TECHNICAL PROGRAMME

- Opening, Keynote and Plenary Speeches
- Oral Presentation Session
- Poster Presentation Sessions

OPENING, KEYNOTE AND PLENARY SPEECHES

Monday, November 4
08:30-12:10
Golden Hall, 1F, Qujiang International Conference Center

OPENING

Chairman: Ying Zhao
Professor, Nankai University, China

08:30-09:00
Opening and Welcome Address
Baoshan Li
Vice Chair, China Renewable Energy Society, China
Xuqun You
President, Shaanxi Normal University, China

Opening Speech from National Energy Agency of China (NEA), Ministry of Industry and Information Technology of China (MIIT), Ministry of Science and Technology of China (MOST)

Welcome Address from LONGi, TBEA, China

09:00-09:20
PVSEC Award Ceremony
Chairman: Honghua Xu
Vice Chair, China Renewable Energy Society, China

KEYNOTE & PLENARY

Chairman: Shengzhong Liu
Professor, Shaanxi Normal University, China

09:20-09:50
KEYNOTE: Sun Culture and Solar Technologies in Ancient China
Hui Shen
Professor, Sun Yat-sen University, China

09:50-10:15
Plenary: PV - From Technology to The Energy System - Latest Insights by IEA PVPS
Stefan Nowak
Chairman, IEA PVPS

10:15-10:40
Plenary: China PV Development Status and Future Energy Revolution Vision
Zhongying Wang
Director, China National Renewable Enerrgy Center, China

10:40-11:05
Plenary: Environmental and Ecological Impacts of Wind-Photovoltaic-Hydro-Storage Complementary Energy and Large-Scale Photovoltaic Power Stations
Xiaoping Xie
Chairman, Yellow River Upstream Hydropower Development Co., Ltd, China

11:05-11:15
Coffee Break

11:15-11:45
KEYNOTE: What Comes after PERC?
Martin A. Green
Professor, University of New South Wales (UNSW), Australia

11:45-12:10
Plenary: Efficient and Stable Perovskite Solar Cells
Jingbi You
Professor, Institute of Semiconductors, Chinese Academy of Sciences, China

Tuesday, November 5
08:30-12:15
Golden Hall, 1F, Qujiang International Conference Center

Chairman: Dengyuan Song
CTO, Yingli Solar, China

08:30-08:55
Plenary: Silicon Photovoltaics - New Opportunities for an Old Technology
Stefan W. Glunz
Professor, Fraunhofer Institute for Solar Energy Systems

08:55-09:20
Plenary: Recent Key Technology Progresses and Issues in Crystalline Silicon Wafers for Solar Cells
Yuepeng Wan
CTO, GCL-Poly Energy Holdings Limited, China

09:20-09:45
Plenary: Recent Improvements in Research and Industrialization of Front and Back-contacted Solar Cells and Modules Using Low-temperature Passivating Contacts
Christophe Ballif
Professor, EPFL, Switzerland

09:45-10:05
Plenary: Power, Peak, Cost Valley - Innovation LCOE Solution
Jun Lv
Vice President, Longi Solar Technology Co., Ltd., China

10:05-10:25
Plenary: Passive Damping Scheme Design for Multiple Grid-Connected Photovoltaic Inverters with a Common Capacitor
Hongwei Zhou
CTO, TBEA XINJIANG SUNOASIS CO., LTD., China

10:25-10:35
Coffee Break

Chairman: Zhiqiang Feng
Vice President, Trina Solar, China

10:35-11:00
Plenary: Recent Progress and Future Prospects of CIS-based Thin-film Solar Cell Technology – High Efficiency and New Applications
Takuya Kato
Chief Researcher, Idemitsu Kosan Co., Ltd., China

11:00-11:25
Plenary: CdTe and 1.7 eV MgCdTe Solar Cells and A Liftoff Technology Using Water-soluble Sacrificial Layers
Yong-Hang Zhang
Professor, Arizona State University, USA

11:25-11:50
Plenary: Super-high Efficiency III-V Multi-junction and Concentrator Solar Cells, and PV-powered Vehicle Applications
Masafumi Yamaguchi
Professor, Toyota Technological Institute, Japan

11:50-12:15
Plenary: Systematic Study on Potential-induced Degradation of N-type Crystalline Si Photovoltaic Modules
Keisuke Ohdaira
Professor, Japan Advanced Institute of Science and Technology, Japan

ORAL PRESENTATION

Monday, November 4, Room 402

2Mo01

Area 2 Perovskite Solar Cells

Session Chair: Xiaodan Zhang, Janwon Seo

INVITED SPEECH

13:30-13:50
Interfacial Layers for Efficient and Stable Perovskite Solar Cells
Jangwon Seo
Korea Research Institute of Chemical Technology (KRICT), Korea

13:50-14:10
Materials Engineering for Efficient Stable Pb-Free Perovskite Photovoltaics
Yuanyuan Zhou
Brown University, USA

ORAL PRESENTATION

14:10-14:25
Interfacial Engineering of Perovskite Solar Cell with Efficient Electron Transport Layers
Molang Cai
North China Electric Power University, China

14:25-14:40
Ion Migration Study and Interfacial Engineering Toward Operationally Stable Perovskite Solar Cells
Qing Zhao
Peking University, China

14:40-14:55
Perovskite: The Control of Phase Transformation
Kui Zhao
ShaanXi Normal University, China

14:55-15:10
Multifunctional Passivator with Carboxyl Groups for Planar Perovskite Solar Cells
Xiaoqiang Shi, Xuepeng Liu, Yong Ding, Molang Cai, Songyuan Dai
North China Electric Power University, China

15:10-15:25
Functional Interfacial Modification by PTAA for Enhanced Efficiency and Stability of Planar Perovskite Solar Cells
Yuelong Li, Xuepeng Liu, Fuhua Hou, Yong Ding, Ying Zhao, Xiaodan Zhang
Nankai University, China

15:25-15:40
Thiocyanate Assisted Nucleation for Perovskite Solar Cell by Gas-Quenched Deposition
Haimang Yi, Leiping Duan, Faiazul Haque, Gavin Conibeer, Ashraf Uddin
University of New South Wales, Australia

15:40-15:55
Surface Passivation of Perovskite Film for Efficient Solar Cells
Yang Zhao, Qiufeng Ye, Zema Chu, Feng Gao, Jingbi You
Institute of Semiconductors, Chinese Academy of Sciences, China

Monday, November 4, Room 308 **3Mo01**

Area 3 Organic Solar Cells

Session Chair: Jianhui Hou

INVITED SPEECH

13:30-13:50
Organic Solar Cells as A Next Generation Green Energy Source
Han Young Woo
Department of Chemistry, College of Science, Korea University, Korea

13:50-14:10
Efficient Flexible Organic Solar Cells
Ziyi Ge
Ningbo Institute of Materials Tecnology&Engineering, Chinese Academy of Sciences, China

ORAL PRESENTATION

14:10-14:22
Time-Resolved Microwave Conductivity Measurements for Organic Solar Cell Materials
Supriya Pillai[1, 2], Nikos Kopidakis[2], Chao Wang[3], Mats Anderson[4], Christopher McNeill[3]
[1]University of New South Wales (UNSW), Australia
[2]Macquarie University, Australia
[3]Monash University, Australia
[4]Flinders University, Australia

14:22-14:34
AMANDA - A Platform for Automatic and Autonomous Research on Printed Semiconductors
Tobias Stubhan[1], Christian Berger[1], Jerrit Wagner[1], Jens Hauch[1], Prof. Dr. Christoph J. Brabec[1]
[1]Helmholtz Institute Erlangen-Nuremberg, Germany

14:34-14:46
Stability Improvement in Organic Solar Cells with Annealed Pentacene/Gold Anode Buffer
Kenji Harafuji[1], Takahiro Okada[1]
[1]Ritsumeikan University, Japan

INVITED SPEECH

14:46-15:06

Development of High Performance Polymers for Applications to Highly Reliable Large-Area Organic Solar Cells

Hae Jung Son

Photo-electronic Hybrids Research Center, Korea Institute of Science and Technology (KIST)

15:06-15:26

Interface Engineering and Optical Coupling for Highly Efficient Semitransparent Inverted Polymer Solar Cells

Yinhua Zhou

HUST (Huazhong University of Science and Technology)

ORAL PRESENTATION

15:26-15:38

Entropy Promotes Charge Separation in Bulk Heterojunction Organic Photovoltaics

Eisuke Kawashima[1], Mikiya Fujii[1], Koichi Yamashita[2]

[1]The University of Tokyo, Japan

[2]Kyoto University, Japan

15:38-15:50

Energy Distributions of Charge Transfer State in Organic Photovoltaics

Zilong Zheng[1], Wencai Zhou[1], Yongzhe Zhang[1]

[1]Beijing University of Technology, China

15:50-16:02

10cm² Nonfullerene Solar Cells with Efficiency over 10% Using An Ultrathin Silver Electrode with A 4-nm Percolation Threshold Thickness

Xueshi Jiang[1], Yinhua Zhou[1]

[1]Huazhong University of Science and Technology, China

Monday, November 4, Room 306 **6Mo01**

Area 6 Silicon Feedstock & Wafers

Session Chair: Yuepeng Wan, Reimann

INVITED SPEECH

13:30-13:50

Crystal Growth of CZ-Si for High Efficiency Cells: Learn Lessons from the Past

Koichi Kakimoto

Research Institute for Applied Mechanics, Kyushu University, Japan

13:50-14:10

Defect Engineering of Cast Silicon Crystal

Xuegong Yu

Zhejiang University, China

ORAL PRESENTATION

14:10-14:25
Production of High Performance Multi-Crystalline Silicon Ingots for PV Application by Using Contamination-Free Sixny Seed Particles
Christian Reimann
Fraunhofer IISB, Germany

14:25-14:40
Influence of Temperature Gradient at Solid/Liquid Interface on the Defect Propagation in High-Performance Mc-Si Ingot Growth
Zhiqiang Zhang[1], Xuegong Yu[1], Shuai Yuan[1], Hao Jin[2], Qi Wang[2], Deren Yang[1]
[1]Zhejiang University, China
[2]Jinko Solar, China

14:40-14:55
Quantitative Evaluation of Electrical Characteristics of Inclined Grain Boundaries in Multicrystalline Silicon by Photoluminescence Imaging and Finite Element Simulation
Kazuki Mitamura1, Kentaro Kutsukake1, Takuto Kojima2, Noritaka Usami1
1Graduate School of Engineering, Nagoya University
2Center for Advanced Intelligence Project, RIKEN

14:55-15:10
Transient Global Modeling of Oxygen and Carbon Segregations During the Pulling Process of Czochralski Silicon Crystal Growth
Xin Liu, Hirofumi Harada, Yoshiji Miyamura, Xue-feng Han, Satoshi Nakano, Shin-ichi Nishizawa, Koichi Kakimoto
Research Institute for Applied Mechanics, Kyushu University, Japan

15:10-15:25
Numerical Analysis on Asymmetric Phenomenon in the 200 mm (8 inch) Floating Zone Silicon
Xuefeng Han, Satoshi Nakano, Xin Liu, Hirofumi Harada, Yoshiji Miyamura, Koichi Kakimoto
Kyushu University, Japan

15:25-15:40
Numerical Analysis of the Effect of Seed Crystal on Dislocation Density in Si Crystal for Solar Cells
Satoshi Nakano, Xin Liu, Xuefeng Han, Koichi Kakimoto
Kyushu University, Japan

15:40-15:55
Numerical Analysis and Optimization of Gas Flow and Impurity Control in Directional Solidification Multi-crystalline Silicon
Wenjia Su, Chen Li
Jiangsu University, China

Monday, November 4, Room 313

10Mo01

Area 10 Performance and Reliability of PV Module

Session Chair: Zhang Zhen

INVITED SPEECH

13:30-13:50

Corrosion Mechanisms of the Front-Side Metallization by High-Temperature High-Humidity Test on Crystalline Si PV Module

Taeko Semba
NAMICS Corporation, Japan

ORAL PRESENTATION

13:50-14:05

Effect of High Wind Speed Dust on Silicon Photovoltaic Modules Performance

Chengying Shi
Telecommunication Technology Labs, China

14:05-14:20

Thermomechanical Stress in Glass-Glass Modules of Half Silicon Solar Cells Interconnected by Conventional Tabbing

Pei-Chieh Hsiao[1], Zhimeng Wang[1], Ning Song[1], Yang Li[1], Zi Ouyang[1], Chen Zhu[2], Jun Lv[2], Canjun Shen[2], Cheng Chen[2], Guoqing Chen[2], Xueqing Zhang[3], Alison Lennon[1]
[1]School of Photovoltaics and Renewable Energy Engineering, UNSW, Australia
[2]LONGi Solar Technology Co, Chian
[3]Hebei Sizhuo Photovoltaic Technology Co, China

14:20-14:35

Performance Monitoring of PV Modules and Arrays for Reliability Evaluation

Yoshihiro HISHIKAWA[1], Masahiro Yoshita[1], Takakazu Takenouchi[1], Michiya Higa[1], Manit Seapan[2], Keiichi Okajima[2]
[1]AIST, Japan
[2]University of Tsukuba, Japan

14:35-14:50

The Irradiance Mismatch Effects on the Performance of Bifacial Photovoltaic Modules

Yating Zhang[1], Qi Gao[2], Youlin Yu[3], Fanying Meng[1], Zhengxin Liu[1]
[1]Shanghai Institute of Microsystem and Information Technology (SIMIT), Chinese Academy of Sciences (CAS) University of the Chinese Academy of Sciences, China
[2]Shanghai Institute of Microsystem and Information Technology (SIMIT), Chinese Academy of Sciences (CAS), China
[3]Shanghai Institute of Microsystem and Information Technology (SIMIT), Chinese Academy of Sciences (CAS) ShanghaiTech University, China

14:50-15:05
Thermal Management of PV Modules: Passive Cooling Solutions for Front and Back Surfaces
Juan Camilo Ortiz Lizcano
Delft University of Technology, Netherland

15:05-15:20
Study on Simulation and Optimization for output Characteristics of Bifacial PV Modules Based on Outdoor Empirical Tests
Yunlinsun[1], Siming Chen[2], Rongrong Chen[2], Bingzhi Li[2]
[1]ShunDe SYSU Institute for Solar Energy, Guangdong HuaJu Testing Tech. Co., Ltd, China
[2]Guangdong HuaJu Testing Tech. Co., Ltd, China

15:20-15:35
Impact of (Multi-) Busbar Design in Full and Halved Cell Modules on the Cell-to-Module Yield under Realistic Conditions
Marco Ernst[1], Ingrid Haedrich, Yang Li[2] , Alison Lennon[2]
[1]Australian National University, Australia
[2]University of New South Wales, Australia

15:35-15:50
Physical Mechanism and Temperature Control of Shaded Solar Cell Hot-Spot
Peide Han, Huixue Ren, Cong Gao
Institute of Semiconductors, Chinese Academy of Sciences, China

Monday, November 4, Room 311 **13Mo01**

Area 13 PV Energy Storage and Novel PV Application

Session Chair: Xiaoliang Wei, Baoguo Wang

INVITED SPEECH

13:30-13:50
Flow Battery for Large Scale Energy Storage
Huamin Zhang
Dalian Institute of Chemical Physics China Academy of Sciences (DICP), China

13:50-14:10
Research on the Electrode of High-Power-All-Vanadium Redox Flow Batteries
Xiongwei Wu
Hunan Agricultural University, China

14:10-14:30
Organic Redox Flow Batteries for Next-Generation Grid Energy Storage
Xiaoliang Wei[1], Wei Wang[2], Lu Zhang[3], Zhengcheng Zhang[3]
[1]Indiana University-Purdue University Indianapolis (IUPUI), India
[2]Pacific Northwest National Laboratory, USA
[3]Argonne National Laboratory, USA

ORAL PRESENTATION

14:30-14:45

Standardization Discussions for the Car-Roof PV – Starting Two Years Ago, and What We Have Achieved Since Then

Kenji Araki[1], Liang Ji[2], George Kelly[3], Emilio Agudo[4], Ignacio Anton[5], Mathieu Baudrit[6], Anna Carr[7], Rebeca Herrero[5], Sarah Kurtz[8], Zhengxin Liu[9], Moritz Limpinsel[10], Zhonglin Lu[11], Mauro Pravettoni[12], Kensuke Nishioka[13], Yasuyuki Ota[13], Paul Robusto[14], Hiromi Tobita[15], Qian Wu[16], Zhenyu Wu[16], Sewang Yoon[17], Masahiro Yoshita[18], Masafumi Yamaguchi[1]

[1]Toyota Technological Institute, Japan
[2]UL, USA
[3]Sunset technology, USA
[4]Solar Added Value (SAV), Spain
[5]Instituto de Energía Solar-Universidad Politécnica de Madrid, Spain
[6]Sono Motors GmbH de'guo Germany
[7]TNO, Holland
[8]University California Merced, Merced, USA
[9]SIMIT Chinese Academy of Sciences, Shanghai, China
[10]Alta Devices, USA
[11]Nanjing Sunport Power Corp, China
[12]Solar Energy Research Institute of Singapore, National University of Singapore , Singapore
[13]University of Miyazaki, Japan
[14]Miasolé Hi-Tech Corp. USA
[15]Japan Electrical Safety & Environment Technology Laboratory (JET), Japan
[16]Hanergy Mobile Energy Holding Group, China
[17]TS Corporation, Seoul, North Korea
[18]AIST, Japan

14:45-15:00

Product Development and Characterization for Building Integrated Photovoltaics as A Future GW Market

Joerg Palm, Jochen Weick, Lutz Tautenhahn, Peter Borowski, Manfred Kitze, Stefan Grünsteidl
AVANCIS GmbH, Germany

15:00-15:15

A Brand New Whole-Roof-Integrated Solar System

Xiaowei Nie, Jicai DING, Xiaowei NIE, Shanlong LOU, Yan LIN
Yantai DingCheng New Energy Co. Ltd.

15:15-15:30

Home/Building Island Nano-Grid For 100% Renewable Clean Energy and 3 Years Payback

John Borland
J.O.B. Technologies, USA

15:30-15:45

Estimation of the Annually Angular Distribution of Solar Irradiance onto the Vehicle Using Shading Model

Yasuyuki Ota, Kenji Araki, Masafumi Yamaguchi
[1]University of Miyazaki, Japan
[2]Toyota Technological Institute, Japan

15:45-16:00

Research on Household Energy Storage System Based on Droop Control

Xunbo Fu[1], Zhiran Dong[1], Hongwei Liu[1], Wenhui Shi[2], Zhankui Zhang[2]
[1]Beijing Corona Science & Technology Co. Ltd,China
[2]State Key Laboratory of Operation and Control of Renewable Energy & Storage Systems, China Electric Power Research Institute.

ORAL PRESENTATION

Tuesday, November 5, Room 402

1Tu01

Area 1 Advanced Concepts and New Emerging Materials for Future PV

Session Chair: Jiang Tang

INVITED SPEECH

13:30-13:50
Study on Highly Stable and Efficiency Perovskite Solar Cells
Wenhua Zhang
Institute of chemical materials, China academy of engineering physics

13:50-14:10
Solution Processed High Efficiency Thin Film $Sb_2(S, Se)_3$ Solar Cells
Tao Chen, Xiaomin Wang, Chunyan Wu
University of Science and Technology of China (USTC), China

ORAL PRESENTATION

14:10-14:25
Alcohol Vapor Post-Annealing for Highly Efficient Sb_2S_3 Planar Heterojunction Solar Cells
Xuanhua Li
Northwestern Polytechnical University, China

14:25-14:40
PbS Quantum Dot/ZnO Nanowire Solar Cells with High Infrared Spectral Sensitivity
Haibin Wang
RCAST, The University of Tokyo, Japan

14:40-14:55
Epitaxial Growth of $BaSi_2$ Thin Films by Sputtering for Solar Cell Applications
Rui Du, Kaiwen Yang, Yiwen Zhang, Weijie Du
Shanghai Normal University, China

14:55-15:10
Close-spaced Evaporation: Scalable Technique for $BaSi_2$ Film Deposition
Kosuke O. Hara[1], Shuhei Takizawa[1], Noritaka Usami[2], Junji Yamanaka[1], Keisuke Arimoto[1]
[1]University of Yamanashi, Japan
[2]Nagoya University, Japan

15:10-15:25
Low Temperature Silver Nanowires as Transparent Conducting Layer for Solar Cells
Supriya Pillai[1], Martin Green[1], Supriya Pillai[1, 2]
[1]University of New South Wales, Australia
[2]Macquarie University, Australia

15:25-15:40
9.2%-efficient Core-shell Structured Antimony Selenide Nanorod Array Solar Cells
Xiaoyang Liang[1], Li Ziqiang[1], Liang Xiaoyang[1], Guo Chunsheng[1], Liu Tao[1], Liu Yufan[1], Mai Yaohua[2]
[1]Hebei University, China
[2]Jinan University, China

15:40-15:55
Effect of Narrow Bandpass Filtering in Heat Recovery (HERC) Solar Cell
Kenji Kamide[1], Toshimitsu Mochizuki[1], Hidefumi Akiyama[2], Hidetaka Takato[1]
[1]National Institute of Advanced Industrial Science and Technology (AIST), Japan
[2]The University of Tokyo, Japan

Tuesday, November 5, Room 405 **4Tu01**

Area 4 Thin-film Compound Semiconductor PV

Session Chair: Xudong Xiao, William Shafarman

INVITED SPEECH

13:30-13:50
Actively Control the Energy Bandgap Grading of Light Absorber in Cu(InGa)Se_2 Solar Cells
Xudong Xiao
The Chinese University of Hong Kong, China

13:50-14:10
Advances in Alloying and Bandgap Control for CIGS Solar Cells
William Shafarman
University of Delaware, USA

ORAL PRESENTATION

14:10-14:25
High Efficiency Ag-Alloyed CIGS Process Development at MiaSolé Hi-Tech
Dmitry Poplavskyy Neil Mackie, Xinxuan Tan, Atiye Bayman, Nanke Jiang
Miasole Hi-Tech Corp, USA

14:25-14:40
High-Performance Near-Stoichiometric Cu(In, Ga)(Se, S)$_2$ Solar Cells by Sub-Percent Ag-Doping
Hiroki Sugimoto, Hiroshi Tomita, Koji Yamaguchi, Yoshiaki Hirai, Takuya Kato
Advanced Technology Research Laboratories, Idemitsu Kosan Co., Ltd., Japan

14:40-14:55
Epitaxial Cu(In, Ga)Se_2 Solar Cells on p-type GaAs Substrates
Jiro Nishinaga, Takeyoshi Sugaya
AIST, Japan

14:55-15:00
Break

15:00-15:15
Impact of Alkali Treatment in Cu(In, Ga)(S, Se)$_2$ on Its Quality and Carrier Recombination
Jakapan Chantana[1], Yu Kawano[1], Takahito Nishimura[1], Yoshinori Kimoto[2], Takuya Kato[2], Hiroki Sugimoto[2], Takashi Minemoto[1]
[1]Ritsumeikan University, Japan
[2]Showa Shell Sekiyu K. K., Japan

15:15-15:30
Optimization of Ag-based Reflective Back Mirrors for Ultrathin Cu(In, Ga)Se2-Based Solar Cells
Louis Gouillart[1], Wei Chao Chen[2], Andrea Cattoni[1], Julie Goffard[1], Lars Riekher[2], Marie Jubault[3], Negar Naghavi[4], Marika Edoff[2], Stéphane Collin[5]
[1]C2N, France
[2]Ångström Solar Centre, Sweden
[3]EDF, France
[4]IPVF, France
[5]C2N, USA

15:30-15:45
Dielectric-Based Surface Passivation for Thin Film Photovoltaics, What Can We Expect in the Near Future?
Bart Vermang
Imec / UHasselt / EnergyVille, Belgium

15:45-16:00
Adjustment of the Ga Grading in Cu(In, Ga)Se2 Thin Films at Low-Temperature Deposition Process
Wei Liu
Institute of Photoelectronic Thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology of Tianjin, Nankai University, Tianjin 300071, P. R. China.

Tuesday, November 5, Room 306

6Tu02

Area 6 Silicon Feedstock & Wafers

Session Chair: Xuegong Yu, Noritaka Usami

INVITED SPEECH

13:30-13:50

Ultra-high Bulk Carrier Lifetime Measurement in Crystalline Silicon

John Murphy
University of Warwick, UK

ORAL PRESENTATION

13:50-14:05

The Effect of DB on Minority Carrier Lifetime Improvement of Seed Assisted Cast Silicon Ingot

Huali Zhang
GCL Jiangsu Silicon Materials, China

14:05-14:20

Defect Filtering Effect in Cast Mono-Like Silicon

Yuan Shuai[1], Xuegong Yu[1], Dongli Hu[2], Xiaodong Zhu[1], Hangfei Li[1], Liang He[3], Hongrong Chen[2], Hongzhi Luo[3], Yunfei Xu[3], Deren Yang[1]
[1]Zhejiang University, China
[2]Jiangsu GCL Silicon Material Technology Development Co., Ltd., China
[3]LDK Solar Co. Ltd., China

14:20-14:35

The Effect of Temperature on Iron Detection in Crystalline Silicon by Carrier Lifetime Measurements

Xiaodong Zhu, ShuaiYuan, Xuegong Yu, Deren Yang
Zhejiang University, China

14:35-14:50

Onset of Ring Defects in n-type Czochralski Silicon

Rabin Basnet[1], sieu Pheng Phang[1], Christian Samundsett[1], Di Yan[1], Wenshenf Liang[1], Chang Sun[1], Stephane Armand[1], Fiacre E. Rougieux[2], Daniel Macdonald[1]
[1]The Australian National University, Australia
[2]University of New South Wales, Australia

14:50-15:05

Towards 22.1% conversion efficiency using new generation low dislocation cast mono wafer

Zhenzhong Zhang
Rietech new energy science & technology, China

15:05-15:20
Design and Numerical Optimization on Spray-type Gas Guidance System in Multi-crystalline Silicon Furnace
Wenjia Su, Chen Li
Jiangsu University, China

15:20-15:35
Characterization of Bendable Crystalline Si Solar Cells Made by Ultra-thin Wafer Slicing
Noboru Yamada[1], Kohei Onishi[2], Ryo Yokogawa[2], Tappei Nishihara[2], Takefumi Kamioka[2], Kyotaro Nakamura[3], Tomoyuki Kawatsu[4], Toshiki Nagai[4], Yuya Kotake[1], Yukio Miyashita[1], Yoshio Ohshita[3], Atsushi Ogura[2]
[1]Nagaoka University of Technology, Japan
[2]Meiji University, Japan
[3]Toyota Technological Institute, Japan
[4]Komatsu NTC Ltd., Japan

15:35-15:50
Alternative Mono Crystalline Si Wafers for A Sustainable PV Market Growth
Stefan Janz, Stephan Riepe
Fraunhofer ISE, Germany

15:50-16:05
Demonstration of A Potential Closed-Loop Approach to Recycle End-Of-Life Silicon Photovoltaic Modules
Rong Deng, Marina Monteiro Lunardi , Jingjia Ji, Chee Mun Chong
University of New South Wales, Australia

Tuesday, November 5, Room 311 **8Tu01**

Area 8 Thin Film, IBC and HITsolar Cells

Session Chair: Zhengxin Liu, Daisuke Adachi

INVITED SPEECH

13:30-14:00
Silicon Heterojunction Technology Rising up to Progressive PV Industry Adoption: Myth or Reality?
Ribeyron Pierre-Jean
CEA-INES, France

ORAL PRESENTATION

14:00-14:15
Defect Engineering for Silicon Heterojunction Solar Cells
Matthew Wright[1], Daniel Chen[1], Anastasia Soeriyadi[1], Bruno Vicari stefani[1], Moonyong Kim[1], Brett Hallam[1]
[1]University of New South Wales (UNSW), Australia

14:15-14:30
ASA Software for Opto-Electrical Simulation of Silicon, CIGS and Perovskite Solar Cells
Rudi Santbergen[1], Carlos Ruiz Tobon[1], Paul Procel Moya[1], Manvika Singh[1],
Nasim Rezaei[1], Andres Calcabrini[1], Miro Zeman[1], Olindo Isabella[1]
[1]Delft University of Technology, Holland

14:30-14:45
New Analysis Method to Evaluate Amorphous/Crystalline Si Interface for High Efficiency Heterojunction Solar Cells
Takefumi Kamioka[1], Yutaka Hayashi[2], Kazuhiro Gotoh[3], Ryo Ozaki[2], Motoo Morimura[2],
Ayako Shimizu[3], Kyotaro Nakamura[2], Noritaka Usami[3], Yoshio Ohshita[2], Atsushi Ogura[1]
[1]Meiji University, Japan
[2]Toyota Technological Institute Japan
[3]Nagoya University , Japan

