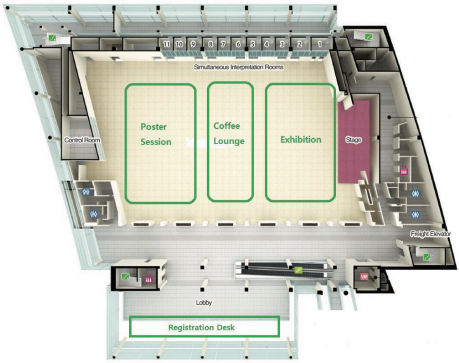

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Preview room	: 103
Secretariat office	: 2F
Exhibition	: 3F
Poster session	: 3F
Coffee lounge	: 3F

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