14:45-15:00
Origins of Hydrogen for Bulk Defect Passivation in Silicon Heterojunction Solar Cells
Chang Sun[1], William Weigand[2], Daniel Chen[3], Jianwei Shi[2], Rabin Basnet[1],
Zhengshan Yu[2], Sieu Pheng Phang[1], Zachary C. Holman[2], Brett Hallam[3],
Daniel Macdonald[1]
[1]The Australian National University, Australia
[2]Arizona State University, USA
[3]University of New South Wales, Australia

15:00-15:15
Novel High-mobility IFO:H Film for Passivating Contacts in c-Si Solar Cells
Can Han[1], Luana Mazzarella[1], Yifeng Zhao[1], Guangtao Yang[1], Paul Procel[1],
Martijn Tijssen[1], Ana Montes[1], Luca Spitaleri[2], Antonino Gulino[2], Xiaodan Zhang[3]
Olindo Isabella[1], Miro Zeman[1]
[1]Delft University of Technology, Netherland
[2]University of Catania , Italy
[3]Nankai University , China

15:15-15:30
Optimized a-Si:H(i)/c-Si Interface Passivation and Band Alignment Via Hydrogen Dilution Treatment for Rear-Emitter Silicon Heterojunction Solar Cells
Zhuopeng Wu[1], Liping Zhang[1], Renfang Chen[1], Zhenfei Li[1], Fanying Meng[1],
Zhengxin Liu[1]
[1]Shanghai Institute of Microsystem and Information Technology, China

15:30-15:45
Study of the Various P-Type Material Rear Emitter Optimization for High Efficient Bifacial Rear Emitter Heterojunction Cells
Sangho Kim[1], Eun-chel Cho[1], Young Hyun Cho[1], Youngkuk Kim[1], Jinjoo Park[2],

Sunhwa Lee[1], Pham Duy Phong[1], Donghyun Oh[1], Junsin Yi[1]
[1]Sungkyunkwan University, Korea
[2]Cheongju University, Korea

15:45-16:00
Low Reflective Index Interlayer in Microcrystalline Silicon Oxide Front Contact Layers for Silicon Heterojunction Solar Cells
Chen-Wei Peng[1], Juyun Wang[1], Chao Lei[2], Wei Long[1], Cao Yu[1], Jingquan Zhang[2], Xixiang Xu[1]
[1]Hanergy Thin Film Power Group, China
[2]Sichuan University, China

Tuesday, November 5, Room 308 **9Tu01**

Area 9 Topcon Solar Cells

Session Chair: Jin Hao

INVITED SPEECH

13:30-13:50
Passivating Contacts for Silicon Solar Cells Based on Physical Vapour Deposition of Doped Silicon Films
Di Yan, Andres Cuevas, Sieu Pheng Phang, Yimao Wan, Wenjie Yang, Daniel Macdonald
Research School of Electrical, Energy and Materials Engineering, The Australian National University, Australia

13:50-14:10
Silicon-Based Carrier-Selective Passivating Contacts for High-Efficiency C-Si Solar Cells
Olindo Isabella
Delft University of Technology, Holland

ORAL PRESENTATION

14:10-14:25
Ultra-thin poly-Si Passivating Contacts for c-Si Solar Cells
Guangtao Yang[1], Paul Procel[1], Can Han[1], Luana Mazzarella[1], Manvika Singh[1], Arthur Weeber[1], Olindo Isabella[1], Miro Zeman[1]
[1]Delft University of Technology, Netherland

14:25-14:40
Mass Production of Low Cost Polysi Passivating Contacts N-Type Solar Cells
Zhang Wei[1], Wang Ziqian[1], Lang Fang[1], Ma Hongna[1], Zhang Wenhui[1], Li feng[1]
[1]Yingli Energy (China) Co., Ltd, China

14:40-14:55
Approaching 23% Cell Efficiency with Meyer Burger Single Side Passivated Contact Technology
Dirk Landgraf
Meyer Burger (Germany) GmbH, Germany

14:55-15:10

Band Bending at the TiO_2 Electron-Selective Contact/n-Si Interface Directly Observed by Hard X-ray Photoelectron Spectroscopy

Hyunju Lee[1], Takefumi Kamioka[2], Atsushi Ogura[2], Yoshio Ohshita[1]
[1]Toyota Technological Institute, Japan
[2]Meiji University, Japan

15:10-15:25

Development of Thin Poly-SiCx Passivating Contacts for c-Si Solar Cells

L. Mazzarella, Antonios Mandrampazakis[1], Can Han[2], Paul Procel[1], Yifeng Zhao[1], Guangtao Yang[1], Arthur Weeber[3], Olindo Isabella[1], Miro Zeman[1]
[1]Delft University of Technology, Netherland
[2]Delft University of Technology, Nankai University, Shenzhen Institute of Wide bandgap Semiconductors, Netherland
[3]Delft University of Technology, ECN.TNO Solar Energy, Netherland

15:25-15:40

Dopant Diffusion Through Pinholes and Continuous Oxide Layers in N-Type Polysilicon on Oxide (POLO) Passivating Contacts

Jan Krügener[1], Felix Haase[2], Christina Hollemann[2], Robby Peibst[2], Hans-Jörg OSten[3],
1Institute of Electronic Materials and Devices, Germany
2Institute for Solar Energy Research in Hamelin, Germany
3Institute of Electronic Materials and Devices; Laboratory of Nano and Quantum Engineering, Germany

15:40-15:55

Development of Ultra-thin Doped Poly-Si Layers for Passivated Contact Solar Cell Applications

Xia Yan, Ning CHEN[1], Firdaus Bin SUHAIMI[1], Menglei XU[2], Jie YANG[2], Xinyu ZHANG[2], Qi WANG[2], Hao JIN[2], Shanmugam VINODH[1], Shubham DUTTAGUPTA[1]
[1]SERIS, Singapore
[2]Jinko, China

ORAL PRESENTATION

Wednesday, November 6, Room 402 **2We02**

Area 2 Perovskite Solar Cells

Session Chair: Baomin Xu, Hairen Tan

INVITED SPEECH

08:30-08:50

Efficient and Stable Perovskite Solar Cell and Module

Liyuan Han
Shanghai Jiao Tong University, China

ORAL PRESENTATION

08:50-09:05

Fabricating Wide Bandgap Perovskite Solar Cells through Thermal Evaporating Method

Yong Peng, Zhiliang Ku, Yi-bing Cheng
Skate Key lab of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, China

09:05-09:20

Constructing a "litchi array" - Like Textured Perovskite Absorber with Excellent Light Harvesting in Planar Perovskite Solar Cells

Lin Fan, Pengfei Wang, Lili Yang, Fengyou Wang, Xiaoyan Liu, Maobin Wei, Huilian Liu, Jinghai Yang
Key Laboratory of Functional Materials Physics and Chemistry of the Ministry of Education, China.

09:20-09:35

Current Matching in Monolithic Two-terminal Perovskite/Silicon Tandem Cells via Band Gap Tuning

Zeguo Tang[1], Shaofei Yang[2], Yongcai He[1], Lin Mao[1], Tian Yang[1], Minghui Xie[1], Qing Chang[1], Lei Ding[1], Bo He[1], Zhenwei Peng[1], Cao Yu[1], Xia Hao[3], Jingquan Zhang[3], Hui Yan[4], Xixiang Xu[1]
[1]Hanergy Thin Film Power Group, China
[2]The Hanergy Thin Film Power Group Limited, China
[3]Sichuan University, China
[4]Beijing University of Technology, China

09:35-09:50

Compositional Engineering of Perovskite Materials for Tandem Devices

Fuhua Hou, Biao Shi, Yucheng Li, Lingling Yan, Peirun Chen, Pengyang Wang, Changchun Wei, Dekun Zhang, Guangcai Wang, Yi Ding, Qian Huang, Yuelong Li, Ying Zhao, Xiaodan Zhang
Institute of Photo-electronic Thin Film Devices and Technology of Nankai University, China

09:50-10:05
Efficient and Stable Monolithic All-perovskite Tandem Solar Cells
Renxing Lin, Ke Xiao, Qiaolei Han, Yuan Gao, Hairen Tan
Nanjing University, China

Wednesday, November 6, Room 402 **2We03**

Area 2 Perovskite Solar Cells

Session Chair: Sang Il Seok, Liyuan Han

INVITED SPEECH

10:30-10:50
Fabrication of High Efficiency and Highly Stable Perovskite Solar Cells
Baomin Xu
Southern University of Science and Technology, Shenzhen, China

ORAL PRESENTATION

10:50-11:05
Multi-Inch Single-Crystalline Perovskite Membrane for High-Detectivity Flexible Photosensors
Yucheng Liu, Yunxia Zhang, Zhou Yang, Kui Zhao, Shengzhong (Frank) Liu
Shaanxi Normal University, China

11:05-11:20
Accurate Efficiency Measurements for Emerging PV: A Comparison of NREL's Steady-State Performance Calibration Protocol Between Conventional and Emerging PV Technologies
Tao Song Tom Moriarty, Dean Levi
National Renewable Energy Laboratory, USA

11:20-11:35
Yttria Stabilized Zirconia-based Photoelectrodes for Perovskite Solar Cells
Marina Vildanova, Anna Nikolskaia, Sergey Kozlov, Olga Karyagina, Liudmila Larina, Oleg Shevaleevskiy
Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, Russia

11:35-11:50
Imaging Spatial Variations of Optical Bandgaps in Perovskite Solar Cells
Hieu Nguyen, Boyi Chen, Daniel Macdonald
The Australian National University, Australia

11:50-12:05
Pb-Reduced CsPb0.9Zn0.1I2Br Thin Films for Efficient Perovskite Solar Cells
Jing Zhang
Ningbo University, China

Wednesday, November 6, Room 405 **4We02**

Area 4 Thin-film Compound Semiconductor PV

Session Chair: Jin Hyeok Kim, Edgardo Saucedo

INVITED SPEECH

08:30-08:50

Cation Substitution Strategies for Bandgap Engineering in Kesterite Solar Cells

Edgardo Saucedo, Sergio Giraldo, Yudania Sanchez, Marcel Placidi, Victor Izquierdo-Roca, Alejandro Perez-Rodriguez
Catalonia Institute for Energy Research (IREC), Spain

ORAL PRESENTATION

08:50-09:05

Heterojunction Passivation for Beyond 10% Efficiency Cd-free CZTS Solar Cells by Nanoscale ALD-Alumina

Xin Cui, Kaiwen Sun, Jialiang Huang, Chang-Yeh Lee, Chang Yan, Heng Sun, Yuanfang Zhang, Martin Green, Bram Hoex, Xiaojing Hao
UNSW, Australia

09:05-09:20

Development of Kesterite-Type Thin Films by Using a Combinatorial Approach and High Throughput Characterization

Leo Choubrac, Lars Steinkopf, Taiseer Jokadar, Thomas Unold
HZB, Germany

09:20-09:35

High Performance Pure Selenized $Cu_2ZnSnSe_4$ Solar Cells by Sputtering from Cu-Zn-Sn-Se Quaternary Compound Target

Xinchen Li[1], Daming Zhuang[1], Ning Zhang[2], Ming Zhao[1], Yaowei Wei[1], Guoan Ren[1]
[1]Tsinghua University, China
[2]Beijing Sifang Crenergy Optoelectronics Technology Co., Ltd., China

09:35-09:50

Interface Passivation at CZTS/CdS Heterojunction through UV-O3 Treatment

Shengli Zhang[1], Yi Zhang[2], Minh Tam Hoang[3], Tuquabo Tesfamichael[3], Hongxia Wang[3]
[1]Nankai University & Queensland University of Technology, China
[2]Nankai University, China
[3]Queensland University of Technology, Australia

09:50-10:05

Investigation of Nanostructure at the Heterojunction Interface of High-Efficiency CZTS Solar Cell Using High-resolution Scanning Transmission Electron Microscopy

Jialiang Huang, Kaiwen Sun, Xin Cui, Xiaojing Hao
UNSW, Australia

Wednesday, November 6, Room 405

4We03

Area 4 Thin-film Compound Semiconductor PV

Session Chair: Yaohua Mai, Xianzhong Lin

INVITED SPEECH

10:30-10:50

II-VI Ternary Compound Semiconductors and Their Application in CdTe Solar Cells

Lili Wu

Sichuan University, China

ORAL PRESENTATION

10:50-11:05

Molecular Beam Epitaxy of $BaSi_2$ Light Absorbers with Smooth $BaSi_2$/Si Interface Using Three-Step Growth Method

Yudai Yamashita, Takuma Sato, Kaoru Toko, Takashi Suemasu

University of Tsukuba, Japan

11:05-11:20

SILAR Based ZnxCd1-xS Buffer Layers for Enabling High Voc in Vapor Transport Deposited SnS Thin-film Solar Cells

PRAVIN SHIVAJI PAWAR, Jaeyeong Heo

Chonnam National University, South Korea

11:20-11:35

The Effect of Growth Temperature and Duration on VTD-SnS Absorber Layer for Thin Film Solar Cells

Jaeyeong Heo, Jae Yu Cho

Chonnam National University, South Korea

11:35-11:50

Optical Characterization Methods of Photovoltaics New Materials

Xueyun Zhang, Yasaman Tabari-Saadi, Michael Nielsen, Henner Kampwerth, Xiaojing Hao

UNSW, Australia

11:50-12:05

Fabrication of Sb_2S_3 Planar Thin Film Solar Cell with Vapor Transport Deposition (VTD) Method

Yiyu Zeng, Kaiwen Sun, Jialiang Huang, Martin Green, Xiaojing Hao

University of new south wales, Australia

Wednesday, November 6, Room 313 **5We01**

Area 5 III-V Compound Semiconductor, Concentrator and Space PV Technologies

Session Chair: Nicholas Ekins-Daukes, Sun Qiang, Chen Nuofu

INVITED SPEECH

08:30-08:50
Development of Nanostructures and Light Management Strategies for Radiation Hard Multi-Junction Solar Cells
Seth Hubbard, Julia D'Rozario, George Nelson, Steve Polly
Rochester Institute of Technology, USA

08:50-09:10
High Efficiency Solar Cells for Space Application
He Wang Qiang Sun, Peng Gao
Tianjin Institute of Power Sources, China

ORAL PRESENTATION

09:10-09:25
Towards Scaling-Up of Plastic Integrated CPV (PIC) Panels: Status, Challenges and Prospects
Michihiko Takase[1], Kan-Hua Lee[1], Nobuhiko Hayashi[1], Shutetsu Kanayama[2], Kenji Araki
[1]Panasonic Corporation, Japan
[2]Toyota Technological Institute, Japan

09:25-09:40
Low-Mass, Flexible Thin Film III-V PV Cells & Modules for Low Earth Orbit Applications
Ian Cooper, Aarohi Vijh, Andy Ritenour, Paul Sims, Brendan Kayes
Alta Devices, USA

09:40-09:55
The Degradation of III-V Multijunction Solar Cells Under Non-Uniform Radiation Damages
Wu Yiyong[1], Guo Hongliang[1], Wu Yuemin[2], Sun Qiang[1], Yu Hui[1], Guo Bin[1]
[1]Harbin Institute of Technology
[2]Institute of Spacecraft System Engineering, China Academy of Space Technology, China

09:55-10:10
Scalable and Low Cost Back End of Line (BEOL) Technologies for Development of III-V Solar Cells
Nastaran Hayati-Roodbari, Carina Hendler, Alexander Wheeldon, Roman Trattnig
Joanneum Research Forschungsges.mbH, Austria

Wednesday, November 6, Room 313 **5We02**

Area 5 III-V Compound Semiconductor, Concentrator and Space PV Technologies

Session Chair: Nicholas Ekins-Daukes, Sun Qiang, Chen Nuofu

INVITED SPEECH

10:30-10:50

Integration of III-V Solar Cells with Silicon for Space & Terrestrial Applications and Opportunities for Ultra-Thin, Low Mass, Flexible Device Architectures

Andrew D Johnson
IQE Solar, UK

ORAL PRESENTATION

10:50-11:05

A Spectrum-Energy Model for Annual Yield Estimation of 2- And 4-Terminal Tandem Solar Cells

Hiroki Tawa[1], Hiromu Saiki[1], Yasuyuki Ota[1], Kenji Araki[2], Kohsuke Ueda[3], Tatsuya Takamoto[3], Masafumi Yamaguchi[2], Kensuke Nishioka[1]
[1]University of Miyazaki, Japan
[2]Toyota Technological Institute, Japan
[3]Sharp Corporation, Japan

11:05-11:20

Characteristics of Ge/Si1-xGex Film Grown on Si Substrate with Cut-off Angle

Meng Chen, Nuofu Chen, Quanli Tao, Zhenwen Chang
North China Electric Power University, China

11:20-11:35

Silicon Based Alloy Semiconductors Fabrication by Screen-Printing

Masahiro Nakahara, Shota Suzuki, Kosuke Tsuji, Marwan Dhamrin
Toyo Aluminium, Japan

11:35-11:50

A Novel Model of GaInP/InGaAs/GeSi Triple Junction Solar Cells

Quanli Tao, Nuofu Chen, Meng Chen, Zhenwen Chang, Dayan Ma
North China Electricity Power University, China

11:50-12:05

Can We Break the 43% Limit of the Annual Average Efficiency (Non-concentration)?

Kenji Araki, Daisuke Sato, Yasuyuki Ota, Kensuke Nishioka, Masafumi Yamaguchi
Toyota Technological Institute, Japan

Wednesday, November 6, Room 306 **7We01**

Area 7 Crystalline Silicon Solar Cells and Tandem Solar Cells

Session Chair: Armin Aberle, Qi Wang

INVITED SPEECH

08:30-08:50
Crystalline Silicon N-Type Solar Cells
Qi Wang
Zhejiang Jinko Solar, China

ORAL PRESENTATION

08:50-09:05
Fabrication of Bifacial Si Solar Cell with Very High Bifacial Factor
Wensheng Liang[1], Kean Fong[1], Jingnan Tong[1], Marco Ernst[1], Daniel Walter[1], Parvathala Narangari[1], Stephane Armand[1], Sachin Surve[1], Teng Kho[1], Keith McIntosh[2] Matthew Stocks[1], Klaus Weber[1], Andrew Blakers[1]
[1]Australian National University, Australian
[2]PV Lighthouse, Australian

09:05-09:20
Influence of Light Illumination on the Potential-induced Degradation of n-type Rear-emitter Crystalline Si Photovoltaic Modules
Yuansong Xu[1], Seira Yamaguchi[1], Kyotaro Nakamura[2], Atsushi Masuda[3], Keisuke Ohdaira[1]
[1]Japan Advanced Insistute of Science and Technology, Japan
[2]Toyota Technological Insistute, Japan
[3]National Institute of Advanced Industrial Science and Technology, Japan

09:20-09:35
Fabrication and Comparison of n-type and p-type Bifacial to Mono-facial Si Solar Cells
Kean Chern Fong[1], WenSheng Liang[1], Jingnan Tong[1], Marco Ernst[1], Daniel Walter[1], Parvathala Narangari[1], Sachin Surve[1], Teng Kho[1], Keith McIntosh[2], Matthew Stocks[1], Klaus Weber[1], Andrew Blakers[1]
[1]Australian National University, Australian
[2]PVLighthouse, Australian

09:35-09:50
Investigation of UVID on N-Type Solar Cell
Jikui Ma[1], Shang Qiao[1], Shufang Wang[1], Guangsheng Fu[1], Yonggang Guo[2], Zhicheng Song[2], Peng Dong[2]
[1]Heibei Key Laboratory of Optic-Electronic Information and Materials, College of Physics Science and Technology, Hebei University. China
[2]SPIC Xi'an solar power Co., Ltd.China

09:50-10:05
Investigation of Si Impact with Fine Line Al Printing on Narrow Point Contact Opening
Kosuke Tsuji, Marwan Dhamrin
Toyo Aluminium K.K.Japan

Wednesday, November 6, Room 306 **7We02**

Area 7 Crystalline Silicon Solar Cells and Tandem Solar Cells

Session Chair: Zhenguo Li, Makoto Konagai

INVITED SPEECH

10:30-10:50
Progress With Crystalline Silicon Solar Cells And Modules At SERIS
Armin Aberle
Solar Energy Research Institute of Singapore (SERIS), National University of Singapore (NUS), Singapore

10:50-11:10
Quasi-omnidirectional Silicon Solar Cells
Wenzhong Shen
Institute of Solar Energy, Shanghai Jiao Tong University

ORAL PRESENTATION

11:10-11:25
The Roadmap to 〉24% of PERC
Fan Jianbin
Longi Green Energy Technology Co. Ltd., China

11:25-11:40
PERC+POLO solar cells minimizing carrier recombination at the Ag front contact with simulated efficiency potential up to 23.8%
Thorsten Dullweber
Institute for Solar Energy Research Hamelin (ISFH), Germany

11:40-11:55
LeTID Phenomenon in Monocrystalline PERC
Zhu Haitao
Longi Green Energy Technology Co. Ltd. China

11:55-12:10
Advances in Screen Printed Metallization for Si-Solar Cells -Towards Ultra-Fine Line Contact Fingers Below 20 µm
Sebastian Tepner
Fraunhofer ISE, Germany

Wednesday, November 6, Room 308 **10WeO2**

Area 10 Performance and Reliability of PV Module

Session Chair: Zhiqiang Feng

INVITED SPEECH

08:30-08:50

Detail Analysis of Potential Induced Degradation in P-Type Crystalline Silicon Photovoltaic Modules

Yasuaki Ishikawa, Mohammad Aminul Islam, Dong Chung Nguyen·学生
Nara Institute of Science and Technology, Japan

ORAL PRESENTATION

08:50-09:05

Lifetime Prediction of Crystalline Si PV Modules under UV-Hygrothermal Stress

Yuji Ino[1], Tomonari Sakamoto[2], Kouichirou Niira[2] , Takuya Kurose[2], Shinsuke Uchida[2], Shinji Yada[2], Shirou Inoue[2], Kyosuke Fujiwara[2], Shuichi Asao[1], Katsuhiko Shirasawa[1], Hidetaka Takato[1]
[1]National Institute of Advanced Industrial Science and Technology (AIST), Japan
[2]KYOCERA Corporation, Japan

09:05-09:20

Analysis of PID on the Back of P-PERC Bifacial PV Module

Li Yuanyuan
SPIC XI 'AN SOLAR POWER CO., LTD, China

09:20-09:35

A Simple Method to Estimate Degradation Rates of Photovoltaics without Irradiance Data

Amornrat Limmanee, Nuttakarn Udomdachanut, Suttinan Jaroensathainchok Taweewat Krajangsang, Nopphadol Sitthiphol, Aswin Hongsingthong, Jaran Sritharathikhun
NECTEC, National Science and Technology Development Agency, Thailand

09:35-09:50

IEC TS 60904-1-2 Measurement of Current-Voltage Characteristics of Bifacial PV Devices

Jing Rongwei
TÜV SÜD Certification and Testing (China) Co., Ltd.

09:50-10:05

Indoor Accelerated Aging Test for Silicon PV Module with a Combined Procedure of Thermal Cycling and High Intensity Irradiance

Hao SongBingjie Zhu, Lin Zhang, Zhao Wu, Min Yun
CPVT, China

Wednesday, November 6, Room 308 **10WeO3**

Area 10 Performance and Reliability of PV Module

Session Chair: Guoqiang Xing

INVITED SPEECH

10:30-10:50

Newly Launched Mass Production Module Technologies with Dramatic Improvement in Power and Reliability

Guoqiang Xing

Canadian Solar Inc.

ORAL PRESENTATION

10:50-11:05

Research on Optimization of Structured Ribbon for Photovoltaic Module

Yan Yang, Jianxiong Ni, Jiong Zheng, Ying Zhang, Xiaodong Du, Chao Ma

State Key Laboratory of Photovoltaic Materials and Technology, Yingli Group Company Limited, China

11:05-11:20

Performance and Degradation Comparison for Long-term Reliability of Various Kinds of Photovoltaic Modules in the East of China

Bing Gao, Zhengxin Liu

Chinese Academy of Sciences-Shanghai Institute of Microsystem & Information Technology, China

11:20-11:35

Evaluation Long-term Reliability of Solar Module and Its Components by Field Study

Ji.Xia[1], Hongjie Hu[1], Kaushik Roy Choudhury[2], Thomas Felder[2], Jared Tracy[2], William J. Gambogi[2]

[1]DuPont (China) Research & Development and Management Co., LTD., China

[2]DuPont Company, USA

11:35-11:50

Performance and Durability of Transparent Backsheets for Bifacial PV Modules

William Gambogi[1], Michael Demko[1], Thomas Felder[1], Steven MacMaster[1], Bao-Ling Yu[1], Hongjie Hu[2], Zhen Pan[2], Daniel Hu[2], Kaushik Roy Choudhury[1]

[1]DuPont, USA

[2]DuPont (China) Research & Development and Management Co., Ltd., China

11:50-12:05

The Study on LeTID of Mono Crystalline CZ-silicon

Chunhua Zhong, jiangliangcong, Jianbo Wang, Cheng Zhu, Jun Lv

Longi Solar Technology Co., Ltd., Xi'an 710018, China

12:05-12:20
Optimization of Silicon PV Modules for Power/Yield and Durability Using Light Redirecting Films
James Ma[1], Alison Lennon[2]
[1]3M, USA
[2]University of New South Wales, Australia

Wednesday, November 6, Room 311 **13We02**

Area 13 PV Energy Storage and Novel PV Application

Session Chair: Xianfeng Li, Leo Liu

INVITED SPEECH

10:30-10:50
Electrochemical Energy Conversion and Storage for Sustainable Energy System
Baoguo Wang
Tsinghua University, China

10:50-11:10
Developing New Chemistries for Redox Flow Batteries
T. Leo Liu (Tianbiao Liu)
Utah State University, USA

ORAL PRESENTATION

11:10-11:25
Fabricate and Characterize a Curved Photovoltaic Roof-Tile with Architectural Aesthetics
Yishan
Hanergy Thin Film Power Group, MiaSoléChina High-tech Equipment Manufacturing Company, Fujian, China

11:25-11:40
Single Atom Tungsten Doped Ultrathin α-Ni(OH)2 for Enhanced Electrocatalytic Water Oxidation
Junqing Yan, Shengzhong Liu
Shaanxi Normal University, China

11:40-11:55
Development of a Global Atlas of Off-River Pumped Hydro Energy Storage
Matthew Stocks, Ryan Stocks, Bin Lu, Cheng Cheng, Andrew Blakers
Australian National University, Australia

Wednesday, November 6, Room 311 **14We01**

Area 14 PV Deployment, Markets, Policies and Financing

Session Chair: Hao Jin, Izumi Kaizuka

INVITED SPEECH

08:30-08:50
Policies and Status of Photovoltaic Solar Energy in Europe
Arnulf Jäger-Waldau
European Commission, DG JRC, EU

08:50-09:10
Evolution of Global PV Markets - The Latest Survey Results on PV Markets and Policies from the IEA PVPS Programme in 2018
Izumi Kaizuka
RTS Corporation, IEA PVPS Task 1, Japan

ORAL PRESENTATION

09:10-09:25
Technical, Financial and Environmental Feasibility Analysis of Photovoltaic EV Charging Stations with Energy Storage in China and the United States
Alonzo Sierra[1], Cihan Gercek[1], Angèle Reinders[2]
[1]University of Twente, Netherland
[2]University of Twente, Eindhoven University of Technology, Netherland

09:25-09:40
Life Cycle Comparative Analysis of Three Kinds of Photovoltaic Modules: p-Multi-BSF, p-Mono-PERC and n-Mono-HJT
Xiaojie Jia, Wenjing Wang
Institute of Electrical Engineering, Chinese Academy of Science (CAS), China

09:40-09:55
Latest Development of IEC 61215/61730 Standards
Bo Xiangxi
TÜV SÜD Certification and Testing (China) Co., Ltd., China

09:55-10:10
Energy Ratings of PV Modules
Christos Monokroussos
TÜV Rheinland (Shanghai) Co., Ltd., China

ORAL PRESENTATION

Thursday, November 7, Room 405 **1Th02**

Area 1 Advanced Concepts and New Emerging Materials for Future PV

Session Chair: Tao Chen

INVITED SPEECH

08:30-08:50

Perovskite Single and Multijunction Solar Cells

Joseph J. Berry
National Renewable Energy Labortory(NREL), USA

ORAL PRESENTATION

08:50-09:05

Optimization of Industrial Solar Cell Manufacturing Using Machine Learning

Casper Anton Eijkens, Yoann Buratti, Ziv Hameiri
University of New South Wales (SPREE UNSW), Australia

09:05-09:20

Improvements in Energy Yield and Financial Benefits for Next-generation DSM AR Coatings

Peter Pasmans
DSM, Netherland

09:20-09:35

Ni(X)Al(Y)O Alloy as a Charge Transport Material: Photoemission Study

Samed. Halilov[1], Md. Anower Hossain[2], Tian Zhang[2], Bram Hoex[2], Amir Abdallah[1], Sergey Rashkeev[1]
[1]QEERI, HBKU, Education |City, Doha, Qatar
[2]University of New South Wales, Australia

09:35-09:50

Heat Recovery (HERC) Solar Cell Using Thermoelectric Materials: HERC-SC Type II

Kenji Kamide[1], Toshimitsu Mochizuki[1], Hidefumi Akiyama[2], Hidetaka Takato[1]
[1]National Institute of Advanced Industrial Science and Technology (AIST), Japan
[2]The University of Tokyo, Japan

09:50-10:05

Improvement of Performance Ratio of Tandem Cells Using Super-multijunction Configuration–modeling and Outdoor Performance Validation

Kenji Araki[1], Daisuke Sato[1], Yasuyuki Ota[2], Kensuke Nishioka[2], Masafumi Yamaguchi[1]
[1]Toyota Technological Institute, Japan
[2]University of Miyazaki, Japan

Thursday, November 7, Room 306

1Th03

Area 1 Advanced Concepts and New Emerging Materials for Future PV

Session Chair: Xu Pan

INVITED SPEECH

10:30-10:50

Perovskite Material and Solar Cell Research by Surface Science and Advanced Characterization

Yabing Qi
Okinawa Institute of Science and Technology Graduate University (OIST), Japan

ORAL PRESENTATION

10:50-11:05

Hot Carrier Generation and Energy Selective Extraction in MOSFET-inspired Three Terminal Heterostructure

Zacharie Jehl Li-Kao[1, 4, 5], Oussama Ourahou[2], Daniel Suchet[2], Marc Bescond[3] Sergio Giraldo[4], Yoshitaka Okada[5], Jean-Francois Guillemoles[2]
[1]Catalonia Institute for Energy Research, Spain
[2]LIA NextPV, The University of Tokyo, Japan
[3]LIMMS/CNRS, University of Tokyo, Japan
[4]Catalonia Institute for Energy Research (IREC), Spain
[5]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

11:05-11:20

Demonstration of Three-Terminal GaAs//Si Tandem Solar Cells with a Back-Contact-Type Bottom Cell

Takeshi Tayagaki, Kikuo Makita, Tomihisa Tachibana, Hidenori Mizuno, Ryuji Oshima, Hidetaka Takato, Takeyoshi Sugaya
National Institute of Advanced Industrial Science and Technology (AIST), Japan

11:20-11:35

Charge Accumulation in Quantum Well Solar Cells Studied by Cross-sectional Kelvin Probe Force Microscopy

Takeshi Noda, Nobuyuki Ishida, Takaaki Mano
National Institute for Materials Science, Japan **6Mo01**

11:35-11:50

A New Designed PV Glass to Reduce the Shadowing Loss of the Finger Grid and Improve Solar Cell's Efficiency

Li Xiaodong, Sun Xipeng, Tie Jianrui, Tie Jianrui
Tianjin Hengdian Space Power Co., Ltd, China

Thursday, November 7, Room 402 **2Th04**

Area 2 Perovskite Solar Cells

Session Chair: Tekeru Bessho, Zhike Liu

INVITED SPEECH

08:30-08:50

Development of a Large-area Film-based Perovskite Photovoltaic Module

Shigehiko Mori, Haruhi Ohka, Hideyuki Nakao, Akio Amano, Kenji Todori
Corporate Research & Development Center, Toshiba Corporation, Japan

ORAL PRESENTATION

08:50-09:05

Chemical Origin of Photoluminescence of Cesium-Bismuth-Bromide Perovskites and Improved Luminescence via Transition Metal Chloride Additives

Joonyun Kim, Jinu Park, Byungha Shin
KAIST, Korea

09:05-09:20

Revealing the Hidden Process Parameters of Co-Evaporation: A Practical Guideline for Efficient Co-Evaporated Perovskite Absorbers

Tobias Abzieher, Michael Hetterich, Bryce S. Richards, Uli Lemmer, Michael Powalla, Ulrich W. Paetzold
Karlsruhe Institute of Technology, Germany

09:20-09:35

Green Anti-solvent Processed Planar Perovskite Solar Cells and Its Hysteresis Modulation

Xiaojia Zheng, Deyu Xin, Min Zhang, Zenghua Wang, Wen-Hua Zhang
Sichuan Research Center of New Materials, Institute of Chemical Materials, China Academy of Engineering Physics, China

09:35-09:50

Scalable Printing Perovskites for High Efficiency Photovoltaic Solar Cells

Fei Guo, Yaohua Mai
Jinan University, China

09:50-10:05

Scalable and Efficient Perovskite Solar Cells in Ambient Air with Spray-Coated Active Layer

Jian Su, Hongkun Cai, Jingtao Yang, Xiaofang Ye, Rui Han, Jian Ni, Juan Li, Jianjun Zhang
Nankai University, China

Thursday, November 7, Room 402

2Th05

Area 2 Perovskite Solar Cells

Session Chair: Shigehiko Mori, Yong Peng

INVITED SPEECH

10:30-10:50

Photovoltaic Properties of Less-Hysteresis by Potassium Doped Perovskite Solar Cells

Takeru Bessho

The University of Tokyo, Japan

ORAL PRESENTATION

10:50-11:05

A Technoeconomic Analysis of Perovskite Solar Cell Technology

Zhenrui Yu

Svolt Energy Technology Co. Ltd, China

11:05-11:20

Synergistic Improvement of Perovskite Film Quality for Efficient Solar Cells via Multiple Chloride Salt Additives

Fei Ma, Shaiqiang Mu, Zema Chu, Yang Zhao, Qiufeng Ye, Shiqi Yu, Jingbi You

Key Laboratory of Semiconductor Materials Science, Institute of Semiconductors, Chinese Academy of Sciences, China

11:20-11:35

Sputtered Aluminum Doped Zinc Oxide as the Rear Electrode for the Semitransparent Perovskite Solar Cell

Nan Li[1], Jin Yan[1], Yuqian Ai[1], Fanping Meng[1], Feng Huang[1], Chuihui Shou[2], Jiang Sheng[1], Baojie Yan[1], Jichun Ye[1]

[1]Ningbo Institute of Material Technology and Engineering, China

[2]Zhejiang Energy Group R&D , China

11:35-11:50

Graded Bandgap CsPbI2+xBr1-x Perovskite Solar Cells with a Stabilized Efficiency of 14.4%

Bian Hui, Dongliang Bai, Kang Wang, Lei Liang, Haoran Wang, Jingru Zhang, Zhiwen Jin, Qian Wang, Shengzhong (Frank) Liu

Shaanxi Normal University, China

11:50-12:05

Nb-doped TiO_2 Nanospindles as Superior Electron Transporting Materials for High Performance Planar Structured Perovskite Solar Cells

Bing Cai, Yinhua Lv, Wenhua Zhang

Institute of Chemical Materials, China Academy of Engineering Physics, China.

Thursday, November 7, Room 402 **2Th06**

Area 2 Perovskite Solar Cells

Sessior Chair: Shengzhong Liu, Tingli Ma

INVITED SPEECH

13:30-13:50

Low-cost New Carbon Electrodes for Effective Sandwich-structured Perovskite Solar Cells

Fanning Meng[1], Liguo Gao[1], Chu Zhang[2], Tingli Ma[3]
[1]Dalian University of Technology, China
[2]China Jiliang University, China
[3]Kyushu Institute of Technology, Japan

ORAL PRESENTATION

13:50-14:05

High Efficiency Flexible Perovskite Solar Cells

Shengzhong (Frank) Liu, Jiangshan Feng, Dong Yang, Yucheng Liu, Kui Zhao
Shaanxi Normal University, China

14:05-14:20

Material Engineering towards Stable/Lead-Free Perovskite Solar Cells

Feng Wang[1], Weihua Ning[1], Ni Zhao[2], Feng Gao[1]
[1]Linköping University, Sweden
[2]The Chinese University of Hong Kong, China

14:20-14:35

Ionic Liquid for Facile Fabrication of Efficient and Stable Perovskite Solar Cells

Yonghua Chen[1], Lingfeng Chao[1], Wei Huang[2]
[1]Nanjing Tech University, China
[2]Northwestern Polytechnical University, China

14:35-14:50

Controlling Ions Lateral Diffusion of Perovskite Solar Modules for 1000 Hours Light and Thermal Stability

Enbing Bi, Han Chen, Liyuan Han
Shanghai Jiao Tong University, China

14:50-15:05

Retarding Thermal Degradation in Hybrid Perovskites by Ionic Liquid Additives

Rui Xia[1], Yifeng Chen[1], Daming Chen[1], Zhiqiang Feng[1], Cristina Roldán-Carmona[2], Mohammad Khaja Nazeeruddin[2]
[1]Trina solar, China
[2]EPFL, Swiss

15:05-15:20
The Thermal Behavior of Planar Perovskite Solar Cells
Changbao Han, Yichuan Chen, Qi Meng Yueyue Xiao, Junjie Sun, Hongli Gao, Yongzhe Zhang, Hui Yan
Beijing University of Technology, China

15:20-15:35
Influence of Device Architecture and Absorber Composition on the Thermal Stability of Perovskite Solar Cells
Jonas A. Schwenzer, Tobias Abzieher, Bryce S. Richards, Uli Lemmer, Ulrich W. Paetzold
Karlsruhe Institute of Technology, Germany

15:35-15:50
Achieving Efficient and Stable Perovskite Photovoltaics through Material Design
Yao Kai, Zhou Lang
Nanchang University, China

Thursday, November 7, Room 306 **3Th02**

Area 3 Organic Solar Cells

Session Chair: Feng Gao

INVITED SPEECH

08:30-08:50
Morphology Control during Blade-coating of Organic Solar Cells
Wei Ma
Xi'an Jiaotong University, China

08:50-09:10
n-Type Polymer Semiconductors Containing B←N Unit and Their Application in OPVs and OFETs
Jun Liu, Chuandong Dou, Zicheng Ding, Lixiang Wang
Changchun Institute of Applied Chemistry, Chinese Academy Of Sciences, China

ORAL PRESENTATION

09:10-09:22
Volatilizable Solid Additives in Highly Efficient Non-fullerene Organic Solar Cells
Runnan Yu[1], Huifeng Yao[2], Jianhui Hou[2]
[1]Beijing University of Chemical Technology, China
[2]Institute of Chemistry, Chinese Academy of Sciences , China

INVITED SPEECH

09:22-09:42

Interfacial Engineering and Optical Coupling for Multicolored Semitransparent Inverted Organic Photovoltaics

Zhan'ao Tan[1], Yiming Bai[2], Chunyan Zhao[2], Shuai Zhang[1]
[1]Beijing University of Chemical Technology, China
[2]North China Electric Power University, China

09:42-10:02

Printable Interlayers for Large-area Organic Solar Cells

Bowei Xu
Institute of Chemistry, Chinese Academy of Sciences, China

ORAL PRESENTATION

10:02-10:14

Highly Efficient Interfacial Layers for Polymer Solar Cells

Zhong Zheng[1], Jianhui Hou[1]
[1]Institute of Chemistry CHinese Academy of Sciences, China

Thursday, November 7, Room 405 **4Th04**

Area 4 Thin-film Compound Semiconductor PV

Session Chair: Yonghang Zhang, Deliang Wang

INVITED SPEECH

10:30-10:50

Recent Advances and Future Challenges in CdTe Photovoltaics

Wyatt Metzger
National Renewable Energy Laboratory(NREL), USA

ORAL PRESENTATION

10:50-11:05

Comparison Study of Monocrystalline 1.7-eV MgCdTe Solar Cells with 15.2% Efficiency

Jia Ding, Jacob Becker, Cheng-Ying Tsai, Calli Campbell, Yong-Hang Zhang
Arizona State University, USA

11:05-11:20

Band Offsets in Thin-Film CdTe Solar Cells

James Sites, Alexandra Bothwell, Pascal Jundt
Colorado State University, USA

11:20-11:35

Surface Passivation of Metal Oxide for CdTe

Lingling Wu, Zihan Li, Dongming Wang, Yanbo Cai, Xunyong Lei, Deliang Wang
University of Science and Technology of China, China

11:35-11:50
Ionized Oxygen Vacancy in Highly Conductive Mg0.2Zn0.80 Film
Dongming Wang, Lingling Wu, Guangwei Wang, Yanbo Cai, Deliang Wang
University of Science and Technology of China, China

11:50-12:05
Variations in Grain Boundary Recombination in Cadmium Telluride Solar Cells
Thomas Fiducia[1], Kexue Li[2], Junliang Liu[3], Chris Grovenor[3], Budhika Mendis[4], Amit Munshi[5], Kurt Barth[5], Walajabad Sampath[5], Ryan Maclachlan[1], Vladislav Kornienko[1], Yau Yau Tse[1], Michael Walls[1]
[1]Loughborough University, Britain
[2]Manchester University, Britain
[3]Oxford University, Britain
[4]Durham University, Britain
[5]Colorado State University, USA

12:05-12:15
Poly-CdTe Thin-film Solar Cell with 19.25% Efficiency
Xuanzhi Wu, Peng Zhou, Dikun Lao, Wu Zhan, Yuxia Jiang, Xinyuan Qin, Haibing Ying, Mengfei Zhang, Anhong Hu, Jie Zhou
LONGYAN ENERGY TECHNOLOGY (ADVANCED SOLAR POWER (HANG ZHOU) INC.)

Thursday, November 7, Room 405 **4Th05**

Area 4 Thin-film Compound Semiconductor PV

Session Chair: Michael Powalla, Daming Zhuang

INVITED SPEECH

13:30-13:50
A Sunny Outlook of CdTe PV
Gang Xiong
First Solar, USA

ORAL PRESENTATION

13:50-14:05
Electroplated CdSeTe Solar Module
Kuo-Jui Hsiao
Reel Solar Power Inc., USA

14:05-14:20
High Efficiency Ag-Alloyed Cu(In, Ga)Se_2 Thin Film Solar Cells Reaching 22.9%
Oleksandr Bilousov, Viktor Fjällström, Viktoria Gusak, Philippe Lingois, Sven-Olof Katterwe, Tobias Jarmar, Erik Wallin, Olle Lundberg, Lars Stolt,
Solibro Research AB, Sweden

14:20-14:35
Low Band Gap Cu(In, Ga)Se_2 Absorber for Perovskite - Chalcopyrite Tandem Cells
Pieter Bolt[1], Maarten van der Vleuten[1], Marcel Simor[1], Remi Aninat[1],
Mirjam Theelen[1], Valerio Zardetto[1], Dong Zhang[1], Guy Brammertz[2],
Bart Vermang[2], Pieter Bolt[1]
[1]TNO, Netherlandd
[2]Imec, Belgium
14:35-14:50
Fast Growth of Cu(In, Ga)$(S, Se)_2$ Solar Cell Absorbers under Atmospheric Pressure
Pablo Reyes-Figueroa, Guillermo Farias-Basulto, Erik Waack, Ralf Haberecht,
Reiner Klenk, Rutger Schlatmann
Helmholtz-Zentrum Berlin

14:50-14:55
Break
Session Chair: Shigeru Niki, Lars Stolt

INVITED SPEECH

14:55-15:15
Progress in Understanding CIGS Solar Cells with Efficiencies above 22%
Michael Powalla
ZSW Baden-Württemberg, Germany

ORAL PRESENTATION

15:15-15:30
Materials Designs of $(Cu_{1-x}Ag_x)InSe_2$ and Cu/Ag-poor $(Cu_{1-x}Ag_x)In_5Se_8$ Systems for Ag-Alloyed $CuInSe_2$-Based Solar Cell Application
Tsuyoshi Maeda, Tomoya Ishida, Takahiro Wada
Ryukoku University, Japan

15:30-15:45
Study of Defect Properties in RbF Treated Cu(In, Ga)Se_2 Solar Cells
Hamidou TANGARA[1], Setareh Zahedi-Azad[2], Jennifer Ophelie Lydia NOT[3],
Jakob Schick[2], Alban Lafuente Sampietro[1], Roland Scheer 2, Takeaki Sakurai[1]
[1]University of Tsukuba, Japan
[2]Martin-Luther-Universität Halle-Wittenberg, Germany
[3]Université Grenobles Alpes, University of Tsukuba, France

15:45-16:00
Study on Cu(In, Ga)$(Se, S)_2$ Solar Cells Fabricated via Sputtering Quaternary Targets and Annealing in Sulfur-containing Atmosphere
Xunyan Lyu, Daming Zhuang, Ming Zhao, Yaowei Wei, Guoan Ren, Yixuan Wu, Chen Wang
School of Materials Science and Engineering, Tsinghua University, China

Thursday, November 7, Room 313 **7Th03**

Area 7 Crystalline Silicon Solar Cells and Tandem Solar Cells

Session Chair: Zhiqiang Feng, Xiaodan Zhang

INVITED SPEECH

08:30-08:50
Silicon-Perovskite Hybrid Tandem Devices
A. W. Weeber
ECN, TNO, TU Delft, Netherlands

08:50-09:10
Recent Progress of Rib Si Solar Cell Technology and Its Application to InGaP/Si Spectrum
Makoto Konagai
Advanced Research Laboratories, Japan

ORAL PRESENTATION

09:10-09:25
Large Area Efficient Monolithic Perovskite/Homo-Junction-Silicon Tandem Solar Cell
Jianghui Zheng[1], Jonathan Lau[1], Hamid Mehrvarz[1], Fa-Jun Ma1, Yajie Jiang[1], Xiaofan Deng[1], Anastasia Soeriyadi[1], Jincheol Kim[1], Meng Zhang[1], Long Hu[1], Xin Cui[1], Da Seul Lee[1], Jueming Bing[1], Yongyoon Cho[1], Chwenhaw Liao[1], Yang Li[1], Yong Li[1], Chao Chen[2], Martin Green[1], Shujuan Huang[1], Anita Ho-Baillie[1]
[1]Australian Centre for Advanced Photovoltaics, (UNSW), Australia
[2]Xiamen University, China

09:25-09:40
Detailed Analysis of 25% Silicon IBC, and IBC-Tandem Solar Cells
Kean Chern Fong[1], Osorio Mayon[1], The Duong[1], Wensheng Liang[1], Teng Kho[1], Sachin Surve[1], Keith McIntosh[2], Matthew Stocks[1], Andrew Blakers[1]
[1]Australian National University, Australia
[2]PVLighthouse, Australia

09:40-09:55
Fabrication of III-V/Si Tandem Solar Cells by the Copper Nanoparticle Array-Mediated Smart Stack Approach
Hidenori Mizuno
Research Center for Photovoltaic Technologies (AIST), Japan

09:55-10:10
Application of Laser-Assisted Dielectric Patterning in the Development of Small-size Silicon Cells for Tandem Applications
Mei Huang, Tianyuan Liu, Maung Thway, Xia Yan, Armin G. Aberle, Fen Lin, Rolf Stangl
National University of Singapore, Singapore

Thursday, November 7, Room 313 **7Th04**

Area 7 Crystalline Silicon Solar Cells and Tandem Solar Cells

Session Chair: Pierre J. Verlinden, Arthur W. Weeber

INVITED SPEECH

10:30-10:50

Nanoscale Thin Films for Contact and Surface Passivation of Silicon Solar Cells

Bram Hoex
University of New South Wales, Australia

ORAL PRESENTATION

10:50-11:05

In-situ Doped PolySi Passivating Contacts Resulting in over 22% Perpoly Cells

Kees Tool[1], John Anker[1], Maciej Stodolny[1], Gaby Janssen[1], Astrid Gutjahr[1], Martijn Lenes[2], Peter Venema[2], Jochen Loffler[1]
[1]ECN.TNO Solar, Netherland
[2]Tempress Systems BV, Netherland

11:05-11:20

Metal Nitride Electron-Selective Contacts for Crystalline Silicon Solar Cells

Xinbo Yang, Stefaan De Wolf
King Abdullah University of Science and Technology, Saudi Arabia

11:20-11:35

Effect of Encapsulant on Bifacial Silicon Heterojunction Solar Cell Operation for High Latitudes

Mandy R. Lewis[1], Christopher E. Valdivia[1], Erin M. Tonita[1], Ras-Jeevan K. Obhi[1], Mariana I. Bertoni[2], Karin Hinzer[1]
[1]SUNLAB, University of Ottawa/DEfECT Lab, Arizona State University, Canada
[2]DEfECT Lab, Arizona State University, Canada

11:35-11:50

Lithography-free and Dopant-freeBack-contact Silicon Heterojunction Solar Cells

Yurong Zhou, Zongheng Sun, Fengchao Li, Yuqin Zhou, Fengzhen Liu
University of Chinese Academy of Sciences, China

11:50-12:05

A New High-Quality Surfaces Passivation Technology for Si Solar Cells Without Use of Vacuum Equipment and Thermal Budget

Kunpeng Ge[1], Linlin Yang[1], Jianxin Guo[1], Lu Wan[1], Feng Li[2], Ying Xu[1], Jianhui Chen[1], Dengyuan Song[2]
[1]Hebei university, China
[2]Yingli Green Energy Holding Co. China

Thursday, November 7, Room 313 **7ThO5**

Area 7 Crystalline Silicon Solar Cells and Tandem Solar Cells

Session Chair: Dengyuan Song, Meng Tao

INVITED SPEECH

13:30-13:50
Sustainability of Today's Si PV Technology
M. Tao
Arizona State University, USA

13:50-14:10
Ag-Free Paste Solutions for High Efficiency Silicon Solar Cells
M. Dhamrin
Toyo Aluminium K. K. Shiga, Japan

ORAL PRESENTATION

14:10-14:25
Degaradation Behavior of the PERC Solar Cells after IEC 61215 Damp Heat Test in Dark
Gaofei Li[1], Jin Huang[1], Peng Wang[2], Jilei Wang[1], Miao Wang[1], Pengfei Hao[1], Linfeng Lu[2]
[1]Jinneng Clean Energy Limited Company, China
[2]Shanghai Advanced Research Institute, Chinese Academy of Sciences, China

14:25-14:40
Current Status and Development of Mass Production of Multicrystalline Q.ANTUM p-type Solar Cells
Alexander To, Bernhard Kloeter, Kai Petter
Hanwha Q CELLS GmbH, Germany

14:40-14:55
Carrier Distribution Investigation of Potential-Induced Degradation in Monocrystalline Silicon Solar Cell Using Scanning Nonlinear Dielectric Microscopy
Yasuo Cho[1], Sachiko Jonai[2], Atsushi Masuda[2]
[1]Tohoku University, Japan
[2]National Institute of Advanced Industrial Science and Technology, Japan

14:55-15:10
Machine learning for Q.ANTUM production optimization
Bernhard Klöter, Sven Wasmer
Hanwha Q CELLS GmbH, Germany

15:10-15:25
High performance & flexible passivation stacks realized by industrial scale batch-type plasma-enhanced atomic layer deposition/chemical vapor deposition (PEALD/CVD) platform for high efficiency solar cell manufacturing
He Zhang, Xiang Li, Weiming Li
Jiangsu Leadmicro Nano-Equipment Technology Ltd, China

15:25-15:40
Research on the Effect of Large Diameter Single Crystal on Crystal Quality
Tingting Du, Nannan Fu, Hao Deng, Rui Zhou
Longi Green Energy Technology Co. Ltd, China

Thursday, November 7, Room 306 **8Th02**

Area 8 Thin Film, IBC and HITsolar Cells

Session Chair: Pierre Verlinden, RIBEYRON Pierre-Jean

INVITED SPEECH

13:30-13:50
High-efficiency Technology of Silicon Heterojunction Solar Cells
Mitsuhiro Matsumoto
Panasonic, Japan

13:50-14:10
Road of Amorphous/Crystalline Silicon Heterojunction (SHJ) Solar Cells of SIMIT from Lab to Industry
Fanying Meng
Shanghai Institute of Microsystem & Information Technology (SIMIT) Chinese Academy of Sciences, China

ORAL PRESENTATION

14:10-14:25
Insight of Hydrogen Plasma Etching on the Improvement of surface passivation in Silicon Wafer Heterojunction Solar Cells
Ge Jia[1], Muzhi TANG[2], Thomas MUELLER[3]
[1]Nanjing Tech University, China
[2]REC Solar Pte. Ltd, Singapore
[3]Solar Energy Research Institute of Singapore, Singapore

14:25-14:40
Study on the Influence of N-type Monocrystalline Silicon Quality on HJT Cell Efficiency
Nannan Fu[1], Hao Deng[1]
[1]LONGi Green Energy Technology Co., Ltd., China

14:40-14:55
Achieving High Efficiency Silicon Heterojunction Solar Cells by Applying Porous Amorphous Silicon Buffer Layers with No Epitaxial Growth
Tianyu Ruan[1], Minghao Qu[2], Xiaoning Ru[2], Xianlin Qu[1], Jianqiang Wang[1], Yongcai He[1], Kun Zheng[1], Xixiang Xu[2], Cao Yu[2], Yongzhe Zhang[1], Hui Yan[1]
[1]Beijing University of Technology, China
[2]Hanergy Thin Film Power Group Ltd. China

15:10-15:25
Progress in HJT Solar Cells and Modules about the 100MW Mass Production Line in Jinergy
Gaofei Li[1], Liyou Yang[1], Jilei Wang[1], Juan Zhang[1], Yong Gao[1], Jin Huang[1], Yanhui Bai[1], Linfeng Lu[2], Dongdong Li[2], PengWang[2], Guanlin Du[2]
[1]Jinneng Clean Energy Limited Company, Lvliang, Shanxi 032100, China
[2]Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai 201210, China

15:25-15:40
Increasing the Performance of Silicon Heterojunction Solar Cells by Heat-Assisted Light Soaking
Hexian Zhang
Gsolar Power CO., Ltd, China

15:40-15:55
Optimised Design of Silicon Heterojunction Solar Cells for Field Operating Conditions
Jean Cattin[1], Olivier Dupré[1], Brahim Aïssa[2], Jan Haschke[1], Christophe Ballif[1], Mathieu Boccard[1]
[1]EPFL, Switzerland
[2]Hamad Bin Khalifa University - QEERI, State of Qatar

15:55-16:10
Pushing the Practical Efficiency Limit of Passivated Contacts Solar Cells Using Thin CZ-wafers
André Augusto, Pradeep Balaji, Joseph Karas, Richard R. King, Stuart G. Bowden
Arizona State University, USA

Thursday, November 7, Room 308 **9Th02**

Area 9 Topcon Solar Cells

Session Chair: Rensheng Liu

INVITED SPEECH

13:30-13:50
Silicon Alloys for Silicon Heterojunction and Passivated Contact Solar Cells
Kaining Ding
Forschungszentrum Jülich GmbH, Germany

13:50-14:10
TOPCon - Improvements in Laboratory and Industrialization at Fraunhofer ISE
Frank Feldmann
Fraunhofer ISE, Germany

ORAL PRESENTATION

14:10-14:25
The Development and Mass-production of Bifacial nTOPCon Silicon Solar Cells and Modules
Cheng Chen
Jolywood Solar Technology Co. Ltd., China

14:25-14:40
Investigation of the Light Soaking Stability of Contact-passivated Solar Cells Employing Ultra-thin ALD AlOx as the Tunnel Layer
Zheng Xin[1], Zhi Peng Ling[2], Rolf STANGL[1], Jian Wei HO[1]
[1]Solar Energy Research Institute of Singapore, Singapore
[2]REC Solar Pte. Ltd. , Singapore

14:40-14:55
Stability Study on the Passivation Quality of Polysilicon-based Passivating Contacts for Silicon Solar Cells
Hang Cheong Sio, Daniel Macdonald, Hang Cheong Sio, Di Kang
The Australian National University, Australia

14:55-15:10
Analysis of Screen-printed Metallisation of monoPolyTM Cells
Ankit Khanna[1], Pradeep Padhamnath[1], Naomi Nandakumar[1], James Lai[1] , Jeffrey Ison[1], Deng Wang[2], Qian Sun[2], Ming Huang[2], Shumei Huang[2], Baobing Fan[2], Bingbing Ding[2], Vinodh Shamugam[1], Shubham Duttagupta[1]
[1]SERIS, Singapore
[2]China

15:10-15:25
Development of Industrial High Efficiency N-type Solar Cell with Passivated Contact Technololy
Dawei Liu, Yufeng Ni
SPIC Xi'an Solar Power Co., Ltd, China

15:25-15:40
Combining Poly-Silicon on Oxide Solar Cells with Cast-Mono Wafers: an Alternative Path for Low Carbon-Footprint Premium Products?
DUBOIS Sébastien, ROUSSEAU Sylvain, CABAL Raphael, DESRUES Thibaut, HAYES Maxim, LANTERNE Adeline, MARTEL Benoit, OLIVEAU Camille, PIHAN Etienne
CEA-INES, France

15:40-15:55
Luminescence: Science and Applications in Silicon Photovoltaics
Hieu Nguyen, Daniel Macdonald
The Australian National University, Australia

15:55-16:10
Passivation with Ultrathin SiO_x and Poly-SiN_x on c-Si for TOPCon Solar Cells
Qing Yang, Yuheng Zeng, Zhixue Wang, Xueqi Guo, Zhe Rui, Baojie Yan, Jichun Ye
Ningbo Institute of Materials Technology & Engineering, China

Thursday, November 7, Room 311 **10Th04**

Area 10 Performance and Reliability of PV Module

Session Chair: Atsushi Masuda

INVITED SPEECH

08:30-08:50
LID and LETID in PERC type Solar Modules: Ensuring High and Consistent Energy Yields
Max B. Koentopp
Hanwha Q CELLS GmbH, USA

08:50-09:10
Low Uncertainty PV Module Calibrations
Nikos Kopidakis
National Renewable Energy Laboratory, USA

ORAL PRESENTATION

09:10-09:25
Quantitative Evaluation of Outdoor Degradation Rate of PV System by Analyzing Output Current , Voltage and Power
Takehiro Yoshida, Kanako Kawasaki, Hiroto Koshirae, Yuzuru Ueda
Tokyo University of Science, Japan

09:25-09:40
Balanced Contact Method to Reduce Thermomechanical Stress in Silicon Solar Cells Induced by Interconnection
Pei-Chieh Hsiao[1], Zhimeng Wang[1], Ning Song[1], Yang Li[1], Zi Ouyang[1], Chen Zhu[2], Jun Lv[2], Canjun Shen[2], Cheng Chen[2], Guoqing Chen[2], Xueqing Zhang[2]
[1]School of Photovoltaics and Renewable Energy Engineering, UNSW, Australia
[2]LONGi Solar Technology Co, China

09:40-09:55
Recovery of CIGS Solar Cells from PID Stress with Spectrally Selective Illumination and Light Soaking
Keiichiro Sakurai[1], Hiroshi Tomita[2], Shuuji Tokuda[2], Darshan Schmitz[2], Hajime Shibata[1], Atsushi Masuda[1]
[1]AIST, Japan
[2]Solar Frontier, Japan

09:55-10:10
Establishing the Long Term Reliability Performance of Flexible PV Modules from Accelerated Testing
Bill J.J. Liu, Venkata Bheemreddy
Miasole, USA

Thursday, November 7, Room 308 **11Th01**

Area 11 PV Systems Including BOS Component

Session Chair: Boris. Farnung

INVITED SPEECH

08:30-08:55
Long-term Trends of in-plane-irradiance, Energy Yield and Performance for PV Systems
Björn Müller
Fraunhofer Institute for Solar Energy Systems, Germany

ORAL PRESENTATION

08:55-09:15
Development of a Big Data Bank for PV Monitoring Data, Analysis and Simulation in COST Action PEARL PV
Angele Reinders[1], Wilfried van Sark[1], David Moser[2]
[1]University of Twente and Eindhoven University of Technology, Netherland
[2]EURAC, Italy

09:15-09:35
Artificial Intelligence Algorithm for Bifacial Solar Tracking System
Shitao Wang
Arctech Solar Holding Co., Ltd, China

09:35-09:55
Is Tracker Allocation Optimization in Monsoon Region Different from North America and Europe?
Kenji Araki[1], Daisuke Sato[1], Yasuyuki Ota[2], Kensuke Nishioka[2], Masafumi Yamaguchi[1]
[1]Toyota Technological Institute, Japan
[2]University of Miyazaki, Japan

Thursday, November 7, Room 308 **11Th02**

Area 11 PV Systems Including BOS Component

Session Chair: Haitao Liu

INVITED SPEECH

10:30-10:55
Intelligent Microgrid-System Solutions for Distributed Energy
Huang Lang
TBEA Xinjiang Sunoasis Co., Ltd. China

ORAL PRESENTATION

10:55-11:15
Photovoltaics in the Urban Environment: Towards a Fast, Accurate and Remote 3D-Based Energy Potential Simulation Framework
Andres Calcabrini, Hesan Ziar, Olindo Isabella, Miro Zeman
Delft University of Technology, Netherland

11:15-11:40
River PV Pump Systems and Its Role in Local Economic and Society Development
Zuming Liu, Jiehui Li, Jun Dong
Yunnan Normal University/Yunnan ZY Energy Corporation, China

11:40-12:00
A Fault Detection Method Based on Similarity Measurement for Photovoltaic System
Chen Chen, Wu Linyong, Ce Ji, Shukai Tian, Liying Luo
Xi'an LONGi Clean Energy Co., Ltd. China

Thursday, November 7, Room 308 **12Th01**

Area 12 PV System Integration Including Smart Grid

Session Chair: Yibo Wang, Luciano Martini

INVITED SPEECH

10:30-10:50
Cooperation with Neighboring Countries to Realize Super Grid in Northeast Asia
Jinsoo Song
Northeast Asia Renewable Energy Institute

10:50-11:10
Researches and Practices of Grid Integration Technology
Lingzhi Zhu
New energy research center, China electric power research institute

11:10-11:30
An Overview of Global Grid Codes for the Integration of High Penetration of Solar PV Systems
Roland Bründlinger
Austrian Institute of Technology (AIT), Austria

ORAL PRESENTATION
11:30-11:45
Large-scale Solar Energy Integration in Australia and the Asia-Pacific
Bin Lu, Andrew Blakers, Matthew Stocks, Cheng Cheng, Anna Nadolny
Australian National Univerisity, Australia

11:45-12:00
Integrating High PV Penetrations into Restructured Electricity Industries - Experience from the Australian National Electricity Market
Iain MacGill, Navid Haghdadi, Anna Bruce
UNSW Sydney, Australia

Thursday, November 7, Room 308 **12Th02**

Area 12 PV System Integration Including Smart Grid

Session Chair: Yibo Wang, Luciano Martini

INVITED SPEECH
13:30-13:50
International Cooperation to Enable Seamless Integration of High Levels of Variable Renewable Energy into Electric Power Systems
Luciano Martini
Ricerca sul Sistema Energetico Spa (RSE), Italy

13:50-14:10
Distribted Direct Current (DC) Microgrid in Building and Campus Energy System Applications
Wei Feng
Lawrence Berkeley National Laboratory(LBNL), USA

14:10-14:30
Integration of Photovoltaic Systems into Smart Grids
Gerd Heilscher
Technische Hochschule Ulm, University of Applied Sciences, Germany

ORAL PRESENTATION

14:30-14:42
Data-driven Estimation of Aggregate Distributed PV Systems output in the Australian States
Navid Haghdadi, Anna Bruce, Iain MacGill
UNSW, Australia

14:42-14:54
Series-connected PV MVDC Converter with Wide Range Input and Output Voltage for Large Scale PV System
Huan Wang, Xinke Huang, Yibo Wang, Honghua Xu
Institute of Electrical Engineering, Chinese Academy of Sciences, China

14:54-15:06
An Improved Double-diode Model Based Simulation Method for PV Arrays
Yuanqing Yao, Yibo Wang
Institute of Electrical Engineering, Chinese Academy of Sciences, China

15:06-15:18
Solar Collective Self-consumption and Blockchain
Quinette Jean Yves
TECSOL, France

15:18-15:30
A Control Method of Low Voltage Ride Through for Photovoltaic Converters Based on Model Predictive Control
Gang Fang, Yong Yang, Jinjun Lu, Tao Liu, Weibo Zeng, Jiabing Wu, Shuai Weng, Li Wang, Chenyang Li
Jiang Su Goodwe Power Technology Co., Ltd

15:30-15:42
Fault Diagnosis Algorithm Based on IV Curve and Parameter Optimization for PV Arrays
Kun Ding Xiang Chen, Fudong Chen, Yuanliang Li
College of Mechanical & Electrical Engineering, Hohai University, China

15:42-15:54
Seasonal Irradiation Prediction in Solar-sharing by Solar-trackers for Uniform Illumination to Crops Using Solar Irradiation Databases
Kenji Araki, Daisuke Sato, Masafumi Yamaguchi
Toyota Technological Institute, Japan

ORAL PRESENTATION

Friday, November 8, International Reporting Hall **2Fr07**

Area 2 Perovskite Solar Cells

Session Chair: Hiroshi Segawa, Yonghua Chen

INVITED SPEECH

08:30-08:50
Sn-Perovskite Solar Cells with Narrow Band Gap –Toward Tandem and Pb Free Perovskite Solar Cells
Shuzi Hayase
The University of Electro-Communications, Japan

08:50-09:10
Thermal Stability Issue of Perovskite Solar Cells
Seigo Ito
University of Hyogo, Japan

ORAL PRESENTATION

09:10-09:25
Surface Molecular Doping of Metal Oxide Nanocrystals to Enhance Carrier Transport of Perovskite Solar Cells
Zhubing He, Wei Chen, Bao Tu, Yinghui Wu, Rongguo Xu
Southern University of Science and Technology, China

09:25-09:40
Precursor Engineering for High Performance $CsPbI_2Br$ Perovskite Solar Cells
Zhike Liu, Shengzhong (Frank) Liu
Shaanxi Normal University, China

09:40-09:55
Reduced Defects Density in Perovskite Absorber Achieved by Ionic Compensation
Xin Zhou, Yuelong Li
Nankai University, China

9:55-10:10
First-Principles Study of Enhanced Out-of-Plane Transport Properties and Stability in Dion-Jacobson 2D Perovskite Semiconductors for High-Performance optoelectronics
Zhuo Xu, Ming Chen, Shengzhong (Frank) Liu
Shaanxi Normal Universiy, China

Friday, November 8, Room 402

4Fr06

Area 4 Thin-film Compound Semiconductor PV

Session Chair: Xiaojing Hao, Hitoshi Tampo

INVITED SPEECH

08:30-08:50

Beyond 10% Efficiency Cd-Free Earth-Abundant and Environmentally-Friendly CZTS Solar Cells

Xiaojing Hao
University of New South Wales, Australia

ORAL PRESENTATION

08:50-09:05

High Efficiency Cu_2ZnSnS_4 Solar Cells Through a Novel Moisture-Assisted Post-Deposition Annealing

Heng Sun, Jialiang Huang, Chang Yan, Kaiwen Sun, Jaesung Yun, Trevor Young, Martin Green, Xiaojing Hao
University of New South Wales, Australia

09:05-09:20

Interface Carrier Transport of Pure Sulfide Cu_2ZnSnS_4 Thin Film Solar Cells

Yanchan Huang[1], Jianjun Li[2], Xiaochen You[1], Hongbing Zhu[1], Yaohua Mai[1], Xiaojing Hao[2] , Martin A. Green[2]
[1]Institute of New Energy Technology, College of Information Science and Technology, Jinan University, Guangzhou 510632, China
[2]Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Sydney, NSW 2052, Australia

09:20-09:35

The Influences of Zn/Sn Ratio on Performances of $Cu_2ZnSnSe_4$ Solar Cells by Sputtering from Quaternary Targets

Xinchen Li[1], Daming Zhuang[1], Ming Zhao[1], Ning Zhang[2], Guoan Ren[1], Xunyan Lyu[1], Chen Wang[1]
[1]Tsinghua University, China
[2]Beijing Sifang Crenergy Optoelectronics Technology Co., Ltd., China

09:35-09:50

Enhancing the Performance of Ba-Doped Kesterite Solar Cells by Sol-Gel Method

Jiajia Guo, Zhaojing Zhang, Qing Gao, Jianping Ao, Guozhong Sun, Zhiqing Zhou, Fangfang Liu, Yi Zhang, Yun Sun
Nankai University, China

09:50-10:05
Effects of H_2Se Concentration in Mixed Annealing Atmosphere on CZTSSe Absorbers for High-Efficiency CZTSSe Solar Cells
Guoan Ren, DaMing Zhuang, Ming Zhao, YaoWei Wei, YiXuan Wu, XinChen Li, XunYan Lyu, Chen Wang
Tsinghua University, China

Friday, November 8, Room 306 **5Fr03**

Area 5 III-V Compound Semiconductor, Concentrator and Space PV Technologies

Session Chair: Nicholas Ekins-Daukes, Sun Qiang, Chen Nuofu

INVITED SPEECH

08:30-08:50
Navigating the 1eV Junction Challenge with Lattice-Matched Gaas Based Multi-Junction Solar Cells
Nicholas Ekins-Daukes
UNSW Sydney, Australia

08:50-09:10
Progress in Industrialization of High Efficient Space GaAs Solar Cells in China
Tu JieLei
Yunnan Normal University, China

ORAL PRESENTATION

09:10-09:25
Potential of Low-concentration Static CPV Module (Tandem, Flexible and High Coverage to the 3-D Curved Surface) for Car-roof Application
Daisuke Sato[1], Kenji Araki[1], Noboru Yamada[2], Masafumi Yamaguchi[1]
[1]Toyota Technological Institute, Japan
[2]Nagaoka University of Technology, Japan

09:25-09:40
GaAs//Si Hybrid Double Junction Cells Fabricated by Direct Bonding of Epitaxially Lifted-Off GaAs Subcell Layers on PET Films
Ryo Kozono[1], Jianbo Liang[1], Kentaroh Watanabe[2], Masakazu Sugiyama[2], Naoteru Shigekawa[1]
[1]Osaka City University, Japan
[2]University of Tokyo, Japan

09:40-09:55
High-efficiency Planar Micro-tracking Photovoltaic Modules with Hybrid III-V/Si Architecture for Space-constrained Installations
Gael Nardin[1], Alvaro F. Aguilar[1], Laetitia Anglade[1] Florian Gerlich[1], Mathieu Ackermann[1], Laurent Coulot[1], Delphine Petri[2], Jacques Levrat[2], Jonathan Champliaud[2],

Antonin Faes[2], Matthieu Despeisses[2], Stephen Askins[3], Norman Jost[3], César Domingez[3], Ignacio Anton[3]
[1]Insolight SA, Switzerland
[2]CSEM PV-Center, Switzerland
[3]Universidad Politécnica de Madrid, Spain

09:55-10:10
Development of GaAs//InGaAs 2-junction Solar Cell with Surface Activated Bonding
Takafumi Fukutani[1] , Kentaroh Watanabe[2], Hassanet Sodabanlu[2], Yoshiaki Nakano[1], Masakazu Sugiyama[2]
[1]Department of Engineering, University of Tokyo, Japan
[2]Research Center for Advanced Science and Technology, University of Tokyo, Japan

Friday, November 8, Room 311 **8Fr03**

Area 8 Thin Film, IBC and HITsolar Cells

Session Chair: Fanying Meng, Mitsuhiro Matsumoto

INVITED SPEECH

08:30-08:50
High Efficiency Hetero-junction Back Contact Crystalline Si Solar Cells
Daisuke Adachi
Kaneka, Japan

08:50-09:10
ZEBRA: Standardly Diffused IBC Cell Technology Moving Towards 700mV and 24% at PERC Production Costs
Radovan Kopecek
ISC Konstanz, Germany

ORAL PRESENTATION

09:10-09:25
Bifacial IBC Crystalline Silicon Solar Cell: Fabrication with Multi-layer Metallization Structure Using Screen Printing Technology
Tomihisa Tachibana, Katsuto Tanahashi, Toshimitsu Mochizuki, Katsuhiko Shirasawa, Hidetaka Takato
AIST, Japan

09:25-09:40
Rib Silicon Heterojunction Solar Cells with Textured Surfaces
Tsukasa Takamura[1], Ryuto Iwata[1], Yukimi Ichikawa[1], Kimihiko Saito[2], Makoto Konagai[1]
[1]Tokyo City University, Japan
[2]Fukushima University, Japan

09:40-09:55
Development and Mass-production of Cost-effective Interdigitated Back Contact Solar Cells
Yingwen Zhao
Jolywood Solar Technology Co. Ltd. China

09:55-10:10
Straight Forward IBC-HJT Cells over 25% Efficiency
Strahm, Benjamin, D. Lachenal, D. Baetzner, W. Frammelsberger, N. Holm, T. Koessler, B. Legradic, P. papet
Meyer Burger Research AG, Switzerland

Friday, November 8, Room 308 **11Fr03**

Area 11 PV Systems Including BOS Component

Session Chair: Yonggang Shao

INVITED SPEECH

08:30-08:55
Degradation Rates of High-efficiency Crystalline Silicon Photovoltaic Technologies under Subtropical Coastal Climate Conditions
Tetsuyuki Ishii
Central Research Institute of Electric Power Industry, Japan

ORAL PRESENTATION

08:55-09:15
Snow Cover Loss Separetion Method for PV Systems Using Clustering of Operating Point
Ryutarou Iwashita, Yuzuru Ueda
Tokyo University of Science, Japan

09:15-09:35
Estimated Power Generation Amounts Calculated by Using the Degradation Rate of Photovoltaic Modules Exposed Outdoors in Japan
Yasuo Chiba[1], Tetsuyuki Ishii[2], Ritsuko Sato[1], Sungwoo Choi[1], Atsushi Masuda[1]
[1]National Institute of Advanced Industrial Science and Technology, Japan
[2]Central Research Institute of Electric Power Industry, Japan

09:35-9:55
Feasibility for Use of Multilayer Polymer Planar Booster Reflector in PV Systems
Yugao Deng[1], Yahui Shao[2]
[1]Toray Industries, Japan
[2]Shanghai Institute of Microsystem & Information Technology Chinese Academy of Sciences, China

POSTER PRESENTATION

16:30-18:30 Monday, November 4 **ROOM 406**

Area 1 Advanced Concepts and New Emerging Materials for Future PV

1MoP.1/1190
Characterizing Modules Light Management Potential with Existing Materials (structured ribbons, films, multiwire) and New Solutions by Means of Hemispheric IAM (HIAM) Robust Method.
Martino Falsini
Martino Falsini, Italy

1MoP.2/1049
Study the Mechanisms of Carrier Quantum Confinement and Interfacial Phonon Mismatch over Phonon Bottleneck Effect in InN Multiple Quantum Wells
Yi Zhang
Hohai University/College of Energy and Electrical Engineering, China

1MoP.3/787
Hydrogen Dilution Micro-control of Intrinsic Amorphous Silicon Absorber Layer in Amorphous Silicon Solar Cells
Zilun Sheng, Pengfei Shi, Qi Shan, Ke Zhong, Hao Du, Tiantian Li
Inner Mongolia University, China

1MoP.4/777
Up to 98.2% Super Transmittance and Precise Modification Wavelength Band Via Veins Like Ag in ITO/Ag/AZO Sandwich Structure
Ningyu Ren, Pengfei Shi, Ke Zhong, Qi Shan, Zilun Sheng, Tiantian Li
Inner Mongolia University, China

1MoP.5/750
Novel Organic-Silicon Heterojunction Solar Cells with Solution-Processed Contacts
Rongzong Shen, Yurong Zhou, Fengzhen Liu
Center of Materials Science and Optoelectronics Engineering & College of Materials Science and Opto-Electronic Technology, University of Chinese Academy of Sciences, China

1MoP.6/691
Graphene-silicon Schottky Junction Solar Cells by Direct Synthesis of Graphene on Silicon
Sudip Adhikari, M. Umeno
C's Techno Inc, Japan

1MoP.7/646
Enhanced Power Conversion Efficiency Via Hybrid Ligand Exchange Treatment of p-Type PbS Quantum Dot
Zhi Li The, Robert J Patterson, Yijun Gao, Gavin Conibeer, Shujuan Huang
UNSW, Australia

1MoP.8/603
Two-step Solution-processed Tin Oxide Films as an Electron Transport Layer for Planar Perovskite Solar Cell
Xiaoyang Ma, Jia Xu, Xiaolong Liu, Jianxi Yao
North China Electric Power University, China

1MoP.9/588
Efficient Planar $CH_3NH_3PbBr_3$ Perovskite Solar Cells Prepared at Room Temperature with Ionic-liquids/Fullerene as an Electron Transport Bilayer
Yao Qi, Jicheng Luan, Jia Xu, Xiaolong Liu, Jianxi Yao
North China Electric Power University, China

1MoP.10/554
Research of V_2O_5/WO_3 Layers as Hole Selective Contact for p-type Silicon Solar Cell
Zongtao Liu, Wenjie Lin, Qi Xie, Lanxiang Meng, Kai Zhang, Hui Shen
Sun Yat-sen University, China

1MoP.11/503
Investigations on Composite-Absorber Solar Cells through SCAPS Simulation
Xiaohan Yin, Zhipeng Xuan, Yunfan Wang, Dan Yang, Lili Wu
Institute of Solar Energy Materials and Devices, Sichuan University, China

1MoP.12/444
Significant Photoresponsivity Improvement of Hydrogen Passivated $BaSi_2$
Zhihao Xu, Kaoru Toko, Takashi Suemasu
University of Tsukuba, Japan

1MoP.13/407
Improvement in Electrical Conductivity of PEDOT:PSS Films Induced by Efficient Packing of PEDOT
Yanbin Shi, Yuqin Zhou, Fengzhen Liu, Ming Liu, Fengchao Li, Yurong Zhou
University of Chinese Academy of Sciences, China

1MoP.14/359
Two-Dimensional $(PEA)_2PbBr_4$ Perovskite Single Crystals for High Performance UV-Detector
Yunxia Zhang, Yucheng Liu, Zhou Yang, Shengzhong Liu
Shaanxi Normal University, China

1MoP.15/335
Structural, Optical and Electrical Properties of Transparent and Conducting F-doped MgZnO Films Prepared by RF Magnetron Co-sputtering
Huiqin Wang, Ailing Wang, Lili Wu, Wei li, Jingquan Zhang, Wenwu Wang, Lianghuan Feng
Sichuan University, China

1MoP.16/301
Memoristor Based on Yellow-phase $CsPbI_3$ Films
Yanhong Wu, Jia Xu, Jianxi Yao
NCEPU, China

1MoP.17/275
Facile Solution-Processed Ternary Sulfide as Light Absorber in Thin Film Solar Cells
Liangzheng Zhu[1], Xu Pan[2]
[1]Anhui Province Key Laboratory of Condensed Matter Physics at Extreme Conditions, High Magnetic Field Laboratory, Chinese Academy of Science, China
[2]Key Laboratory of Novel Thin-Film Solar Cells, Institute of Applied Technology, Hefei Institutes of Physical Science, Chinese Academy of Sciences, China

1MoP.18/264
Composition Engineering of Sb_2S_3 Film Enabling High Performance Solar Cells
Yiwei Yin, Chunyan Wu, Tao Chen, Changfei Zhu
University of Science and Technology of China, China

1MoP.19/7
The Role of Highly Conductive ZnO by Pulsed Laser Deposition for Interface Charge Transfer in PbS Colloidal Quantum Dot Solar Cells
Jiantuo Gan
University of Electronic Science and Technology of China, China

1MoP.20/245
Single Phase FA0.92MA0.08PbI3 with Broader Absorption Spectrum, Reduced defects, and Significantly Enhanced Stability
Pengju Shi, Songyuan Dai
NCEPU, China

1MoP.21/242
Alkali Metals Doping for High-Performance Planar Heterojunction Sb_2S_3 Solar Cells
Chenhui Jiang, Tao Chen, Rongfeng Tang, Xaiomin Wang
University of Science and Technology of China, China

1MoP.22/231
Development of Fabrication Process for Nano-wall Si Solar Cells
Yukimi Ichikawa, Masakazu Hirai, Makoto Konagai
Tokyo City University, Japan

1MoP.23/215
Self-assembly Effect of Potassium Iodide in the $FAPbI_3$ Perovskite Solar Cells
Weng Yang, Molang Cai, Songyuan Dai
North China Electric Power University, China

1MoP.24/181
Triple Cation $NH_3+C_2H_4NH2+C_2H_4NH_3+$-induced Phase-stable Inorganic α-$CsPbI_3$ Perovskite Films for Use in Solar Cells
Xihong Ding, Songyuan Dai
North China Electric Power University, China

1MoP.25/156
Bi_2O_2Se/Graphene Heterostructures for Photo-electric Conversion
Chengyun Hong, Songyuan Dai
NCEPU, China

1MoP.26/127
Modified MnO_2 Nanomaterials as a Cycle-stable Cathode for High-Performance Aqueous Zn-Ion Batteries
Yunzhao Wu, Yong Ding, Songyuan Dai
North China Electric Power University, China

1MoP.27/110
Facile Synthesized Pyridine-Triphenylamine Hole Transport Material for Inverted Perovskite Solar Cells
Shuang Ma, Xuepeng Liu, Songyuan Dai
North China Electric Power University, China

1MoP.28/59
Characterization of Silicon Quantum Dot Solar Cell with the Phosphorus Blocking Layer
Ryushiro Akaishi[1], Kazuhiro Gotoh[1], Shinya Kato[2], Noritaka Usami[1], Yasuyoshi Kurokawa[1]
[1]Department of Materials Process Engineering, Nagoya University, Japan
[2]Department of Electrical and Mechanical Engineering, Nagoya Institute of Technology, Japan

1MoP.29/1297
Effect of Number of Multiple Quantum Well to Radiative and Non-radiative Recombination
Warakorn Yanwachirakul[1], Tetsuya Nakamura[2], Kentaroh Watanabe[1], Yoshiaki Nakano[3], Masakazu Sugiyama[1]
[1]Research Center of Advance Science and Technology (RCAST), The University of Tokyo, Japan
[2]Japan Aerospace Exploration Agency (JAXA), Japan
[3]Department of Electrical Engineering and Information System, The University of Tokyo, Japan

Area 2.1 Perovskite Solar Cells

2.1MoP.1/52
Planar Heterojunction Solar Cells using $MAPbI_3$ Films Deposited by Hot-Wall Method
Satoru Seto, Atushi Matuzawa, Miharu Kanetani
National Institute of Technology, Ishikawa College, Japan

2.1MoP.2/1160
Suppressing the Metal-contact-induced Degradation of Inverted Perovskite Solar Cells by Electron Transport Bilayer Structure
Haixu Liu Hao Luo, Huiyu Zhang, Yanan Hao, Wenxiu Zhang, Wanbing Lu, Wei Yu
National-Local Joint Engineering Laboratory of New Energy Photoelectric Devices, College of Physics Science and Technology, Hebei University, China

2.1MoP.3/1126
Enhanced Light Absorption of Perovskite Solar Cells With Porous Sn02 Layer
Heng PanPeirun Chen, Biao Shi, Yucheng li, Qian Huang, Ying Zhao, Xiaodan Zhang
Institute of Photoelectronic Thin Film Devices and Technology of Nankai University, China

2.1MoP.4/1124
CO_2 Plasma Treatment of AZO Film as Effective Electron Transport Layer for Planar Perovskite Solar Cells
Huang Qian
Institute of Optoelectronic Thin Film Devices and Technology, Nankai University, Tianjin, China

2.1MoP.5/1083
Critical Role of Potassium in Charge-carrier Balance and Diffusion Induced Defect Passivation for Efficient Inverted pPerovskite Solar Cells
Ziyi Wu, Xuewen Yin, Hong Lin
Tsinghua University, China

2.1MoP.6/1064
Incorporation of a Novel Interfacial Layer for Improved Efficiency in Inverted Structure Perovskite Solar Cells
Faiazul Haque[1], Haimang Yi[1], Jihoo Lim[1], Leiping Duan[1], Hong Duc Pham[2], Prashant Sonar[2], Matthew Wright[1], Gavin Conibeer[1], Ashraf Uddin[1]
[1]The University of New South Wales, Australia
[2]Queensland University of Technology, Australia

2.1MoP.7/1005
One-step Solution Synthesis and Stability Study of Inorganic Perovskite Semiconductor Cs2SnI6
Nairui Xiao, Yali Qiu Duoduo Liu, Yehua Tang, Kefan Wang
Henan University, China

2.1MoP.8/946
NbF5: A Novel α-Phase Stabilizer for FA-based Perovskite Solar Cells with High Efficiency
Shihao Yuan
Shaanxi Normal University, China

2.1MoP.9/940
Dual Function SBOET Glass Improves the Stability and Efficiency of Perovskite Solar Cell
Yiyang He, Jingyan Fan, Jing Gou, Shengzhong (Frank) Liu
School of Materials Science and Engineering, Shaanxi Normal University, China

2.1MoP.10/938
Fabrication of Efficient $CsPbBr_3$ Perovskite Solar Cells by Single-source Thermal Evaporation
Fei Ga, Juan Li, Rongrong Gao, Haoxu Wang, Hao Liu, Shengzhong Liu
Shaanxi Normal Univeristy, China

2.1MoP.12/931
Stable High-Performance Perovskite Solar Cells via Grain Boundary Passivation
Tianqi Niu
Shaanxi Normal University, China

2.1MoP.13/930
Crystallized Perovskite Materials used for Radiation Detection
Mingxi Hu, Zhou Yang, Shengzhong(Frank) Liu
Shaanxi Normal University, China

2.1MoP.14/927
Fluorine Passivated Defects in Zinc Oxide Electron Transport Layers for High-Performance PSCs
Shengzhong(Frank) Liu, Dapeng Wang, Wenjing Zhao
Shaanxi Normal University, China

2.1MoP.15/921
Cyrstallization Engineering for High Performance Perovskite Solar Cells
Haoran Wang, Kui Zhao, Shengzhong(Frank) Liu
Shaanxi Normal University, China

2.1MoP.16/914
A Complete set of Energy Level Positions of all Primary Metal-halide Perovskites
Shuxia Tao
TU/e, Netherlands

2.1MoP.17/909
Low-temperature Processed a-W0x/SnO_2 Electron Transporting Layer for Efficient Perovskite Solar Cells
Fengyou Wang, Yuhong Zhang, Meifang Yang, Jinyue Du, Lili Yang, Lin Fan
Jilin Normal University, China

2.1MoP.18/908
H2O-Assisted Hierarchical TiO_2 as Electron Transporting Layers for Perovskite Solar Cells
Fengyou Wang, Meifang Yang, Yuhong Zhang, Lili Yang, Lin Fan
Jilin Normal University, China

2.1MoP.19/853
Strategies to Improve the Wettability of PTAA in Inverted Planar Perovskite Solar Cells
Ying Tian, Yuzeng Xu, Minna Hou, Yan Wu, Changchun Wei, Guangcai Wang, Dekun Zhang, Qian Huang, Yuelong Li, Guofu Hou, Ying Zhao, Yi Ding, Xiaodan Zhang
Nankai University, China

2.1MoP.20/852
Stability of CuSCN-Based Perovskite Solar Cells
Ying Tian, Yuzeng Xu, Minna Hou, Yan Wu, Changchun Wei, Guangcai Wang, Dekun Zhang, Qian Huang, Yuelong Li, Guofu Hou, Ying Zhao, Yi Ding, Xiaodan Zhang
Nankai University, China

2.1MoP.21/851
Effect of Solvent Blends on The Morphology and Efficiency of Perovskite Solar Cells
Nam Le, Nguyen Truong, Trang T.T Le, Chinho Park
Yeungnam University, Korea

2.1MoP.22/806
Highly Efficient and Stable Tin Perovskite Solar Cells Via Material and Interface Engineering
Bin-Bin Yu, Min Liao, Zhubing He
Southern University of Science and Technology, China

2.1MoP.23/780
Large-grain and Smother Cesium Doped $CH_3NH_3PbI_3$ Perovskite Films by CsI Post-treatment for Improved Solar Cells
Jinhua Gu
Zhengzhou University, China

2.1MoP.24/770
Highly Efficient and Stable Perovskite Solar Cells with NiO Thin Film as Hole Transporting Material Prepared by Physical Vapor Deposition
A. K. Mahmud Hasan[1], Zarrin Bani[2], Boon Kar Yap[2], Itaru Raifuku[3], Yasuaki Ishikawa[3], NOWSHAD AMIN[2], Yukiharu Uraoka[3], Md. Akhtaruzzaman[1]
[1]Universiti Kebangsaan, Malaysia
[2]Universiti Tenaga Nasional, Malaysia
[3]Nara Institute of Science and Technology, Japan

2.1MoP.25/762

Reactive Sputtered CuxO Thin Film as Hole Transport Materials for Efficient Perovskite Solar Cell Application

M. A. Islam[1], Zarrin Bani[1], Halina Misran[1], Boon Kar Yap[1], Nilofar Asim[2], Md. Akhtaruzzaman[2], NOWSHAD AMIN[1]

[1]Universiti Tenaga Nasional, Malaysia

[2]Universiti Kebangsaan, Malaysia

2.1MoP.26/757

Stable High Efficiency Two-Dimensional Perovskite Solar Cells via Cesium Dopin

Xu Zhang[1], Kui Zhao[2], Shengzhong (Frank) Liu[3]

[1]Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China

[2]Shaanxi Normal University

[3]Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Shaanxi Normal University, China

2.1MoP.27/749

One-step, in-situ Formation of the Perovskite Layer by Bar-coating of the Polymer-containing Perovskite Ink

Akihiro Okada[1], Marika Ohwada[1], Takeo Suga[1], Kenichi Oyaizu[1], Hiroshi SEGAWA[2], Hiroyuki Nishide[1]

[1]Department of Applied Chemistry and Research Institute for Science and Engineering, Waseda University, Tokyo 169-8555, Japan

[2]Research Center for Advanced Science and Technology, University of Tokyo, Tokyo 153-8904, Japan

2.1MoP.28/688

Record Effciency Stable Flexible Perovskite Solar Cell Using Effective Additive Assistant Strategy

Jiangshan Feng, Dong Yang, Shengzhong (Frank) Liu

Shaanxi Normal University, China

2.1MoP.29/679

Synergistic Effect of DMF and MACl in Two-step Method Towards Efficient Perovskite Solar Cells

Minna Hou, Ying Tian, Yuzeng Xu, Yan Wu, Changchun Wei, Guangcai Wang, Dekun Zhang, Qian Huang, Yuelong Li, Yi Ding, Guofu Hou, Ying Zhao, Xiaodan Zhang

Nankai University, China

2.1MoP.30/595

Reactive Thermal Evaporated SnO_2 as Electron TransportLayer of Planar Perovskite Solar Cells for Textured Tandem Solar Cells Application

Zhigang Che, Ming Liu, Fengchao Li, Yanbin Shi, Yurong Zhou, Fengzhen Liu, Yuqin Zhou

University of Chinese Academy of Sciences, China

2.1MoP.31/582
Moth-Eye PEDOT:PSS Layer for Improving Light Harvesting Efficiency in p-i-n Perovskite Solar Cells
Yanan Li, Jianing Cheng, Weijie Du, Yiwen Zhang
Shanghai Normal University, China

2.1MoP.32/527
Flexible Perovskite Solar Cells Formed on Brookite TiO_2 Nanoparticle Electron Transport Layer
Masao Isomura
Tokai University, Japan

2.1MoP.33/480
Enhanced Efficiency in Perovskite Solar Cells by Eliminating Electron Contact Barrier between the Metal Electrode and Electron Transport layer
Junlei Tao
Hebei University, China

2.1MoP.34/469
Study on Interface Passivation of Perovskite Solar Cells Based on Semiconductor Additives
Shuai Zhang, Zhilei Hu, Wenwen Liu, Li Wang
Changzhou University, China

2.1MoP.35/458
Enhanced Perovskite Crystallization by Polyvinylpyrrolidone Additive for Solar Cells
Jin Yan, Nan Li, Yuqian Ai, Zenggui Wang, Min Zhao, Weichuang Yang, Baojie Yan, Jichun Ye, Jiang Sheng
Ningbo Institute of Materials Technology and Engineering, China

2.1MoP.36/457
Optical Management with Upconversion Nanoparticles for Light Conversion Efficiency Enhancement in Inorganic γ-$CsPbI_3$ Solar Cells
Liang Lei
Shaanxi Normal University, China

Area 4.1 Thin-film Compound Semiconductor PV

4.1MoP.1/1165
Influence of Deposition Pressure on the Properties of Sputtered-SnS Thin Films and Power Conversion Efficiency of SnS Thin Film Solar Cells
SangWoon LEE[1], Juna Kim[2], Donghyun Hwang[2], Chang-Sik Son[2]
[1]Pusan National University, Korea
[2]Silla University, Korea

4.1MoP.2/1141
Wide Bandgap Cu(InGa)S_2 Prepared by Co-evaporation Method
Shinho Kim, Takehiko Nagai, Shogo Ishizuka, Hitoshi Tampo, Shigeru Niki
AIST, Japan

4.1MoP.3/1139
Effect of Pre-mixed Potassium on Selenization of Sputtered Mo and Cu-In-Ga Precursor
JiA Oh, HyeJin Shin, HyeonJi Baek, SungWook Cho, ChanWook Jeon
Yeungnam University, Korea

4.1MoP.4/1122
Compositional Change of Ge-incorporated Kesterite Solar Cell for High Device Performance
Dong Min Lee[1], Hitoshi Tampo[2], Shinho Kim[2], Hajime Shibata[2], Jin Hyeok Kim[1]
[1]Department of Materials Science and Engineering , Chonnam National University, Korea
[2]Research Center for Photovoltaics (RCPV), National Institute of Advanced Industrial Science and Technology (AIST), Japan

4.1MoP.5/1117
Effect of Sintering Temperature on the Optoelectronic Properties of Mg and Ga Co-Doped ZnO Thin Films
Jun Sung Jang, Jin Hyeok Kim
Chonnam National University, Korea

4.1MoP.6/1114
Synthesis and Characterization of SnS_2 Buffer Layer for Cu(In, Ga)Se_2 Thin Film Solar Cell
Salh Alhammadi, Sreedevi Gedi, Yeongju Seo, Doohyung Moon, Euiseon Kim,
Woo Kyoung Kim
Yeungnam University, Korea

4.1MoP.7/1108
Fabrication of Cu_2SnS_3 Thin Film Solar Cells on Molybdenum Foil Substrates
Eunae Jo, Jin Hyeok Kim
Chonnam National University, Korea

4.1MoP.8/1107
Effect of Annealing Temperature on Morphological Evolution of Stack and Co-puttered Precursors in $Cu_2ZnSn(S, Se)_4$ Thin Film Solar Cells
Vijay Chandrakant Karade, Jin Hyeok Kim
Department of Materials Science and Engineering, Chonnam National University, Korea

4.1MoP.9/1102
Studies on of SnS and SnS_2 Thin Films for Solar Cells
Sreedevi Gedi[1], Vasudeva Reddy Minnam Reddy[1], Salh Alhammadi[1], Doohyung Moon[1], Yeongju Seo[1], Tulasi Ramakrishna Reddy Kotte[2], Woo Kyoung Kim[1]
[1]Yeungnam University, Korea
[2]Sri Venkateswara University

4.1MoP.10/1098
Improving the Performance of Sb_2Se_3 Thin Film Solar Cells Via Optimum Inclusion of SbOx
Yuseong Jang, Youngjin Kim, Seongcheol Jung, Byungha Shin
Department of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Korea

4.1MoP.11/1091
Preparation of Cu_2GeS_3 thin Films by a Co-evaporation Method
Ryota Ohashi[1], Yoji Akaki[2], Hideaki Araki[1]
[1]National Institute of Technology (KOSEN), Nagaoka College, Japan
[2]National Institute of Technology (KOSEN), Miyakonojo College, Japan

4.1MoP.12/1054
Effect of $GeSe_2$ on the Preparation and Properties of $Cu_2Zn(Sn, Ge)(S, Se)_4$ Films
Chao Gao
Hebei University, China

4.1MoP.13/1042
16% CIGS Solar Cells Sputtered From a Single Target Without Additional Selenization
Wanlei Dai, Junmin Zhang, Ruobing Wang, Chaowei Xue, Haoyu Xu, Wei Yu
Hebei University, China

4.1MoP.14/1028
Deposition of Earth-Abundant Zinc Tin Nitride Films Free of Oxygen Impurity by Plasma Enhanced Chemical Vapor Deposition
Ji Woon Choi[1], Young Kuk Lee[2], Byungha Shin[1]
[1]Korea Advanced Institute of Science and Technology (KAIST), Korea
[2]Korea Research Institute of Chemical Technology (KRICT), Korea

4.1MoP.15/1018
Enhanced Performance of Solution-processed CZTSSe Thin Film Solar Cells by Selenium Addition in Non-hydrazine Precursor Solution
Xiaojie Yuan[1], Jun Zhang[2], Feng Peng[3], Martin Green[1], Xiaojing Hao[1]

[1]UNSW, Australia
[2]Lingnan Normal University, China
[3]Guangzhou University, China

4.1MoP.16/1000
Understanding the Influence of Seed Layer Towards the Growth of Cubic SnS for Solar Cell Applications
KrishnaRao Eswar Neerugatti, Pravin S Pawar, Jae Yu Cho, Jaeyeong Heo
Department of Materials Engineering, Optoelectronics Convergence Research Center, Chonnam National University, Korea

4.1MoP.17/964
Effect of Sulfurization Temperature on the Properties of SnS Thin Films Sulfurized by Effusion Cell Evaporation
Vasudeva Reddy, Mohan Reddy, Chinho Park
Yeungnam University, Korea

4.1MoP.18/961
Comparison of (Ga, Al):ZnO and Al:ZnO Transparent Conducting Oxide layer On Cu(In, Ga) Se_2 Thin-film Solar Cell
SungWook Cho[1], JiA Oh[1], ShinHyuk Kang[2], HyungRok Lee[2], ChanWook Jeon[1]
[1]Yeungnam University, Korea
[2]Samsung Corning Advanced Glass LLC., Korea

4.1MoP.19/958
Effect of Sulfurization Time on the Efficiency of Monoclinic Cu_2SnS_3 Solar Cells
Mohan Reddy Pallavolu, Vasudeva Reddy Minnam Reddy, Chinho Park
Yeungnam University, Korea

4.1MoP.20/894
Study of the Influence of the Carrier Gas on the Properties of CdS Nanowires Obtained with Bi Nanoparticles as Metal Catalyst
Patricia Gutierrez Zayas-Bazán, Karla Gutierrez Zayas-Bazán, Jorge Sastré Hernández, Jorge R. Aguilar Hernández, Gerardo S. Contreras Puente
Escuela Superior de Física y Matemáticas del Instituto Politécnico Nacional, México

4.1MoP.21/798
Effect of H2S Annealing for Sb-doped Cu_2SnS_3 Thin Films Prepared by Vacuum Evaporation
Yoji Akaki[1], Tomohiro Uchimura1, Konosuke Hatakeda[1], Shigeyuki Nakamura[2], Hideaki Araki[2]
[1]National Institute of Technology (KOSEN), Miyakonojo College, Japan
[2]National Institute of Technology (KOSEN), Tsuyama College, Japan
[3]National Institute of Technology (KOSEN), Nagaoka College, Japan

4.1MoP.22/714
Epitaxial Lift-off CdTe/MgCdTe Double Heterostructures for Thin-film and Flexible Solar Cells Applications
Jia Ding, Cheng-Ying Tsai, Zheng Ju, Yong-Hang Zhang
Arizona State University, America

4.1MoP.23/698
Effect of KF-PDT Annealing Time on CIGS Solar Cells
Xianyang Zhang
Hebei Key Laboratory of Optic-Electronic Information Materials, China

4.1MoP.24/695
Addition of Ge in Sn/Cu/Zn Stacked Precursors and the CharacteRization of the CZTGSSe Thin Films and Devices
Dae-Ho Son, Seung-Hyun Kim, Se-Yun Kim, Young-Ill Kim, Sammi Kim, Kwangseok Ahn, Shi-Joon Sung, Dae-Kue Hwang, Kee-Jeong Yang, Jin-Kyu Kang, Dae-Hwan Kim
DGIST, Korea

4.1MoP.25/683
Modify Selenization Process to Deposit $Cu_2ZnSn(S, Se)_4$ Thin Film Solar Cells
Yiming Wang, Huimin Hao, Jianming Shi, Xin Jian, Ruijian Liu, Yanchun Yang, Chengjun Zhu
Inner Mongolia University, China

4.1MoP.26/663
The Role of Interface Modification in Performance Enhancement of ZnTe:Cu Contacted CdTe Thin Film Solar Cells
Kai Shen, China
Jinan University, China

4.1MoP.27/641
Efficiency Improvement of Kesterite Cu_2ZnSnS_4 Solar Cell Achieved by Controlling the Donor Concentration in N-type Buffer Layer
Kaiwen Sun, Jialiang Huang, Chang Yan, Ao Wang, Xin Cui, Heng Sun, Martin Green, Xiaojing Hao
The University of New South Wales, Australia

4.1MoP.28/626
Effects of Ag Layer on the Inhibited MoS_2 in Cu_2ZnSnS_4 Solar Cells Prepared at above Atmospheric Pressure
Kang Gu, Ruiting Hao, Jie Guo, Abuduwayiti Aierken, XinXing Liu
Yunnan Normal University, China

4.1MoP.29/620
The formation of $MoSe_2$ Layer in the Selenization of Cu/Zn/Sn Metal Precursor at Low Se and SnSex Vapor pressure
Liyong Yao[1], Jianping Ao[2], Ming-Jer Jeng[3], Jinlian Bi[2], Zhaojing Zhang[2], Guozhong Sun[2], Yun Sun[2], Liann-Be Chang[3]
[1]Tianjin Institute of Power Source, China
[2]Nankai University, China
[3]Chang Gung University, China

4.1MoP.30/612
Modification of Mo to Suppress the Stratification of CIGS Layer Fabricated by Sputtering from a Quaternary Target
Longlong Zeng, Chunhong Zeng, Yunfeng Liang, Jian Zhou, Peinian Huang, Haofeng Lin, Ruijiang Hong
Sun Yat-sen University, China

4.1MoP.31/593
Numerical Study and Design of Back-contacted CIGS Solar Cells
Nasim Rezaei[1], Paul Procel[1], Marcel Simor[2], Zeger Vroon[3], Olindo Isabella[1], Miro Zeman[1]
[1]Delft University of Technology, Netherlands
[2]TNO/Solliance, Netherlands
[3]TNO-Brigthlands Materials Center, Netherlands

4.1MoP.32/569
Effect of Metallic Precursor Pre-Annealing Temperature on $CuInS_2$ (CIS) Film Formation
Dwinanri Egyna[1], Kazuyoshi Nakada[2], Akira Yamada[2]
[1]Tokyo Institute of Technology, Indonesia
[2]Tokyo Institute of Technology, Japan

4.1MoP.33/566
Room-Temperature Surface Sulfurization for High-Performance Kesterite CZTSe Solar Cells
Siyu Wang
Nankai University, China

4.1MoP.34/543
Performance of Cu_2ZnSnS_4 Solar Cells Annealed in Sulfur-free Atmosphere
Bin Liu, Jie Guo, Ruiting Hao
Yunnan Normal University, China

4.1MoP.35/540
Optimum Back Contact for Flexible and Bifacial CIGS Solar Cells Fabricated by Lift-off Process
Naoto Hamada[1], Mikiya Inoue1, Taizo Masuda[2], Takahito Nishimura1, Yu Kawano[1], Jakapan Chantana[1], Takashi Minemoto[1]
[1]Ritsumeikan university, Japan
[2]Toyota Motor Corporation, Japan

4.1MoP.36/536
Effect of Oxygen Flux on the S/(S+O) Ratio of Zn(O, S) Buffer Layer for Cd-free CIGS Solar Cells
Wei Liu
Institute of Photoelectronic Thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology of Tianjin, Nankai University, China

Area 7 Crystalline Silicon Solar Cells and Tandem Solar Cells

7MoP.1/49
Removing By-products and Plasma Damaged Layer of mc-Si Wafer induced by RIE Process
Dongkyun Kang, HyunJung Park, Yoonmoook Kang, Hae-Seok Lee, Donghwan Kim
Korea University, South Korea

7MoP.2/111
The Post-modification of MACE Black Silicon's Nanosized Texture and its Influences to the Properties of mc-Si Solar Cells
Rui Jia[1], Ke Tao[1], Xiaojing Liang[1], Zhibo Gao[1], Shuai Jiang[1], Yaopei Zhu[2], Chongyou Zhao[3]
[1]Institute of Microelectronics, Chinese Academy of Sciences, China
[2]Jiangsu Rongma New Energy, China
[3]Beijing Zhongkexin Electrical Equipment Co. Ltd, China

7MoP.3/179
Optimization of PECVD Aluminium Oxide Thickness for Rear Passivation of PERC Solar Cells
Nagarajan Balaji, Pradeep Padmanath, Naomi Nandakumar, Vinodh Shanmugam, John Woodrofee Rodriguez, Shubham Duttagupta
Solar Energy Research Institute of Singapore (SERIS), National University of Singapore, Singapore

7MoP.4/454
A Study on Amorphous Silicon Lifetime, Hydrogen Effusion and Passivation Quality
Huiting Wu, Hieu T. Nguyen, Di Kang, Nikita Gagrani, Wenjie Yang, Daniel Macdonald
The Australian National University, Australia

7MoP.5/450
Ag Doped ZnO/ZnO Double Antireflection Layer on Crystalline Silicon Solar Cells
Deb Kumar Shah, Youhyun Son, Ha Ryeon Lee, M. Shaheer Akhtar, O-Bong Yang, Chong Yeal Kim
Chonbuk National University, South Korea

7MoP.6/442
Forming Multi-scale Texture on the Diamond-wire-sawn mc-Si Wafer by Introducing Artificial Defects
Chengkun Wu, Shuai Zou, Xiaodong Su
Soochow University, China

7MoP.7/323
21.3%-Efficient n-Type Silicon Solar Cell with a Full Area Rear TiO_2/LiF/Al Electron-selective Contact
Wenjie Wang[1, 2], Jian He[2], Di Yan[2], Chris Samundsett[2], Wenzhong Shen[1], James Bullock[3], Yimao Wan[2]
[1]Shanghai Jiaotong University, China
[2]Australian National University, Australia
[3]University of Melbourne, Australia

7MoP.8/295
Microstructure Evolution and Passivation Quality of Hydrogenated Amorphous Silicon Oxide (a-SiO_x:H) on ⟨100⟩ and ⟨111⟩-orientated c-Si Wafers
Shengsheng Zhao, Junfan Chen, Lingling Yan, Huizhi Ren, Can Han, Dekun Zhang, Guangcai Wang, Changchun Wei, Guofu Hou, Ying Zhao, Xiaodan Zhang
Institute of Photoelectronic Thin Film Devices and Technology of Nankai University, China

7MoP.9/283
Phosphorus Treatment To Promote Crystallinity Of The Microcrystalline Silicon Front Contact Layers For Highly Efficient Heterojunction Solar Cells
Chao Lei, Lili Wu
Institute of Solar Energy Materials and Devices, College of Materials Science and Engineering, Sichuan University, China

7MoP.10/250
Surface Passivation of nano-AlOOH Sol Based on Rapid Thermal Processing
Liqi Cao, Hongbo Li, Ning Yang, Shizheng Li, Xiao Yuan, Hua Tong
East China University of Science and Technology, China

7MoP.11/241
On the Nature of Swirl-like Recombination Centers in Czochralski Silicon Solar Cells
Zijing Wang, Deren Yang
State Key Lab of Silicon Materials and Department of Materials Science & Engineering, Zhejiang University, China

7MoP.12/238
19.5% Efficiency of Mass Production with MCCE Textured Solar Cell
Hongfang Wang, Zhuo Xu, Feng Li, Jinchao Shi, Dengyuan Song
Yingli Energy (China) Co. Ltd, ., China

7MoP.13/230
Deep Learning on Electroluminescence Imaging for End-of-Line Cell Binning
Yoann Buratti, Arcot Sowmya, Rhett Evans, Thorsten Trupke, Ziv Hameiri
University of NewSouth Wales, Australia

7MoP.14/221
Beyond 22% Large-Area N-Type PERT Bifacial Solar Cells In Research and Production
Dawei Liu
SPIC Xi'an Solar Power Co., Ltd, China

7MoP.15/172
A Metal-free Additive Texturization Method On Diamond Wire Sawn Multi-Crystalline Silicon Wafers
Likai Li, Yali Ruan, Lei Wang, Deren Yang
State Key Laboratory of Silicon Materials and School of Materials Science and Engineering, Zhejiang University, China

7MoP.16/148
The Role of Glass in Contact Interface Reaction in Ag Paste Electrode Metallization Process
Jiefeng Zhang, Hua Tong, Yunxia Yang, Hongbo Li, Xiao Yuan
East China University of Science and Technology, China

7MoP.17/86
Double-sided Atomic Layer Deposited SiO_2 Passivated p-PERC Solar Cells
Shizheng Li[1], Jiahui Xu[1], Haitao Xiang[2], Xiao Yuan[1], Cui Liu[1], Hongbo Li[1]
[1]East China University of Science and Technology, China
[2]Jolywood (SuZhou) Sunwatt Co., Ltd., China

7MoP.18/81
High-Performance Texturization of Multi-crystalline Silicon Wafer by $HF/HNO_3/H_2O/MnO_2$ System
Huan Liu, Lei Zhao, Hongwei Diao, Wenjing Wang
Institute of Electrical Engineering, the Chinese Academy of Sciences, China

7MoP.19/61
Silicon Based Heterojunction with Hybridized Oxide Layer for Monolithic Tandem Solar Cells
D.Y.Chen1K.J.Wu[1], H.W.Du[2], M.Gao[1], X.M.Song[1], F.Xu[1], F.Hong[1], L.Zhao[1], Z.Q.Ma[1]
[1]Shanghai University, China
[2]China Jiliang University, China

7MoP.20/125
Application of B/Al Paste in Multicrystalline Silicon Passivated Emitter and Rear Cells
Ning Yang, Shizheng Li, Cui Liu, Xiao Yuan, Xiaojun Ye, Hongbo Li
East China University of Science and Technology, China

7MoP.21/1249
Metal Assisted Micro-cale Inverted Pyramids Texturization of Monocrystalline Silicon for Highly Efficient Light Trapping
Subbiramaniyan Kubendhiran, Hsiao-Ping Hsu, Chung-Wen Lan, National Taiwan
National Taiwan University, China

7MoP.22/1156
Investigation of Carrier Selectivity and Thermal Stability of Transition Metal Oxides with Pre-grown Thin SiO_x for Si Solar Cells
Jingnan Tong[1], Kean Chern Fong[1], Wensheng Liang[1], Marco Ernst[1], Daniel Walter[1], Parvathala Narangari[1], Stephane Armand[1], Sachin Surve[1], Teng Kho[1], Keith McIntosh[2], Matthew Stocks[1], Andrew Blakers[1]
[1]Australian National University, Australia
[2]PV Lighthouse, Australia

7MoP.23/1140
Study on High Efficiency Mono Crystal Low Surface Composite PERC Solar Cells with Mass Production Efficiency (〉22.5%)
Zhang Peng
Tongwei Solar (Chengdu) Co., Ltd, China

7MoP.24/1129
Research on Bifaciality of Industrial P Type Mono-Si Bifacial PERC Cells
Chenxu He
Chint New Energy (Hai Ning) CO., LTD, China

7MoP.25/1121
Effect of Pulsed Nd:YAG Laser Beam Translation for Texturing Silicon Solar Cells Surfaces
Nurul Huda binti Abdul Razak
Universiti Kebangsaan Malaysia, Malaysia

7MoP.26/1111
Automated Image Process of Island Electrode of Solar Cell Using Image Processing for Metal Ink-jet printing
Sujeong Jeong, Jisung Hwang, Jinsol Kim, Myoungseop Kim, Hae-seok Lee, Yoonmook Kang, Donghwan Kim
Korea University, South Korea

7MoP.27/1044
Panels with Thin PERC Solar Cells for Stratospheric Airship
X.S. Wang, L.L. Song, Y. Yang, J.K. Yang, X.Y. Jiao, Z.C. Chen, J. Xue
Shanghai Institute of Space Power Sources, China

7MoP.28/1031
Fabrication of SHJ Solar Cells with p-type a-Si Films Formed from n-a-Si by B Cat-doping
Taiyoh Tsurugai, Keisuke Ohdaira
JAIST(Japan Adv. Inst. Sci. & Tech.), Japan

7MoP.29/1030
Two-cavity Light-tripping Scheme Used in Ultrathin c-Si Solar Cells
XiaoDong Lu, XinXin Wang
BoHai University

7MoP.30/1017

Low-cost and Controllable Texturing for DWS Silicon via Copper-assisted Chemical Etching

Shihao Hong[1], Yuanchih Chang[2], Guizhang Sheng[1], Shaoyuan Li[1], Wenhui Ma[1]
[1]Institute of New Energy/State Key Laboratory of Complex Nonferrous Metal Resources Clean Utilization, Kunming University of Science and Technology, China
[2]School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, China Taiwan

7MoP.31/1014

Recovery of Silver from c-Si Solar Cell Using Organic Acid by Fractional Distillation

Jun-kyu Lee[1], Young-soo Ahn[1], Jeong-gu Yeo[1], Gi-hwan KANG[2], Jin-seok LEE[1]
[1]Korea Institute of Energy Research, Separation and Conversion Materials Laboratory, South Korea
[2]Korea Institute of Energy Research, Photovoltaic Laboratory, South Korea

7MoP.32/999

Controllable Synthesis of Black Silicon with Inverted Pyramid Arrays Using Copper-assisted Chemical Etching

Shuai Zhao, Qi Wang, Wenqiang Liu, Guodong Yuan
Institute of semiconductors, CAS, China

7MoP.33/982

Development of High Purification Technology of Silicon Using Supercritical CO_2 and Hexane

Hyo Seok Lee, Jaeyeong Heo, Jae Yu Cho
Chonnam National University, South Korea

7MoP.34/934

Influence of NH_3-related Radicals Generated in a Cat-CVD Apparatus on the Passivation Quality of SiN_x Films

Yoshiaki Sumitomo Keisuke Ohdaira
Japan Advanced Institute of Science and Technology, Japan

7MoP.35/926

Optimization of Laser-Opening Pattern for the Industrial Shingle Type PERC Cell

Chang-sub Park, Yong-Gi MinHaewook Chung, Dong Ho Kim, Byeong Jun Kim, Jong-Youb Lim, Keunkee Hong, Eunjoo Lee, Dong Seop Kim
Shinsung E&G, South Korea

7MoP.36/917

Novel Technique for Large Area (156mm×156mm) n-type Black Silicon Solar Cell by Formation of Nanograss after Diffusion Process

Soma Ray[1], Baishakhi Pal[2], Anup Mondal[3], Chandan Banerjee[4], Utpal Gangopadhyay[1]
[1]Meghnad Saha Institute of Technology, India
[2]Meghnad Saha Institute of Technology, America
[3]IEST, Shibpur, India
[4]NISE, Haryana, India

7MoP.37/847
Light Stability of Ultrathin Electron-selective TiO_2 Contacts with an AlO_x Tunnel Layer
Hyunju Lee[1], Junsin Yi[2], Yoshio Ohshita[1]
[1]Toyota Technological Institute, Japan
[2]Sungkyunkwan University, South Korea

7MoP.38/785
LID and Regeneration of Boron-doped p-Type Cz-Si Wafers and Solar Cells from One Silicon Rod
Shuai Yuan[1], Bin Ai[1], Daming Chen[2], Jingsheng Jin[3], Xueqin Liang[4], Xiongxin Ye[5]
[1]Sun Yat-sen University, China
[2]Trina Solar, China
[3]Jinko Solar Holding Co. Ltd, China
[4]Yichang CSG Polysilicon Co., Ltd, China
[5]CSG PVTECH Co., Ltd, China

7MoP.39/778
Research on Casting Monocrystalline Silicon Passivated Emitter and Rear Cells
Hanyu Yin
Chint New Energy (Haining) Co., Ltd, China

7MoP.40/773
Numerical Model of Potential-Induced Degradation for p-Type Crystalline Silicon Photovoltaic Modules for Time-Degradation-Analysis
Hiroki Yoshida[1], Fumitaka Ohashi[1], Nobukazu Kameyama[1], Yasushi Sobajima[1], Atsushi Masuda[2], Shuichi Nonomura[1]
[1]Gifu University, Japan
[2]AIST, Japan

7MoP.41/772
Metal Electrode Firing Temperature Impact on LeTID in CZ Monocrystalline PERC
Hao Yu, Lingxin Fang, Wei San, Sheng He, Weizhi Xu
Chint New Energy (Haining) technology co., LTD, China

7MoP.42/763
Fabrication and Evaluation of Passivated Emitter and Rear Cell with Implanted Selective Emitter (ISE-PERC)
Toshimitsu Mochizuki, Tomihisa Tachibana, Masaaki Moriya, Satoshi Utsunomiya, Yasuhiro Kida, Katsuto Tanahashi, Katsuhiko Shirasawa, Hidetaka Takato
AIST, Japan

7MoP.43/758
A double Sided Diffusion Technique for PERT Solar Cell
He Ren, Chaolei Wu, Yang Ding, Zhiping Huang, Jingwei Chen, Ying Xu, Dengyuan Song
Hebei University, China

7MoP.44/708
P Doped poly-Si/Oxide Passivating Contact via Spin-on Doping
Zetao Ding[1], Di Yan[1], Wenhao Chen[1], Sieu Pheng Phang[1], Chris Samundsett[1], Zhao Wang[2]
[1]Australian National University, Australia
[2]Jinko Solar, China

7MoP.45/675
Comparative Study on Temperature Coefficients of Al-BSF Solar Cells and PERC Solar Cells
Hong Yang
Xi'an Jiaotong University, China

7MoP.46/667
Fabrication of Metal-oxide Passivation Films by Mist Chemical Vapor Deposition
Koji Arafune
University of Hyogo, Japan

7MoP.47/665
Study of Aluminum Oxide Passivation Films Deposited by Reactive Sputtering with Low-Inductance-Antenna
Yudai Kuramochi, Koji Arafune
University of Hyogo, Japan

7MoP.48/661
Effect of SiH4 Flow Rates on The Structures and Properties of Poly-Crystalline Silicon Thin Films Deposited by Hot Wire Method
Yansai Tian
Inner Mongolia Normal University, China

7MoP.49/651
Achieving High-Performance Monolithic Perovskite/Silicon Tandem Solar Cells Via Interfacial Passivation
Hany Elbatal, Shaofei Yang, Yongcai He, Lin Mao, Tian Yang, Minghui Xie, Qing Chang, Lei Ding, Bo He, Zhenwei Peng, Cao Yu, Xia Hao, Jingquan Zhang, Hui Yan, Zeguo Tang, Xixiang Xu
Hanergy Thin Film Power Group, China

7MoP.50/507
Influence of the Annealing Temperature on ALD-Al2O3/NAOS/Si MOS Interface Properties
Wei Fu[1], Xufang Zhang[1], Hiroshi Umishio[2], Aboulaye Traore[2], Hiroshi Yano[2], Takeaki Sakurai[1]
[1]University of Tsukuba, China
[2]University of Tsukuba, Japan

7MoP.51/636
The Impact of Narrowing Aluminum Grids for Bifacial Solar Cells
Shota Suzuki, Masahiro Nakahara, Naoya Morishita, Takashi Kuroki, Kosuke Tsuji, Marwan Dhamrin
Toyo Aluminium K.K., Japan

7MoP.52/627
Evaluation of Plasma Induced Damage in Silicon Substrate
Kohei Onishi[1], Yutaka Hara[1], Tappei Nishihara[1], Hiroki Kanai[1], Takefumi Kamioka[1], Yoshio Ohshita[2], Atsushi Ogura[1]
[1]Meiji University, Japan
[2]Toyota Technological Institute, Japan

7MoP.53/615
Research on Back Surface Technology for Low LeTID Mono PERC Cell
Hongfang Wang, Zhuo Xu, Feng Li, Jinchao Shi, Dengyuan Song
Yingli Energy (China) Co. Ltd, China

7MoP.54/613
Temperature-dependent Suns-Voc and Suns-PL method for Advanced Characterization of Solar Cells
Johannes P. Seif[1], Thomas G. Allen[2], Ziv Hameiri[1]
[1]University of New South Wales, Australia
[2]King Abdullah University of Science and Technology, Kingdom of Saudi Arabia

7MoP.55/602
The Research on the In-situ Experiment for Determining the Initiation of Micro-crack in Polycrystalline Silicon Photovoltaic Wafer
Yangbo Zhang, Hong Zuo
Xi'an Jiaotong University, China

7MoP.56/590
Industrially Metal Catalyzed Chemical Etch Texutured Cells on Mono-like Substrates
Zhuo Xu, Hongfang Wang, Feng Li, Jinchao Shi, Dengyuan Song
Yingli Energy (China) Co.Ltd, China

POSTER PRESENTATION

16:30-18:30 Tuesday, November 5 **ROOM 406**

Area 2.2 Perovskite Solar Cells

2.2TuP.1/456
High Performance Inverted Perovskite Solar Cells by Reducing Electron Capture Region for Electron Transport Layers
Shengnan Zuo
Shaanxi Normal University, China

2.2TuP.2/448
Flexible Perovskite Solar Sells Fabricated by Gradient Heat Treatment Process
Yueyue Xiao
Hebei University of Science and Technology, China

2.2TuP.3/436
Dynamical Transformation of Two-Dimensional Perovskites with Alternating Cations in the Interlayer Space for High-Performance Photovoltaics
Yalan Zhang
ShaanXi Normal University, China

2.2TuP.4/431
The Influence of Light on the Stability of Perovskite Cells was Studied by In-situ Electrochemical Impedance
Xiaobo Zhang, Yichuan Chen, Qi Meng, Xiaoqing Chen, Changbao Han, Yongzhe Zhang, Hui Yan
Beijing University of Technology, China

2.2TuP.5/428
Effect of Heat Treatment on the Performance of Perovskite Solar Cells
Qi Meng[1], Yichuan Chen[1], Yueyue Xiao[1], Xiaobo Zhang[1], Junjie Sun[1], Changbao Han[1], Hongli Gao[1], Yongzhe Zhang[1], Hui Yan[1], Yongcai He[1], ZeguoTang[2], Xixiang Xu[2]
[1]Beijing University of Technology, China
[2]Hanergy Thin Film Power Group Ltd., China

2.2TuP.6/422
Different Halides Regulated Film Formation of $CH_3NH_3PbX_3$ (X=Cl, Br, I) for Large-grain Perovskite Solar Cells
Leilei Gu
Jiangsu Collaborative Innovation Centre of Photovoltaic Science & Engineering, Changzhou University, China

2.2TuP.7/420
Photo-mobilized Ions and its Reaction with Free Carriers in Perovskite Colar Cells Revealed by Small Perturbation Techniques
Xiaoqing Chen
Beijing University of Technology, China

2.2TuP.8/410
Natively Textured Surface of Ga-doped ZnO films Electron Transporting Layer for Perovskite Solar Cells: Further performance analysis from Device Simulation
Yichuan Chen[1], Qi Meng1, Yueyue Xiao[1] , Xiaobo Zhang[1], Junjie Sun[1], Yongcai He[1], Linrui Zhang[1], Changbao Han[1], Hongli Gao[1], Yongzhe Zhang[1], Hui Yan[1], ZeguoTang[2], Xixiang Xu[2]
[1]Beijing University of Technology, China
[2]Hanergy Thin Film Power Group Ltd., China

2.2TuP.9/397
Enhancing Perovskite Solar Cell Performance by TiO2/perovskite Interface Engineering
Anna Nikolskaia, Nikolai Tsvetkov, Sergey Kozlov, Marina Vildanova, Oleg Shevaleevskiy, Liudmila Larina
Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, Russia

2.2TuP.10/391
Forming Intermediate Phase on the Surface of PbI_2 Precursor Films by Short-Time DMSO Treatment for High-Efficiency Planar Perovskite Solar Cells
Haibin Chen
Hebei University, China

2.2TuP.11/388
Organic Monomolecular Layers Enable Energy-Level Matching for Efficient Hole Transporting Layer Free Inverted Perovskite Solar Cells
Weiguang Kong
Hebei University, China

2.2TuP.12/371
Poly(vinylphenol)/Ammonium Bromide Passivation for a High Performance Perovskite Solar Cell
Keisuke Sugai[1], Takeo Suga[1], Kenichi Oyaizu[1], Hiroshi Segawa[2], Hiroyuki Nishide[1]
[1]Department of Applied Chemistry and Reserch Institute for Science and Engneering, Waseda University, Japan
[2]Research Center for Advanced Science and Technology, University of Tokyo, Tokyo 153-8904, Japan

2.2TuP.13/363
Cyanine Dye as Dopant Free Hole Transport Material in Perovskite Solar Cells
Yanfeng Wang[1], Wenchao Wei[1], Lin Mao[1], Xin Dong[1], Ze Wang[2], Yonghao Zheng[2], Zeguo Tang[1], Bo He[1]
[1]Hanergy Mobile Energy Holding Group, China
[2]University of Electronic Science and Technology of China, China

2.2TuP.14/316
Detection of Degradation and Internal Field of Perovskite Solar Cell using Laser Terahertz Emission Microscope (LTEM)
Toshimitsu Mochizuki[1], Akira Ito[2], Hidetoshi Nakanishi[2], Iwao Kawayama[3], Masayoshi Tonouchi[3], Yoshihiko Nishinara[1], Masayuki Chikamatsu[1] , Yuji YOSHIDA[1], Hidetaka TAKATO[1]
[1]AIST, Japan
[2]SCREEN, Japan
[3]ILE, Osaka Univ., Japan

2.2TuP.15/270
Potassium Iodide Doped Perovskite Solar Cells: the Mechanism of Grain Boundary and Interface Passivation
Lili Wu, Yin Yang
Institute of Solar Energy Materials and Devices, Collage of Materials Science and Engineering, Sichuan University, China

2.2TuP.16/234
Highly Stable and Efficient $FASnI_3$ Based Perovskite Solar Cells by Introducing Hydrogen Bonding
Xiangyue Meng, Liyuan Han
National Institute for Materials Science, Japan

2.2TuP.17/222
Highly Efficient Infrared Light Converting Perovskite Solar Cells: Direct Electron Injection from $NaYF_4$:Yb_3+, Er_3+ to the TiO_2 Ya-Han Wu, Song-Yuan Dai
Yahan Wu
North China Electric Power University, China

2.2TuP.18/205
Effect of High-temperature Post-annealing on Cesium Lead Bromide Thin Films Deposited by Vacuum Evaporation
Ayuki Murata[1], Hirofumi Shimizu[1], Shinsuke Miyajima[1], Takuya Kato[2], Ryousuke Ishikawa[3]
[1]Tokyo Institute of Technology, Japan
[2]Niigata University, Japan
[3]Tokyo City University, Japan

2.2TuP.19/198
Improving the Grain Growth for High-performance Inorganic Perovskite Solar Cells
Dongliang Bai
Shaanxi Normal University, China

2.2TuP.20/195
Quantitatively Evaluating $PbCl_2$ Passivated Triple Cation Perovskite Solar Cells with Spatially Resolved Electroluminescence Images
Huagui Lai, Aobo Ren, Xia Hao, Lili Wu
Sichuan University, China

2.2TuP.21/189
$CsPbBr_3$ Quantum Dots Assisted Crystallization of Solution-processed Perovskite Films with Preferential Orientation for High Performance Perovskite Solar Cells
Yuxin Yao, Xuegong Yu
ZheJiang University, China

2.2TuP.22/159
Investigation of Thermochemical Stability of Perovskite Solar Cells with Various Zinc Oxide Electron Transport Layers
Dapeng Wang
Shaanxi Normal University, China

2.2TuP.23/153
A $MAPbIxCl_{3-x}$ Interlayer for Ultra-violet-filter-free, Efficient and Photostable Perovskite Solar Cells
Pengjie Hang
State Key Laboratory of Silicon Materials and School of Materials Science and Engineering, Zhejiang University, China

2.2TuP.24/133
Phase-induced Stability Improvement for All-inorganic Perovskite Solar Cells
Huirong Peng, Molang Cai, Songyuan Dai
North China Electric Power University, China

2.2TuP.25/117
High Performance Perovskite Solar Cells Using TiO_2 Nanospindles as Ultrathin Mesoporous Layer
Qingshan Ma
Institute of Chemical Materials, China Academy of Engineering Physics, China

2.2TuP.26/107
The Impact of Preparation Methods in $CsPbIBr_2$ Inorganic Perovskite Solar Cells
Haoxu Wang
Shaanxi Normal University, China

2.2TuP.27101
Improved Efficiency and Photo-stability of Methylamine-free Perovskite Solar Cells via Cadmium Doping
Feng Gao, Yong Chen, Qiufeng Ye, Zema Chu, Shaiqiang Mu, Jingbi You
Institute of Semiconductors, Chinese Academy of Sciences, China

2.2TuP.28/100
Theoretical Study of the Effects of Bi_3+ Incorporation on Crystal Structure of $CH_3NH_3PbBr_3$ Single Crystals
Lipeng Han[1], Lili Wu[1], Cai Liu[2]
[1]Sichuan University, China
[2]Southern University of Science and Technology, China

2.2TuP.29/98
Antisolvent with an Ultrawide Processing Window for the One Step Fabrication of Efficient and Large Area Perovskite Solar Cells
Xiaodong Ren, Shengzhong (Frank) Liu
Shaanxi Normal University, China

2.2TuP.30/97
Iodine Salts Optimized Interface for High Efficiency Inorganic $CsPbBrI_2$ Perovskite Solar Cell
Jingru Zhang[1], Dongliang Bai[1], Zhiwen Jin[2], Hui Bian[1], Kang Wang[1],
Shengzhong (Frank) Liu[1]
[1]Shaanxi Normal University, China
[2]lanzhou university, China

2.2TuP.31/84
Unraveling the Passivation Process of PbI_2 to Enhance the Efficiency of Planar Perovskite Solar Cells
Biao Shi, Fuhua Hou, Yucheng Li, Changchun Wei, Yi Ding, Yuelong Li , Dekun Zhang
Caiguang Wang, Yin Zhao, Xiaodan Zhang
Institute of Photoelectronic Thin Film Devices and Technology of Nankai University, China

2.2TuP.32/78
Design of An Inorganic Mesoporous Hole Transporting Layer for Highly Efficient and Stable Inverted Perovskite Solar Cells
Yu Chen, Yihui Wu, Wen-Hua Zhang
Sichuan Research Center of New Materials, Institute of Chemical Materials, China Academy of Engineering Physics, China

2.2TuP.33/77
Facile Fabrication of One-dimensional SnO_2 Nanorod Arrays Films as Electron Transporting Layer for Perovskite Solar Cells
Yinhua LvPeng Wang, Wen-Hua Zhang
Institute of Chemical Materials, Academy of Engineering Physics, China

2.2TuP.34/404
Dopant-free Poly(triarylamine)s as the Hole-transporting Layer for a Robust Perovskite Solar Cell
Koichiro Kamimori, Koki Suwa, Takeo Suga, Kenichi Oyaizu, Hiroshi Segawa, Hiroyuki Nishide
Department of Applied Chemistry and Reserch Institute of Science and Engineering, Waseda University, Japan

2.2TuP.35/71
Plasma-modified Defects in TiO_2 as Electron Transport Layer for Planar Perovskite Solar Cells
Kang Wang, Dapeng Wang, Shengzhong (Frank) Liu
Shannxi normal university, China

2.2TuP.36/67
Room-Temperature Molten Salt for Facile Fabrication of Efficient and Stable Perovskite Solar Cells in Ambient Air
Chao Lingfeng[1], Xia Yingdong[2], Chen Yonghua[2], Huang wei[1]
[1]Northwestern Polytechnical University, China
[2]Nanjing Tech University, China

2.2TuP.37/689
Improving the Performance of $CH_3NH_3PbI_3$ Thin-film Solar Cells with Optically-rough and Electrically-flat TCO Substrates
Lei Meng
Institute of Semiconductors, Chinese Academy of Sciences, China

Area 3 Organic Solar Cells

3TuP.1/1080
Improving Active Layer Morphology of All-Polymer Solar Cells by Dissolving the Two Polymers Individually
Ning Wang, Jun Liu
Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China

3TuP.2/214
Water Transfer Printing to Fabricate Organic Solar Cells
Lulu Sun, Yinhua Zhou
Huazhong University of Science and Technology, China

3TuP.3/1043
Extending the Photo-response of Perovskite via Integrating Organic Bulk-heterojunction for Efficient Perovskite/Organic Integrated Solar Cells
Qiang Guo[1], Erjun Zhou[1], Zhan'ao Tan[2]
[1]Henan Institutes of Advanced Technology/Zhengzhou University, China
[2]State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources/North China Electric Power University, China

3TuP.4/861
Fine-tuning Founctional Layer for Efficient inverted Tandem Polymer Solar Cells
Zhenzhen Shi[1], Zhan'ao Tan[2]
[1]Zhejing University of Water Resources and Electric Power, China
[2]Beijing University of Chemical Technology, China

3TuP.5/756
Europium doped ZnO Thin Films Deposited by Spray Deposited for Organic Solar Cell
Vinod Kumar[1], Tauheed Mohammad[2], V. Dutta[2]
[1]Indian Institute of Technology Delhi, India
[2]IIT Delhi, India

3TuP.6/488
Simultaneous Enhancement of Short-circuit Current Density, Open Circuit Voltage and Fill Factor in Ternary Organic Solar Cells Based on PTB7-Th:IT-M:PC71BM
Shahua Huang
Hebei University, China

3TuP.7/462
Control of Optoelectronic Properties of Transparent Conductive Polymer Thin Films
Qiming Liu, Yonggang Zhao, Mingzhi Lv, Deyan He, Chaohui Jiao
Lanzhou University, China

3TuP.8/303
Pentacyclic S, N-heteroacene Based Electron Acceptor with Strong Near-infrared Absorption for Efficient Organic Solar Cells
Xiaohan Chen[1], Zhan'ao Tan[2]
[1]North China Electric Power University, China
[2]Beijing University of Chemical Technology, China

3TuP.9/292
Improving Active Layer Morphology of All-Polymer Solar Cells by Dissolving the Two Polymers Individually
Wang Ning, Liu Jun
Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China

Area 4.2 Thin-film compound semiconductor PV

4.2TuP.1/530
Preparation and Photocatalytic Properties of Anatase Porous nano-TiO_2
Xiaozhuang Xu, Jielei Tu
Yunnan normal university, China

4.2TuP.2/492
Effect of Oxygen Partial Pressure on the Structure and Properties of RF Magnetron Sputtered Mg Doped ZnO thin Films
Yufeng Zhang, Qiuchen Wu, Ziyao Zhu, Xinlu Lin, Yuhang Liu, Xiangxin Liu
The key laboratroy of solar thermal and photovoltaic system, institute of electrical engineering, CAS, Beijing 10019, China

4.2TuP.3/470
Application of (Zn, Mg)O Buffer Layer in $Cu_2(Sn, Ge)S_3$ Solar Cell to Enhance Open-circuit Voltage
Haruki Hayashi, Takahito Nishimura, Jakapan Chantana, Yu Kawano, Takashi Minemoto
Ritsumeikan University, Japan

4.2TuP.4/465
The Structure and Properties of In Doped CdS thin Film by RF Magnetic Sputtering
Yufeng Zhang, Yuhang Liu, Qiuchen Wu, Ziyao Zhu, Xinlu Lin, Xiangxin Liu
The key laboratroy of solar thermal and photovoltaic system, institute of electrical engineering, CAS, Beijing 10019, China

4.2TuP.5/447
Open-circuit Voltage Enhancement for $Cu(In, Ga)S_2$ Solar Cells by Applying Al-doped (Zn, Mg)O Layer
Takahito Nishimura[1], Shinho Kim[2], Jakapan Chantana[1], Yu Kawano[1],
Shogo Ishizuka[2], Takashi Minemoto[1]
[1]Ritsumeikan University, Japan
[2]National Institute of Advanced Industrial Science and Technology (AIST), Japan

4.2TuP.6/423
Simulation Study on Band Gap of Absorber Layer of CIGS Solar Cells
Jingjing Qu[1], Linrui Zhang[1], Tianyu Ruan[1], Qi Meng[1], Xuemei Song[1], Yongzhe Zhang[1],
Hui Yan[1], Minghao Qu[2], Xixiang Xu[2]
[1]Beijing University of Technology, China
[2]Hanergy Thin Film Power Group Ltd., China

4.2TuP.7/414
Rear Interface Modification for Efficient $Cu(In, Ga)Se_2$ Solar Cells
Jianjun Li[1], Baifei Deng[2], Hongbing Zhu[2], Yaohua Mai[2]
[1]University of New South Wales (UNSW), Australia
[2]Jinan University, China

4.2TuP.8/376
An Investigation on the Relationship Between open Circuit Voltage and Grain Size for CZTSSe thin Film Solar Cells Fabricated by Selenization of Sputtered Precursors
Yaowei Wei, Daming Zhuang, Ming Zhao, Guoan Ren, Yixuan Wu, Xinchen Li,
Xunyan Lyu, Lan Hu
Tsinghua University, China

4.2TuP.9/307
Development of Wide Band Gap $Cu_2(Zn, Ge)(S, Se)_4$ thin Film Solar Cells for Deployment in Tandem Devices
Bart Vermang[1], Guy Brammertz[1], Thomas Schnabel[2], Erik Ahlswede[2], Leo Choubrac[3], Nicolas Barreau[3], Pieter Bolt[4], Patrice Bras[5], Samira Khelifi[6], Johan Lauwaert[6], Regan Wilks[7], Marcus Baer[7]
[1]Imec, Belgium
[2]ZSW, Germany
[3]IMN, France
[4]TNO, Netherlands
[5]Midsummer, Sweden
[6]UGent, Belgium
[7]HZB, Germany

4.2TuP.10/304
Br2-CH_3OH Treatment on $CuIn_1$-$xGaxSe_2$ Absorbers Fabricated by Selenizing CuInGa Precursors
Chen Wang, Daming Zhuang, Ming Zhao, Xunyan Lyu, Lan Hu, Yaowei Wei, Guoan Ren, Yixuan Wu
School of Materials Science and Engineering, Tsinghua University, China

4.2TuP.11/302
Effect of Cadmium Alloying on Sulfide Kesterite thin Film Solar Cell
Chang Yan, Jialiang Huang, Kaiwen Sun, Xiaojing Hao, Martin A. Green
UNSW Sydney, Australia

4.2TuP.12//297
Real-Time Thin Films Thickness Monitoring System by Transmittance Interference of Laser
Zhongming Du[1], Ziyao Zhu[1, 2] , Xiangxin Liu[1]
[1]Institute of Electrical Engineering, Chinese Academy of Sciences, China
[2]University of Chinese Academy of Sciences, China

4.2TuP.13/296
Effects of Evaporated Tellurium Back Buffer Layer on CdTe Solar Cell
Yifan Li, Jingmei Li, Jing Dong
Yiting Jiang, Danmin Peng, Qingyue Xue, Lili Wu, Xia Hao, Wenwu Wang
Sichuan University, China

4.2TuP.14/287
Fabrication of a Semi-transparent thin-film Sb_2Se_3 Solar Cell
Huan Ning
Chang University, China

4.2TuP.15/286
$Cu_2ZnSnSe_4$ Solar Cells with over 10% Efficiency by Introducing Electrodeposited Cu-Ge Thin Film

Zhaojing Zhang, Jiajia Guo, Qing Gao, Jianping Ao, Guozhong Sun, Zhiqing Zhou, Fangfang Liu, Yi Zhang, Yun Sun
Nankai University, China

4.2TuP.16/284
Interfacial Engineering by Indium-Doped CdS for High Efficiency Solution Processed $Sb_2(S1-xSex)_3$ Solar Cells
Chunyan Wu, Tao Chen, Changfei Zhu
University of Science and Technology, China

4.2TuP.17/276
Surface State Distribution in Submicrospheres Based Photoelectrode
Chun Gao, Jiawei Zheng, Linhua Hu
Hefei Institutes of Physical Science, Chinese Academy of Sciences, China

4.2TuP.18/271
Effect of Sulfurization Process on Ag_8SnS_6 thin Films Prepared by Vacuum Evaporation
Tomohiro Uchimura*[1], Shigeyuki Nakamura[2], Isao Tsunoda[3], Hideaki Araki[4], Tetsuya Okuyama[5], Seto Satoru[6], Toshiyuki Yamaguchi[7], Yoji Akaki[1]
[1]National Institute of Technology (KOSEN), Miyakonojo College, Japan
[2]National Institute of Technology (KOSEN), Tsuyama College, Japan
[3]National Institute of Technology (KOSEN), Kumamoto College, Japan
[4]National Institute of Technology (KOSEN), Nagaoka College, Japan
[5]National Institute of Technology (KOSEN), Kurume College, Japan
[6]National Institute of Technology (KOSEN), Ishikawa College, Japan
[7]National Institute of Technology (KOSEN), Wakayama College, Japan

4.2TuP.19/266
Beyond 10% Efficient CZTSSe thin-film Solar Cells Fabricated by a Two-step CdS Deposition Process
Yaowei Wei, Daming Zhuang*, Ming Zhao, Guoan Ren, Yixuan Wu, Xinchen Li, Xunyan Lyu, Chen Wang
Tsinghua University, China

4.2TuP.20/254
Enhancement in the Efficiency of Sb_2Se_3 Solar Cells using a TiO_2-modified SnO_2 Buffer Layer
JiaYi Zhang
Changzhou University, China

4.2TuP.21/232
Vacuum Assisted Solution Processing for Highly Efficient Sb_2S_3 Solar Cells
Rongfeng Tang, Tao Chen*
Department of Materials Science and Engineering, University of Science and Technology of China, China

4.2TuP.22/229
Mechanism of Influence of Cationic Ratios on Efficiency of $Cu_2ZnSn(S, Se)_4$ Solar Cells Fabricated with DMF-based Solution Approach
Hongmei Luan, Bin Yao*
Jilin University, China

4.2TuP.23/227
Alternative Approach for the Direct Incorporation of Sodium using a CuGa-NaF Target in the Fabrication of CIGS Solar Cells
Yu-Ren Hong, Yi-Cheng Lin*
Department of Mechatronics Engineering, National Changhua University of Education, Taiwan, China

4.2TuP.24/204
Influence of Interface Diffusion on the Performance of $Cu_2ZnSn(S, Se)_4$ Thin Film Solar Cells
Yun Zhao[1], Xiuxun Han*[2], Xingbin Yan*[1]
[1]Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China
[2]Institute of Optoelectronic Materials and Devices, Jiangxi University of Science and Technology, China

4.2TuP.25/194
Characterization of Sputtered Molybdenum Oxide Films and Their Application in CdTe Solar Cells
Fan He, Lili Wu*
Sichuan University, China

4.2TuP.26/174
Effect of Ga Post Treatment on the 2-step CIGS thin Film Solar Cells on Low Temperature Process
Dong-Hwan Jeon, Dae-Kue Hwang*, Dae-Hwan Kim*, Young-Il Kim, Kee-Jeong Yang
DGIST, Korea

4.2TuP.27/168
Preparation of Cu(In, Ga)Se_2 Solar Cells by Sputtering of CuIn and CuGa Targets
Lan Hu, Hailei Zhao*, Ning Chen*
University of Science and Technology Beijing, China

4.2TuP.28/158
Reaction Mechanisms of CZTSSe using Sn/Cu/Zn Precursors
Se-Yun Kim, Dae-Ho Son, Young-ill Kim, Seung-Hyun Kim, Sammi Kim, Kwangseok Ahn, Shi-Joon Sung, Dae-Kue Hwang, Kee-Jeong Yang, Dae-Hwan Kim, Jin-Kyu Kang
Daegu-Gyeongbuk Institute of Science and Technology (DGIST), Korea

4.2TuP.29/151
The Effect of Rb Doping on CZTSSe Solar Cells
Yixuan Wu, Ming Zhao*, Daming Zhuang*
Tsinghua University, China

4.2TuP.30/136
Influence of Substrate Temperature and Sulfurization Temperature for Fabrication of $Cu_2ZnSn(S, Se)_4$ thin Film Solar Cells Using $Cu_2ZnSnSe_4$ Compound
Toshiyuki Yamaguchi*[1], Hiroya Ogawa[1], Mitsuki Nakashima[1], Hiroyuki Naoi[1], Hironori Katagiri[1], Hideaki Araki[1], Kazuo Jimbo[1], Junji Sasano[2], Masanobu Izaki[2]
[1]National Institute of Technology (KOSEN), Wakayama College, Japan
[2]Toyohashi University of Technology, Japan

4.2TuP.31/106
Adjusting the CZTS/Mo Interface by Reducing the Mass of Sulfur Powder Using in Sulfurization
Junhui Lin, Jiaxiong Xu*, Yuanzheng Yang*
Guangdong University of Technology, China

4.2TuP.32/105
CdTe Deposition at Low Temperature and Low Pressure by Close Space Sublimation
Anhong Hu[1, 2], Jie Zhou[2], Haibing Ying[2], Xinyuan Qin[2], Xiaowei Hou[2], Yuxia Jiang[2], Mengfei Zhang[2], Wu Zhan[2], Xuanzhi Wu[2], Deren Yang[1]
[1]State Key Laboratory of Silicon Material, Zhejiang University, China
[2]Advanced Solar Power (Hangzhou) Inc., China

4.2TuP.33/96
High Optical Transmission Cadmium Stannate Transparent Conductive Layer with Adjustable Work Function
Ziyao Zhu[1, 2], Xiangxin Liu*[1], Yufeng Zhang[1], Qiuchen Wu[1], Xinlu Lin[1]
[1]Institute of Electrical Engineering, Chinese Academy of Sciences, China
[2]University of Chinese Academy of Sciences, China

4.2TuP.34/95
Radio Frequency Sputtered Films of Copper-Doped Zinc Telluride
Xinlu Lin, Yufeng Zhang, Ziyao Zhu, Qiuchen Wu, Xiangxin Liu*
Institute of Electrical Engineering, University of Chinese Academy of Sciences, China

4.2TuP.35/51
Surface Passivation by Inserting Thin $In2S_3$ Layer to $Cu(In, Ga)Se_2$/CdS Photovoltaic Interface
Doohyung Moon, Sreedevi Gedi, Salh Alhammadi, Woo Kyoung Kim*
School of Chemical Engineering, Yeungnam University, Republic of Korea, Korea

4.2TuP.36/39
10.7% Efficient Kesterite Solar Cells: Modification of Absorber Surface by LiCl Post Deposition Treatment
Mingrui He[1], Jinhyeok Kim*[2], Xiaojing Hao*[1]
[1]University of New South Wales, Australia
[2]Chonnam National University, Korea

4.2TuP.37/20
Amorphous GaO_x and Its Alloying For Use As Electron Transport Layer in CIGSe Solar Cells
Hasan Arif Yetkin*
PVcomB / Helmholtz Zentrum Berlin für Materialien und Energie GmbH, Germany

4.2TuP.38/13
Low Temperature Deposited CIGS Solar Cells by 3-stage Coevaporation Process
Weimin Li*, Kaili Li, Sheng Shi, Chenghan Yi, Shuda Xu, Bing Yang, Lin Yao, Xin Li, Ming Chen, Wenjie Li, Ye Feng, Chunlei Yang
Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China

4.2TuP.39/130
Transparent Conducting Oxide Back Contact with Improved Stability for the Processing of CIGS thin Film Solar Cells
Won Mok Kim*[1], Sungbin Choi[2], Jeung-hyun Jeong[2], In-gyu Lee[3]
1Korea Institute of Science and Technology, Korea
2Samsung Electrnics, Korea
3Korea Aerospace University, Korea

4.2TuP.40/129
Effects of Heat Treatment after CdS Deposition on CdTe Thin-Film Solar Cells in Substrate Configuration
Tamotsu Okamoto*
National Institute of Technology, Kisarazu College, Japan

4.2TuP.41/1081
Research on Radio-frequency Magnetron Sputter-deposited ITO thin Film and Its Application as Back Electrode in CdTe Solar Cell
Jingmei Li[1], Lili Wu*[2], Yifan Li[2]
[1]Institute of New Energy and Low-Carbon Technology, Sichuan University, China
[2]Institute of Solar Energy Materials and Devices, College of Materials Science and Engineering, Sichuan University, China

Area 11 PV Systems Including BOS Component

11TuP.1/1125
Photovoltaic DC Array Circuit Analysis on Voltage Mismatching
Young Chul JU, Woo Gyun SHIN, Hye Mi HWANG, Gi Hwan KANG, Suk Whan KO*
Korea Institute of Energy Research, Korea

11TuP.2/997
Feature Extraction Modeling of Thermal Image of Photovoltaic Module using Mel Frequency Cepstral Coefficient (MFCC)
Ronnie Serfa Juan[1], Hyeongwoo Lee[2], Byeongjun Choi[2], Hi Seok Kim[2], Jeha Kim*[2]
[1]Cheongju University, Philippines
[2]Cheongju University, Korea

11TuP.3/976
Optimal Operation of Economic Dispatch of Multi-energy Flow Regional Integrated Energy System Considering Renewable Energy Consumption
Zhitong Chen*, Xinsheng Huang
TBEA Xi'an Electric Design Co., Ltd, China

11TuP.4/975
Research on Harmonic Problems of Grid-connected System of Complex Mountain Photovoltaic Power Station
Jiahuan He*, Bin Ji
TBEA Xi'an Electric Design Co., Ltd, China

11TuP.5/774
Optimization of Module Size Based on Fixed Bracket and Foundation
Liying Luo*, Lingyong Wu, Lili Ju
Xi'an LONGi Clean Energy Co., Ltd., China

11TuP.6/699
Research on PVSyst Shadow Occlusion Algorithm in the Application of Shingling Module
Zhidong Li *, Lingyong Wu, Jun Ren
Xi'an LONGi Clean Energy Co., Ltd., China

11TuP.7/600
Method of Improving MPPT Efficiency by Software Layout in PV Field
Na Su*, Zhong Wang, Zongjun Yang, Pengpeng Chen
SUNGROW POWER SUPPLY CO., LTD, China

11TuP.8/525
The Influence of Inverter OveRload Capacity on PV System
Pengpeng Chen, Zongjun Yang, Yanhu Zhang, Qingmin Lv, Na Su
SUNGROW POWER SUPPLY CO., LTD, China

11TuP.9/435
Design and Optimization of Solar Tracker with u-PRU-PUS Parallel Mechanism
Pengcheng Wang, Xiaoqiang Du
Faculty of Mechanical Engineering and Automation, Zhejiang Sci-Tech University, China

11TuP.10/385
Zero-error tie-Line Power Tracking Control Strategy of micro-Grid
Xiang Hao, Yingchun Xu, Lang Huang, Liangliang Zhao, Pili Shi
TBEA Sunoasis Co., Ltd, China

11TuP.11/384
Maximum Efficiency Modulation for Dual Active Bridge Operating Over Wide Range Under Frequency Domain Analysis
Xiang Hao, Tao Liu, Zhi Li, Lang Huang, WenJian Zhao, XianGen Yu
TBEA Sunoasis Co., Ltd, China

11TuP.12/382
A Research on Asymmetric Modulation for Dual-active-bridge Series Resonant Converter
Yang Xuan, Zhi Li, Tao Liu, Xiang Hao
TBEA Sunoasis Co., Ltd, China

11TuP.13/380
Multi-time Energy Optimal Dispatching Strategy Based on two-Part Tariff for Industrial Park micro-Grid
Xiang Hao, Ruiqiang Si, Yun Liu, Lang Huang, Liangliang Zhao
TBEA Sunoasis Co., Ltd, China

11TuP.14/377
Slope Impact Analysis of Mountainous Fixed Photovoltaic Power Station
Li Zhi
TBEA Sunoasis Co., Ltd, China

11TuP.15/375
Research on the Optimal Cleaning Time of Photovoltaic Power SStation Module
YongXia Liu
TBEA Sunoasis Co., Ltd, China

11TuP.16/374
Australia's New Energy Market and Project Development
XieSi Yu
TBEA Sunoasis Co., Ltd, China

11TuP.17/372
Characteristics About The Projects In Africa
He Yu
TBEA Xinjiang Sunoasis Co., LTD, China

11TuP.18/369
Comparative Analysis of Vertical single-Axis Tracking System and Fixed Tilted System
WenFu Fan, DongMing Zhou
TBEA Sunoasis Co., Ltd, China

11TuP.19/368
Analysis of Factors Affecting Power Generation of Photovoltaic Tracking System
WenFu Fan, JiaWei Liu
TBEA Sunoasis, Co., Ltd, China

11TuP.20/367
A Novel Maximum Power Point Tracking Approach Using Hybrid Control for Building-integrated photovoltaics
YuHang Liu, XiangXin Liu, YuFeng Zhang
Institute of Electrical Engineering, Chinese Academy of Sciences, China

11TuP.21/285
A Study of Power Gain from Utilization of inter-Row Light In A PV Array
Lin Hu[1, 2], QingGuo Zeng[2], Heng Zhang[2], Lang Zhou[2], Jian Shi[3], Hui Yang[1, 4]
[1]Information Engineering School, Nanchang University, China
[2]Institute of Photovoltaics, Nanchang University, China
[3]Shandong Chen Yu Rare Materials and Technology co. Ltd, China
[4]School of Electrical and Electronic Engineering, East China Jiaotong University, China

11TuP.22/260
An Analysis of The Influence of Different Parameters on LCOE
JiaWei Liu, ShengZhong Zhang
TBEA Sunoasis. Co.Ltd, Xi'an, China

11TuP.23/192
~26% Greater Energy; After Dust Cleaning InaA photovoltaic-Array
Yasuhiro Matsumoto[2], Nun Pitalúa-Díaz[1], Ramon Peña[2], Jose Antonio Urbano[2], Miguel Angel Luna[2], Jose Saul Arias[2], Rene Asomosa[2]
[1]Universidad de Sonora, Mexico
[2]CINVESTAV-IPN, Mexico

11TuP.24/112
A Study On The Performance Diagnosis Method of PV Plant Considering Aging and Soiling
Suk Whan, KO, Woo Gyun, SHIN, Hye Mi, HWANG, Young Chul. JU, Gi Hwan, KANG
Korea Institute of Energy Research, Korea

11TuP.25/50
Solar Irradiance Onto Car Body Using Mobile Multiple Pyranometer Array System for vehicle-Integrated Photovoltaic applications – Measurement and Modeling
Kenji Araki[1], Yasuyuki Ota[2], Taizo Masuda[3], Daisuke Sato[1], Masafumi Yamaguchi[1]
[1]Toyota Technological Institute, Japan
[2]University of Miyazaki, Japan
[3]Toyota Motor Corporation, Japan

11TuP.26/
Research and Application of High-precision Set Numerical Weather Forecasting Technology Based on Gridded Historical Meteorological Resources in Yunnan
WenLin Yan, Han Yan, Yongqiang Yang
Yunnan Electric Power Center of Dispatching and Control, China

Area 12 PV System Integration Including Smart Grid

12TuP.1/1006
Selection and Laying of Cables on Floating Photovoltaic Power Generation System
ShunQing Tian
Share Power Co., Ltd., China

12TuP.2/1003
Photovoltaic Power System Technology Combined with Agriculture
XiaoWu Zhuang, HaiKun Zhu
Share Power Co., Ltd., China

12TuP.3/994
Research on Design and Application Technology of Anchorage System for Floating Photovoltaic Power Plant
Xia Deng
Share Power Co., Ltd., China

12TuP.4/992
Installation of Flexible Photovoltaic Support
LiLi Yan, JiHong Liu
Share Power Co., Ltd., China

12TuP.5/991
Research on New Special Anchor Technology for Floating Photovoltaic Power Plant
HuaMin Gu
Share Power Co., Ltd., China

12TuP.6/990
Design and Application of Inverter Concrete Floating Platform for Floating Photovoltaic Power Plant
ZhiHui Tang
Share Power Co., Ltd., China

12TuP.7/983
Model Predictive Control for t-Type Photovoltaic Three-level Three-phase Converters Based on Virtual Voltage Vectors
WeiBo Zeng, Yong Yang, Gang Fang, JinJun Lu, Tao Liu
Jiangsu GoodWe Power Supply Technology CO., LTD, China

12TuP.8/389
Series-type Active Ripple Suppression and Damping Control of a Novel Grid-Connected Inverter
MiaoMiao Wei, YiBo Wang, Huan Wang, Yu Zhou, YuBo Zhang, JunLong Lu
Institute of Electrical Engineer, Chinese Academy of Science, China

12TuP.9/343
Research on Fault Location and Monitoring System of Smart Distribution Network
Fan Qin, Wei Dou, WeiWei Chen, YiBo Wang
Institute of Electrical Engineering, Chinese Academy of Sciences, China

12TuP.10/309
Optimal Planning of High Penetration Distributed Photovoltaic with Considering Grid Reinforcement
BiBin Huang, QiongHui Li, Jing Hu, BoWen Hong, Hu Yan, Kai Feng
SGERI, China

12TuP.11/259
Very Short-term Irradiance Forecasting Based on A Low-Cost Sky Imager
Xi Shao, Zhen Zhang, ZengWei Zhu, QiYuan Zhang
Hohai University, China

12TuP.12/244
Research on Wind-Photovoltaic-Battery Microgrid Configuration Optimization Based on Reliability Constraints
WeiWei Chen*, LiDong Guo, YiBo Wang
Institute of Electrical Engineering Chinese Academy of Sciences, China

12TuP.13/237
Power Dispatching Strategy for Microgrid with Controllable Heating Loads
MingYu Lei*, LiDong Guo, ZiLong Yang, YiBo Wang
Institute of Electrical Engineering, Chinese Academy of Sciences, China

12TuP.14/216
A control System with PV Inverters Connected to The Grid in Series
Xian Gao*[1, 2], YiBo Wang[1]
[1]Institute of Electrical Engineering, Chinese Academy of Sciences, China
[2]University of Chinese Academy of Sciences, China

12TuP.15/716
Photovoltaic Systems Integration using On Load Tap Change Transformers for High Penetration Mitigation Issues: Case Study Malta, Europe
Brian Bartolo*, Brian Azzopardi*
Malta College of Arts, Science and Technology (MCAST), Malta

12TuP.16/650
Design of Earthing System for Floating Photovoltaic Power Station
XiLiang Liu*, ChengYuan Yu
Xi'an LONGi Clean Energy Co., Ltd, China

12TuP.17/735
A Method to Estimate The Installed Capacity of PV Systems in Residential Feeders
Navid Haghdadi*[1], Ziba Gandomkar[2], Anna Bruce[1], Iain MacGill[1]
[1]UNSW, Australia
[2]University of Sydney, Australia

12TuP.18/134
Research on Economic Operation Strategy of Renewable Energy Microgrid with Real-time Accounting of Energy Storage Cost
LiDong Guo
Institute of Electrical Engineering, Chinese Academy of Sciences;University of Chinese Academy of Sciences, China

12TuP.19/183
A SPV Array Optimal Configuration with Novel Bypass-Switching Topology for Partial Shading Mismatch Mitigation
Rui Zhang*, YiBo Wang, HongHua Xu
Institute of Electrical Engineering, Chinese Academy of Sciences, Chinese Academy of Sciences University, China

12TuP.20/165
An Optimal Voltage Control Strategy for Rural Networks with High Proportion of PV
Xian Gao*, Yibo Wang
Institute of Electrical Engineering, Chinese Academy of Sciences;University of Chinese Academy of Sciences, China

12TuP.21/971
Technical Problems During Access to Distribution Network by High-Permeability Distributed Power and Countermeasures
QiongHui Li, XiaoNing Ye*, BoWen Hong, BiBin Buang
Department of New Energy and Energy Statistics, State Grid Energy Research Institute Company LTD, Beijing, China

12TuP.22/552
Three-dimensional Numerical Analysis of Excitation Coil of Forced oil-Cooled Magnetic Separator
YuBo Zhang*, Huan Wang, Yu Zhou, JunLong Lu, MiaoMiao Wei
Institute of Electrical Engineering Chinese Academy of Sciences, P.R. China, China

12TuP.23/551
The Design and Simulation Research of New Interleaved DC / DC Converter
Yu Zhou, Yibo Wang*, Huan Wang, Yubo Zhang, Junlong Lu
Institute of Electrical Engineering, Chinese Academy of Siences, China, China

12TuP.24/548
Voltage Balance Control of The DC/DC Converter in DC Series-Parallel PV Collection System Based on Energy Storage System
XinKe Huang*
Institute of Electrical Engineering, Chinese Academy of Sciences, China

12TuP.25/545
Quasi Z-Source based Full Bridge Isolated DC/DC Topology as A Basic Module for DC-Series PV Converter Connected to HVDC Grid
XinKe Huang*
Institute of Electrical Engineering, Chinese Academy of Sciences, China

12TuP.26/544
A Control Strategy of Low Voltage Ride-through for Grid-connected Photovoltaic Inverter
Ying Zhang *, ZiLong Yang, Yibo Wang
Institute of Electrical Engineering, Chinese Academy of Sciences, China

12TuP.27/542
A High Step-Up DC–DC Converter with Integrated Cascade Structure
Lu JunLong*, YiBo Wang, Huan Wang, MiaoMiao Wei, Yu Zhou, Yubo Zhang
Institute of Electrical Engineering Chinese Academy of Sciences, China

12TuP.28/472
A Control Strategy of Microgrid Inverter for Unbalance Voltage Compensation
JiDong Lai*, JiaLiang Liu, JianHui Su, TianYue Xie, ChenGuang Zhou, MingRui Xie
Hefei University of Technology, China

Area 13 PV Energy Storage and Novel PV Application

13TuP.1/1096
Spatial Decoupling Light Absorption and Catalytic Reaction in n-Si Photocathode for Efficient and Stable Solar Water Splitting
ShuJie Wang
Tianjin University, China

13TuP.2/1046
Enhanced near-Infrared Response of p-Si Photocathode with Surface Hydroxylation for Unassisted Solar Water Splitting
HuiMin Li
Tianjin University, China

13TuP.3/978
Application Study of CIGS Solar Products in Mobile Energy
DongDong Shen, Lei Shi, PengFei Wang, O Haijin, Hou Jian, Gu Lu, XiaoHua Xu *
MiaSole Photovoltaic Technology Co.Ltd, China

13TuP.4/939
Weather Effect on Photovoltaic Module Adaptation in Coastal Areas
Nnamdi Bethel Onyejinaka
University of Nigeria Nsukka

13TuP.5/801
Design of Multishell Microsphere of Transition Metal Oxides for Lithium Ion Battery
Youcai Ding, Linhua Hu
University of Science and Technology of China, China

13TuP.6/769
Designing and Running of a PV-FC-LIB Independent Power Charging System and an Analysis of the System Efficiency and its Optimization
Lin Hu[1], Qinguo Zeng[1], Zhihao Yue[1], Lang Zhou*[1], GuangSheng Liang[2], Yue Yu[2], Qiang Zhang[2]
[1]Nanchang University, China
[2]Beijing Hirek Science Development Ltd, China

13TuP.7/682
3D Curved Photovoltaic Module with Triangular Si Solar Cells
Yoshitaka Hayakawa[1], Hikaru Komiyama[1], Tomohiro Hase[1], Kenji Araki[2], Taizo Masuda[2], Masafumi Yamaguchi2, Noboru Yamada*[1]
[1]Nagaoka University of Technology, Japan
[2]Toyota Technological Institute, Japan

13TuP.8/563
TiN/TiSiN/SiN Solar Selective Absorbing Coatings Prepared via Modulated Pulse Power Magnetron Sputtering
Hongwen Yu*, Xiaobin Zhu, Qian Zhang, Hui Yan, Jun Ouyang
Beijing University of Technology, China

13TuP.9/491
Comparative Investigation of Performances for HIT-PV and PVT Systems
Wei Pang, Yanan Cui, Qian Zhang, Hongwen Yu, Yongzhe Zhang, Hui yYan*
Lang Gu(Tianjin) New Energy Technology Co., Ltd, China

13TuP.10/425
Preliminary Study on Optimal PV Cell Size for PV-Powered Vehicles
Kakeru Matsuta*, Ryuto Shigenobu, Masakazu Ito
University of Fukui

13TuP.11/352
Modelling of Daily Heating Demand of Mongolian Ger with ETS Heater and Solar PV
Bat-Erdene Bayandelger*, Yuzuru Ueda, Amarbayar Adiyabat
Tokyo University of Science, Japan

13TuP.12/293

Design and Simulation on the Dust Collector Using Supersonic Airflow for Photovoltaic Panels

Xiaoqiang Du, Feng Jiang*, Hongli Chen, Bo Yan
Zhejiang Sci-tech University, China

13TuP.13/113

Optimal Allocation Method of Multi-area Energy Storage Capacity with Large-scale Photovoltaic Power Generation

Wei Yuan*, Caixia Wang, Xiaoning Ye, Qionghui Li, Xuejiao Lei, Ziqian Li, Zhiyong Shi
Department of New Energy and Energy Statistics, State Grid Energy Research Institute Company LTD, China

Area 14 PV Deployment, Markets, Policies and Financing

14TuP.1/719

The Jump2 Excel Initiative: Joint Universal Activities for Mediterranean PV Integration Excellence

Brian Azzopardi*[1], Renata Mikalauskiene[1], Vibhu Jately[1], Joseph Mutale[2], Monica Aguado Alonso[3], Maria Jesus Rodriguez Henche[3], Sophie Mailley[4], Antoine Guerin de Montgareuil[4]
[1]Malta College of Arts, Science and Technology (MCAST), Malta
[2]The University of Manchester, UK
[3]Centro Nacional de Energia Renovables (CENER), Spain
[4]The French Alternative Energies and Atomic Energy Commission (CEA), France

POSTER PRESENTATION

16:30-18:30 Thursday, November 4 **ROOM 406**

Area 5 III-V Compound Semiconductor, Concentrator and Space PV Technologies

5ThP.1/44
Large Area High Efficiency Flexible Thin Film Modules with IMM 3J GaAs Solar Cells
J.K. Yang, X.Y. Jiao, Y. Yang, X.S. Wang, L.L. Song, J. Xue, Z.C. Chen
Shanghai Institute of Space Power Sources, China

5ThP.2/10521
MeV Electron Erradiation Effects on GaInP/GaAs Double Solar Cells and Component Subcells
Maliya Heini[1], Xiaofan Zhao[1], Aierken Abuduwayiti[2], Qi Guo[1], Shulong Lu[3]
[1]Xinjiang Technical Institute of Physics & Chemistry, Chinese Academy of Sciences, China
[2]Yunnan Normal University, China
[3]Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China

5ThP.3/1020
Absolute Electroluminescence Characterization for InGaAs PV Cell Lattice-Matched to InP Substrate
Kentaroh Watanabe, Hao Xu, Riko Yokota, Hassanet Sodabanlu,
Yoshiaki Nakano, Masakazu Sugiyama
The University of Tokyo, Japan

5ThP.4/980
Towards the Green Preparation of Cu(In, Ga)Se_2 Nanoparticles by a Sonochemical Method
Trang T.T Le, Sung-wook Cho, Chinho Park
Yeungnam University, South Korea

5ThP.5/977
The Characteristics Study of Concentrated Solar Cell
MingLe Ma
TBEA Xi'an Electric Design Co., Ltd, China

5ThP.6/832
Modeling the Error Tolerance of Micro-CPV with an Uncertainty Analysis
Kan-Hua Lee[1], Michihiko Takase[1], Nobuhiko Hayashi[1], Shutetsu Kanayama[1],
Kenji Araki[2], Masafumi Yamaguchi[2]
[1]Connected Solutions Company, Panasonic Corporation, Japan
[2]Toyota Technological Institute, Japan

5ThP.7/795
Heat-resistant 2D-metal Selenides as a Mechanical Cleavage Layer for the GaAs Lift-off
Nobuaki Kojima, Yu-Cian Wang, Kei Kawakatsu, Akio Yamamoto, Yoshio Ohshita
Masafumi Yamaguchi
Toyota Technological Institute, Japan

5ThP.8/747
Thin Film Triple-junction III-V Solar Cells
Liyong Yao, Chao Xue, Yitong Yang, Mingxu Jiang, Lirui Liu, Yu Wang,
Qiming Zhang, Qiang Sun
Tianjin Insitute of Power Sources, China

5ThP.9/744
Development of 2.0~2.2eV Bandgap AlGaInP Solar Cells Grown by MOCVD
Heng Zhang, Rubin Liu, Qiming Zhang, Chao Xue, Qiang Sun
Tianjin Institute of Power Sources, China

5ThP.10/742
Effect of the Double Grading on the Electric Field and the Generation Rate in Cu(In, Ga) Se_2 Solar Cells
Alban Lafuente-Sampietro, Katsuhisa Yoshida, Katsuhiro Akimoto, Nobuyuki Sano,
Takeaki Sakurai
University of Tsukuba, Japan

5ThP.11/741
Effect of the off-cut Direction of Si(111) Substrate on 2D-In_2Se_3 Twin Formation as a Mechanical Cleavage Layer for the GaAs Lift-off
Kei Kawakatsu, Yu-Cian Wang, Nobuaki Kojima, Yoshio Ohshita, Masafumi Yamaguchi
Toyota Technological Institute, Japan

5ThP.12/738
Flexible GaInP/AlGaAs/InGaAs/InGaAs Inverted Metamorphic (IMM) Four-junction Solar Cell
Xinping Huang, Junhua Long, Dongying Wu, Qiangjian Sun, Wenxian Yang,
Xuefei Li, Shulong Lu
Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China

5ThP.13/707
Growth of AlInGaP by Hydride Vaper Phase Epitaxy Using AlCl3 for Application to InGaP Solar Cells
Yasushi Shoji[1], Ryuji Oshima[1], Kento Aihara[1], Kikuo Makita[1], Akinori Ubukata[2],
Takeyoshi Sugaya[1]
[1]National Institute of Advanced Industrial Science and Technology, Japan
[2]Taiyo Nippon Sanso Corporation, Japan

5ThP.14/644
Electrical Performance Simulation of Gaas Triple-junction Photovoltaic Power Converters
Shi Linfeng[1], Guo Hongliang[2], Wu Yiyong[1]
[1]Harbin Institute of Technology, China
[2]Science and Technology on Power Sources Laboratory, China

5ThP.15/246
High-Efficiency Low-Concentration III-V//Si 3-Junction Solar Cells Using Smart Stack Technology
Kikuo Makita[1], Hidenori Mizuno[1], Takeshi Tayagaki[1], Taketo Aihara[1], Ryuji Oshima[1], Yasushi Shoji[1], Hidetaka Takato[1], Ralph Müller[2], Paul Beutel[2], David Lackner[2], Jan Benick[2], Martin Hermle[2], Frank Dimroth[2], Takeyoshi Sugaya[1]
[1]Advanced Industrial Science and Technology, Japan
[2]Fraunhofer Institute for Solar Energy Systems ISE, Germany

5ThP.16/213
The Model of Photon Recycle in Iii-v Multijunction Solar Cells
Hongliang Guo[1], Yiyong Wu[2], Qiang Sun[1], Rubin Liu[1]
[1]Science and Technology on Power Sources Laboratory
[2]Harbin institute of Technology

5ThP.17/611
Degradation of Ingap/gaas/ge-3 Junction Solar Cells with an Electroless Platinum Black Catalyst for Hydrogen Generation Reaction
Yuichi Mikami[1], Yuki Nakamura[1], Kei Odashima[1], Kota Yoshida[1], Kiryu Yamamoto[1], Ryoki Sugita[1], Nonoka Abe[1], Koki Ito[1], Taiga Shibuya[1], Yuma Aoki[1], Xuefei Li[2], Wenxian Yang[2], Shulong Lu[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, Japan
[2]Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Science, China

5ThP.18/553
Design and Preparation of Tiox/al2o3/mgf2 Anti-reflection Coating for Gaas-based Multi-junction Solar Cells
Guan-yu Song, Jie-lei Tu, Xiao-zhuang Xu, Ping-yuan Yan, Wei-nan Zhang, Xiao-yu Sun
Yunnan Normal University, China

5ThP.19/533
Research Progress of InGaAs Materials Applied in Multi-junction Solar Cells
Weinan Zhang, Jielei Tu
Yunnan Normal University, China

5ThP.20/701
Flexible High Efficiency Thin Film Muti-Junction Inverted Metamorphic Solar Cells
Junhua Long[1], Xinping Huang[1], Qiangjian Sun[1], Xuefei Li[1], Dongying Wu[1], Sai Ye[1], Minghui Song[2], Shulong Lu[1]
[1]Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China
[2]Tianjin San'an Optoelectronics Co., LTD.China

5ThP.21/496
Optical Optimization for III-V/Si Multijunction Solar Cells
Caixia Li
UNSW, Australia

5ThP.22/476
Anti-radiation of Space Four-junction GaAs Solar Cell Based on Bragg Reflector Structure
Pingyuan Yan, Jielei Tu, Weinan Zhang, Xiaozhuang Xu, Guanyu Song, Xiaoyu Sun
Solar Energy Research Institute, Yunnan Normal University, China

5ThP.23/475
Performance Evaluation of Low-concentration Static CPV Module with Smooth 3D Curved Surface
Daisuke Sato[1], Kenji Araki[1], Masafumi Yamaguchi[1], Noboru Yamada[2]
[1]Toyota Technological Institute
[2]Nagaoka University of Technology

5ThP.24/473
Influence of the Sulfurization Temperature on Cu_2ZnSnS_4 (CZTS) Thin Films Prepared by Sol-gel Process
Mengqi Wang, Wei Li, Jiao Wang, Yuan Wang, Yanping Wang, Haoran Li, Jinlian Bi, Kailiang Zhang
School of Electrical and Electronic Engineering, Tianjin Key Laboratory of Film Electronic & Communication Devices, Tianjin University of Technology, Tianjin, 300384, China

5ThP.25/383
Influence of Diffuse Light on Conversion Efficiency Measurement of 4-junction Solar Cells Under Real Concentrated Sunlight
Shinya Honda[1], Yoshihito Imamatsu[1], Shogo Murayama[1], Hideo Teramoto[1], Yuki Nakamura[1], Ryota Jomen[1], Yoshiaki Ajima[1], Shu Takahashi[1], Tomoya Kamata[1], Shunsuke Hayashi[1], Naoki Saito[1], Yuichi Mikami[1], Masayoshi Kawahara[1], Yasuyuki Ota[2], Pan Dai[3], Shulong Lu[3], Shiro Uchida[1]
[1]Chiba Institute of Technology, Japan
[2]University of Miyazaki, Japan
[3]Suzhou Institute of Nano-tech and Nano-bionics, Chinese Academy of Sciences, China

5ThP.26/162
Optical Wireless Power Transmission Using GaAs Solar Cell with Distributed Bragg Reflector
Fumiaki Tanaka, Yuki Komuro, Shinya Honda, Daiki Morita, Yuichi Mikami, Shiro Uchida
Chiba Institute of Technology, Japan

5ThP.27/379
Investigation of Optical Wireless Power Transmission Using GaAs Solar Cell with Cross-type Grid Electrode
Yuki Komuro, Shinya Honda, Daiki Morita, Fumiaki Tanaka, Shiro Uchida
Chiba Institute of Technology, Japan

5ThP.28/524
Multi-step Growth of GaAs on 4o Vicinal Si (111) with Metallic Selenide Buffers
Yu-Cian Wang, Nobuaki Kojima, Kei Kawakatsu, Akio Yamamoto,
Yoshio Ohshita, Masafumi Yamaguchi
Toyota Technological Institute, Japan

Area 6 Silicon feedstock & wafers

6ThP.1/197
Behaviour of Metal Impurities in the LeTID of Mc-Si
Zechen Hu[1], Xuegong Yu[1], Andrej Kuznetsov[2], Deren Yang[1]
[1]State Key Lab of Silicon Materials and Department of Materials Science & Engineering, Zhejiang University, Hangzhou, China
[2]Department of physics, university of Oslo, Norway

6ThP.2/142
Behavior of Iron-acceptor in B/Ga Co-doped Silicon
Xiaotong Hou, Deren Yang
State Key Laboratory of Silicon Materials and School of Materials Science and Engineering, Zhejiang University, Hangzhou, Zhejiang, China

6ThP.3/35
LID Control of PERC Using Industrially Produced Ga, B Co-doped Wafer
Wooseok Nam, Boram Lee
Woongjin Energy Co. Ltd., South Korea

6ThP.4/1247
Silicon Ingot Growth from Nitride Crucibles Made from Kerf-Loss Silicon During Diamond Wire Sawing
A. Lan, Chia-En Liu, Hao-Ting Yu, Han-Lin Yang, Chung-Wen Lan
National Taiwan University, China Taiwan

6ThP.5/325
Behavior of High-pressure Phases and Defects in Slurry and Diamond Wire Sawn Silicon
Hangfei Li, Deren Yang
Zhejiang University, China

6ThP.6/1214
Horizontal Distribution Formula of Phosphorus during Directional Solidification for N-type Multicrystalline Silicon
Zhiqiang Hu, Zilong Wang, Ming Lin, Yi Tan, Pengting Li
School of Materials Science and Engineering Dalian University of Technology, China

6ThP.7/709
Research on Influences of Cutting Fluid Properties on Diamond Wire Saw Cutting Behavior and Wafer Qualities
Daming Di
LONGI Green Energy Technology Co. Ltd, China

6ThP.8/1204
Real-time Monitoring Method of Crystal/Melt Interface Shape during Czochralski Silicon Crystal Growth
Junling Ding, Lijun Liu
Xi'an Jiaotong University, China

6ThP.9/1193
Application of Heater-generating Magnetic Field in the Directional Solidification of Silicon Ingots for Solar Cells
Zaoyang Li, Wenchao Liu, Lijun Liu
Xi'an Jiaotong University, China

6ThP.10/1154
Bubble Size Control in Quartz Crucible used for Czochralski Silicon Process
Yeongju Seo[1], Hyeonwook Park[1], Salh Alhammadi[1], Younggyun Yoo[1], Seong-yeop Eum[2], Joon-Hyeong Oh[2], Woo Kyoung Kim[1]
[1]Yeungnam University, South Korea
[2]QUARTZ TECH, South Korea

Area 8 Thin film, IBC and HJT Solar Cells

8ThP.1/1147
Development and Manufacturing of Silicon Heterojunction Solar Cells
Jianqiang Wang
Beijing University of Technology, China

8ThP.2/132
The Simulated Evolution of 24% IBPC Solar Cell Based on Experimental IBC
Sung-Yu Chen, Shih-Ting Liao, Han-Chen Chang, Jen-Chuan Chang, Chorn-Gjye Huang
Industrial Technology Research Institute, Taiwan, China

8ThP.3/104
Influence of the Front Surfce Field and Defect State of A-si:h/c-si Interface on the Hit Solar Cells
Sunhwa lee[1], Duy Phong Pham[1], Sangho Kim[2], Youngkuk Kim[3], Jinjoo Park[4], Eun-Chel Cho[1], Junsin Yi[1]
[1]Sungkyunkwan University, South Korea
[2]Sangho Kim, South Korea
[3]Youngkuk Kim, South Korea
[4]Cheongju University, South Korea

8ThP.4/94
Effect of ITO Workfunction in the Silicon Heteorojunction Solar Cells
Sehyeon Kim, Sunhwa Lee, Sangho Kim, Youngkuk Kim, Junsin Yi
Sungkyunkwan university, South Korea

8ThP.5/90
Loss Analysis and Recovery for Laser Separated HIT Solar Cells
Yunlai Yuan, Qizhong Zhang, Jun Lv, Jason, Chen Zhu
LONGi Solar Technology Co., Ltd.China

8ThP.6/362
TCO Stack for High Performance Silicon Heterojunction Solar Cells
Gangqiang Dong[1], Shi Yin[1], Ge Cui[1], Yu Cao[1], Wei Long[1], Hongyu Li[2], Jingquan Zhang[2], Xixiang Xu[1]
[1]Hanergy Thin Film Power Group. China
[2]Sichuan University, China

8ThP.7/361
Improving a-Si:H/c-Si Interface Passivation Quality in Silicon Heterojunction Solar Cell with Ultra-thin SiO_x:H Buffer Layer
Xiaoning Ru[1], Minghao Qu[1], Jianqiang Wang[2], Tianyu Ruan[2], Zongyou Jiang[1], Fan Chen[1], Hao Chen[1], Shibin Gu[1], Xixiang Xu[1]
[1]Hanergy Thin Film Power Group, China
[2]Beijing University of Technology, China

8ThP.8/355
Crystallization of Electron-Beam-Evaporated Amorphous Si Films on Textured Glass Substrates by FLA
Aimi Yago, Keisuke Ohdaira*
Japan Advanced Institute of Science and Technology, Japan

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The Influence of Front Surface Passivation Structure on The Performance of Heterojunction –interdigitated back Contact (HBC) Solar Cell

Jianhui Bao[1], Ke Tao[2], Rui Jia*[2], Shuai Jiang[3], Yaopei Zhu[4], Jie Zhu[4], Xuhuan Liu [4], Lei Tang[4]

[1]School of Microelectronics, Dalian University of Technology, Dalian, China
[2]Institute of Microelectronics of Chinese Academy of Sciences, China
[3]Institute of Microelectronics of the Chinese Academy of Sciences, 3# Bei-Tu-Cheng West Road, Beijing, 100029, China
[4]Jiangsu Rongma New Energy, 3# Changjiang road, Siyang, Jiangsu province, 223700, China

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High Efficiency Silicon Heterojunction Solar Cells with Electroplated Copper Grid Electrodes

Xin Shu, Lihui Xu, Chunmei Liu, Bo Liu, Lin Liu, Huaichao Wang, Wei Long, Shi Yin, Hongfan Wu, Yu Cao, Xixiang Xu

Hanergy Thin Film Power Group, China

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Studies on Preparation and Microstructure of Si-rich Silicon Nitride Thin films Containing Si Quantum Dots

Bingqing Zhou*, Xinxin Bu, Desong Ding

Inner Mongolia Normal University, China

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Effects of Radio-frequency Power and Deposition Pressure on Structures and Properties of Silicon-rich Silicon Nitride Thin Films

Jiaxin Sun, Bingqing Zhou*, Xin Gu, Xiuzhang Weng

Inner Mongolia Normal University, China

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Simulation of Full-size Multi-busbar IBC Solar Cell

Zhenzhen Xi*, Yonggang Guo, Xiang Wu

SPIC Xi'an Solar Power Co., Ltd. Xi'an, 710000, China

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Back-Contacted Silicon Solar Cells with Dopant-free Heterojunctions

Pingqi Gao*[1], Hao Lin[2], Wenzhong Shen[2]

[1]Sun Yat-sen University, China
[2]Shanghai Jiao Tong University, China

8ThP.15/60
A Mechanism for Ag Electrode Formation with Low Resistance and Superior Aspect Ratio for Improving Electrical Properties
Donghyun Oh[1], Muhammad Quddamah Khokha[2], Junsin Yi*[2]
[1]School of Information and Communication Engineering, Sungkyunkwan University, Suwon, 16419, Korea
[2]School of Information and Communication Engineering, Sungkyunkwan University, Suwon, 1641, Korea

8ThP.16/1106
The Interfacial Behavior and Stability Analysis of p-type Crystalline Silicon Solar Cells Based on Hole-selective MoOX/Metal Contacts
Shuangying Cao[1], Jingye Li[1], Yinyue Lin[1], Tianyu Pan[1], Guanlin Du[1], Juan Zhang[2], Liyou Yang[2], Xiaoyuan Chen[1], Linfeng Lu[1], Na Min[3], Min Yin[1], Dongdong Li[1]
[1]Shanghai Advanced Research Institute, Chinese Academy of Sciences, China
[2]Jinneng Clean Energy Limited Company, China
[3]Shanghai University, China

8ThP.17/1097
Effect of Boron Concentration on counter-doping of Boron Doped Amorphous Silicon by PH3 Plasma Ion Implantation
Huynh Thi Cam Tu*[1], Noboru Yamaguchi[2], Hideki Matsumura[1], Keisuke Ohdaira[1]
[1]Japan Advanced Institute of Science and Technology, Japan
[2]ULVAC Inc, Japan

8ThP.18/1086
Deposition of Tungsten Oxide by HWCVD for Hole Transport Layer of Silicon Solar Cells
Chen Shiyuan, Yuta Shiratori, Shinsuke Miyajima*
Tokyo Institute of Technology, Japan

8ThP.19/1073
Effect of Substrate Temperature on the Growth Properties of Ag-doped SnS Thin Film Deposited by Sputtering Method for Solar Cell Application
Vinaya Kumar Arepalli, Sungjun Kim, Byeong Chan Lee, Jeha Kim*
Cheongju University, Korea

8ThP.20/1065
Bifacial Passivation of n-silicon metal-insulator-semiconductor Photoelectrodes for Efficient Photoelectrochemical Oxygen and Hydrogen Evolution
Bin Liu
Tianjin University, China

8ThP.21/776
Controlling the Photogenerated Carriers Transport via Silver Nanoparticles embedded In a-Si:H Solar Cells
Tiantian Li[1], Qi Shan[1], Ke Zhong[1], Zilun Sheng[1], Ying Zhao[2], Xiaodan Zhang[2]
[1]Inner Mongolia University, China
[2]Nankai University, China

8ThP.22/723
Fabrication of Silicon Heterojunction Solar Cells with high-quality i-a-Si:H Deposited by Facing Target Sputtering Technique
Yuta Shiratori[1], Shinsuke Miyajima[2]
[1]Tokyo Institute of technology, JSPS research fellowship for young scientists DC1, Japan
[2]Tokyo Institute of technology, Japan

8ThP.23/715
Amorphous Si Quintuple-Junction Solar Cells on Graphene Layer for IoT Applications
Ryousuke Ishikawa*, Momoka Yonemura, Ryo Sasaki, Makoto Konagai
Tokyo City University, Japan

8ThP.24/672
Oxygen Enables Fluent Hole Transport in Rear Emitter SHJ Solar Cells
Wenzhu Liu*[1], Xinbo Yang[1], Liping Zhang[2], Stefaan De Wolf[1]
[1]KAUST, Kingdom of Saudi Arabia
[2]CAS, China

8ThP.25/300
Optimization of Textured Substrate for Silicon Heterojunction Passivated by a-SiO_x:H Thin Film
Kimihiko Saito*[1], Tsukasa Takamura[2], Yukimi Ichikawa[2], Makoto Konagai[2]
[1]Fukushima University, Japan
[2]Tokyo City University, Japan

8ThP.26/282
Novel Si heterojunction Solar Cells with Dopant-free Carrier Selective Transport Layers
Yurong Zhou, Ming Liu, Fengchao Li, Rongzong Shen, Gangqiang Dong,
Fengzhen Liu*, Yuqin Zhou
University of Chinese Academy of Sciences, China

8ThP.27/184
Screen Printing of Copper Pastes for Metallisation of Silicon Heterojunction Solar Cells
Teo Boon Heng*[1], Thomas Mueller[1], Ankit Khanna[1], Vinodh Shanmugam[1],
Ma Luisa Ortega Aguilar[1], Maryknol Estrada Delos Santos[1], Wei-Chen Chang[2],
[1]Solar Energy Research Institute of Singapore, Singapore
[2]Geckos Technology Corp, TaiWan, China

8ThP.28/169
All-solution Based Plating Seed Layer Formation of Copper Metallization for Silicon Heterojunction Solar Cells
Junjun Li Jian Yu*, Tao Chen, Yuelong Huang
Southwest Petroleum University, China

8ThP.29/571
Transition Metal Oxides hole-selective Layers by hot-wire oxidation-sublimation Deposition for Novel Si Heterojunction Solar Cells Application
Fengchao Li, Yurong Zhou*, Gangqiang Dong, Rongzong Shen, Yanbin Shi, Fengzhen Liu
University of Chinese Academy of Sciences, China

8ThP.30/365
A Novel Passivation Structure for N type IBC Silicon Solar Cells
Yiqing Wu[1], Ke Tao[2], Shuai Jiang[2], Rui Jia*[2], Minghui Li[2]
[1]Institute of Microelectronics of Chinese Academy of Sciences, China
[2]Institute of Microelectronics of the Chinese Academy of Sciences, China

8ThP.31/610
High Mobility Transparent Conductive Oxide Film for Silicon Heterojunction Solar Cell
Tappei Nishihara*[1] Hiroki Kanai[1], Takefumi Kamioka[1], Junsuke Matsuzaki[2], Junya Kiyota[2], Yoshio Ohshita[3], Kyotaro Nakamura[3], Satoshi Yasuno[4], Ichiro Hirosawa[4], Toshiro Okawa [5], Astushi Ogura[1]
[1]Meiji university, Japan
[2]ULVAC, Japan
[3]Toyota Technological Institute, Japan
[4]JASRI, Japan
[5]Scienta Omicron, Japan

8ThP.32/485
Preparation of Multifunctional SiO_2 anti-reflection Film by sol-gel
Xiaoyu Sun, Xiaozhuang Xu, Jielei Tu*, Guanyu Song, Pingyuan Yan, Weinan Zhang
Solar Energy Research Institute, Yunnan Normal University, China

8ThP.33/463
Impact of Indium Tin Oxide Double Layers Deposition on the Passivation Performance of a-Si:H/c-Si Heterocontact
Masanori Semma*, Kazuhiro Gotoh, Yasuyoshi Kurokawa, Noritaka Usami
Graduate School of Engineering, Nagoya University, Japan

Area 9 Topcon Solar Cells

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Fabrication of 23.53% Efficiency Tunnel Oxide Passivated Contact Solar Cell
Chun-Heng Chen[1], Li-Yu Li[1], Chun-Ming Yeh[2], Han-Chen Chang[2], chun-chieh LO*[1]
Peichen Yu[3], Sung-Yu Chen[2], Chorng-Jye Huang[2]
[1]IITRI, Taiwan, China
[2]ITRI, USA
[3]NCTU, Taiwan, China

9ThP.2/721
Development of TOPCon-IBC Using Simple p and n Layer Formation Process
Noboru Yamaguchi*[1], Shota Suzuki[2], Toshiyuki Nakamura[1], Makoto Arai[1],
Marwan Dhamrin[2]
[1]ULVAC, inc., Japan
[2]Toyo Aluminium K.K.Japan

9ThP.3/704
Effect of Boron Doping on Hole Selective Passivated Contact
Yunpeng Li[1], Feng Ye[1], Yuqiao Liu[1], Yingying Qin[1], Yushan Nie[1], Jingjing Shen[1],
Ningyi Yuan[2], Jianning Ding[2], Zheren Du*[1]
[1]Linyang Photovoltaic Technology CO., LTD, China
[2]Jiangsu Collaborative Innovation Center for Photovoltaic Science and Engineering, China

9ThP.4/700
Effect of Rear Surface Morphology on n-type Passivated Contact Silicon Solar Cell
Feng Ye[1], Yingying Qin[1], Ting Zhang[2], Yunpeng Li[1], Zheren Du*[2]
[1]Jiangsu linyang photovoltaic technology co. Ltd.China
[2]Jiangsu linyang photovoltaic technology co. Ltd.Singapore

9ThP.5/694
Growth of void-free $Cu_2ZnSn(S, Se)_4$ Thin Film by one-step Annealed Precursor
Lu Wang1 Jie Guo[1], Ruiting Hao*[1], Xinxing Liu[2], Bin Liu1, Kang Gu[2],
Shuaihui Sun[2], Yong Li[2]
[1]School of Physics and Electronic Information, Yunnan normal University, China
[2]Key Laboratory of Renewable Energy Advanced Materials and Manufacturing Technology Ministry of Education, Yunnan Normal University, China

9ThP.6/586
Improving the Performance of Cu_2ZnSnS_4 Solar Cells by Cation Substitution
Shuaihui Sun, Jie Guo*, Ruiting Hao*, Xinxing Liu, Lu Wang, Kang Gu,
Bin Liu, Jinming Cai, Xiaole Ma, Guoshuai Wei, Yong Li
Yunnan Normal University, China

9ThP.7/1168
Recent Advancement in TOPCon Technology for High Efficiency Crystalline Silicon Solar Cell
Sanchari Chowdhury, Donghyun Oh, Sunhwa Lee, Minkyu Ju, Youngkuk Kim, Younghyun Cho, Eun-chel Cho*, Junsin Yi*
Sungkyunkwan University, Korea

9ThP.8/1152
Improved Carrier Selectivity for TOPCon Si Solar Cells by Predeposited Nanocrystalline Silicon Contact
Yanhong Huang, Dongqiang Chen, Yuxiao Jiao, Litao Xin, Haoyu Xu, Haixu Liu, Wei Yu
Hebei University, China

9ThP.9/726
Towards Industrialization of PECVD Deposition of Poly-Si in Passivated Selective Contact for High Efficiency c-Si Solar Cells
Baojie Yan[1], Yuheng Zeng[1], Mingdun Liao[1], Yuhong Cao[2], Liming Fu[2], Jichun Ye*[1]
[1]Ningbo Institute of Materials Technologies and Engineering, China
[2]SCenergy, China

9ThP.10/640
Phosphorus Diffusion Optimization for High Efficiency N-Type Passivated Contact Solar Cells
Xinrui An*, Haiyan Chen, Linan Zhang, Bing Li, Shuo Li, Yunyu Liu, Weiwei Deng
Canadian Solar Inc.China

9ThP.11/531
Influence of Surface Morphology on the Passivation Quality of SiOx/n-poly Silicon Film
Weiwei Deng*
Canadian Solar Inc. China

9ThP.12/517
Comparative Analysis of TOPCon with p-type poly-Si on n-type c-Si Wafer Substrate
Xueqi Guo, Yuheng Zeng, Zhe Rui, Qing Yang, Zhixue Wang, Mingdun Liao, Baojie Yan, Jichun Ye
Ningbo Institute of Materials Technology and Engineering, CAS, China

9ThP.13/366
Industrially TOPCon Solar Cells Based on Phosphorus Diffused poly-Si and Thin Dielectric Interlayers
Ying Zhou[1], Ke Tao[1], Jianhui Bao[1], Rui Jia*[1], Qinqin Wang[2], Yujia Cao[2], Hui Qu[2], Chun Xu[3]
[1]Institute of Microelectronics of the Chinese Academy of Science, China
[2]Shunfeng Photovoltaic Technology, China
[3]Jiangsu Rongma New Energy, China

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Novel TOPCon Solar Cell with n+-doped Wide Bandgap SiCxOy Thin Film As the Front Emitter

Ke Tao[1], Zhiyu Xu[1], Ying Zhou[1], Rui Jia*[1], Jianhui Bao[1], Shui Jiang[1], Hui Qu[2], Yujia Cao[2], Chun Xu[2]

[1]Institute of Microelectronics of the Chinese Academy of Sciences, China
[2]Shunfeng Photovoltaic Technology, China

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Assisted Tunneling and Passivation Properties of metal-doped Silicon Oxides for Low Cost Silicon Based Heterojunction Solar Cells

H.W. Du[1], M.Gao[2], D.Y.Chen[2], K.J. Wu[2], F. Xu[2], F.Hong[2], L.Zhao[2], Z.Q.Ma[2]

[1]China Jiliang University, China
[2]Shanghai University, China

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Passivation with Ultrathin SiO_x and Poly-SiN_x on c-Si for TOPCon Solar Cells

Qing Yang[1], Yuheng Zeng*[1], Zhixue Wang[1], Xueqi Guo[1], Zhe Rui[1], Baojie Yan*[2], Jichun Ye*[1]

[1]Ningbo Institute of Materials Technology & Engineering, China
[2]Ningbo Institute of Materials Technology & Engineering, America

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Aluminum Contacts for n+ and p+ Poly Layers for Advanced Passivated Solar Cells

Naoya Morishita*

Toyo Aluminium K.K.Japan

9ThP.18/15

Surface Passivation of in Situ Doped n-type Polysilicon on Oxide (POLO) Layers for Silicon Solar Cells

Jan Krügener*[5], Felix Haase[1], Christina Hollemann[1], Robby Peibst[2], Uwe Höhne[3], Jan-Dirk Kähler[3], Hans-Jörg Osten[4]

[1]Institute of Electronic Materials and Devices, Germany
[2]Institute for Solar Energy Research in Hamelin; Institute of Electronic Materials and Devices, Germany
[3]centrotherm international AG, Germany
[4]Institute of Electronic Materials and Devices; Laboratory of Nano and Quantum Engineering, Germany
[5]Institute of Electronic Materials and Devices, Germany

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Tunneling Conductivity of Ultra-thin SiNx Films for TOPCon-like Solar Cells Formed by Cat-CVD

Yuli Wen, Keisuke Ohdaira

Japan Advanced Institute of Science and Technology, Japan

Area 10 Performance and reliability of PV module

10ThP.1/1004
Module Performances Using Different Backsheet After Extended IEC Tests
Zhang Yang*, Sunny Zhao
DSM, China

10ThP.2/970
Opportunities and Challenges of POE on double-glass Photovoltaic Modules
Liwei Zhou, Lixia Peng, Baoxin Lliu, Tao Xu*
Canadian Solar Manufacturing (Changshu) Inc.China

10ThP.3/47
A Study on the Reliability Characteristics of Lightweight c-Si PV Module Using Ultra Barrier Film
Woo-Gyun SHIN, Jong-Rok LIM, Suk-Hwan KO, Gi-Hwan KANG,
Young-Chul JU, HYE-MI HWANG
Photovoltaic Laboratory, Korea Institute of Energy Research, Korea

10ThP.4/33
Light/Electrical-Induced Degradation of Crystalline Silicon Photovoltaic Modules at Different Temperatures
Bingjie Zhu, Hao Song, Yi Wang, Haomin Chen, Chaojun Huai, Dan Hu
National Center of Supervision and Inspcetion on Solar Photovoltaic Product Quality(CPVT), China

10ThP.5/149
c-Si Photovoltaic(PV) Module Reliability for Soldered Busbar Interconnects
Weixin Zhou[1], Lunzheng Sun[2], Qiangzhong Zhu[2], Jun Lv[2]
[1]School of Electronic Science and Engineering, Southeast University, China
[2]Longi Solar Technology Co., Ltd., China

10ThP.6/387
Characteristics of ALD-grown Al_2O_3 Moisture Barrier Layer for Solar Module
Sungjun Kim, Vinaya kumar Arepalli, Hyeongwoo Lee, Minje Kim,
Byeungjun Choi, Jeha Kim
Cheongju University, Korea

10ThP.7/386
Factor Analysis of Degradation of Solar Roadways
Firoz Khan[1], Jae Hyun Kim[2]
[1]King Fahd University of Petroleum and Minerals, Saudi Arabia
[2]DGIST, Korea

10ThP.8/373
Investigation on Acid Generation by Humidity Impact for Photovaltaic Modules During UV Irradaitoin Stage in UV and Damp-heat Combined Test

Shota Asano[1], Takanori Morimoto[1], Sachiko Jonai[2], Yukiko Hara[2], Atsushi Masuda[2], Norihiro Umeda[1], Kentaro Iwami[1]
[1]Tokyo University of Agriculture and Technology, Japan
[2]National Institute of Advanced Industrial Science and Technology, Japan

10ThP.9/329
Colored c-Si Photovoltaic Module Employing Luminophores
Hyung-Jun Song[1], Byeong-Guk Jeong[2], Donghyo Hahm[1], Jun Young Kim[3], Myungsang Jeong[4], Min Gu Kang[4], GiHwan Kang[4], Wanki Bae[2]
[1]Seoul National University of Science and Technology, Korea
[2]Sungkyunkwan University, Korea
[3]Gyeongsang National University, Korea
[4]Korea Institute of Energy Research, Korea

10ThP.10/318
Thermal Performance Analysis on Double Glass Photovoltaic Modules
Lei Wang[1], Zhen Zhang[1], Minyan Wu[1], Yue Lu[1], Chuanjia Xu[1], Peng Quan[2]
[1]Hohai University, China
[2]Trinasolar ltd., China

10ThP.11/298
Modeling Study of Thermomechanical Stress in Silicon Solar Cells Interconnection
Cheng Chen[1], Pei-Chich Hsiao[2], Zi Ouyang[2], Canjun Shen[1], Chen Zhu[1], Jun Lv[1], Alison Lennon[2]
[1]Longi Solar Technology Co., Ltd., China
[2]School of Photovoltaics and Renewable Energy Engineering, UNSW, Australia

10ThP.12/281
Temperature and Thermomechanical Stress Distribution Analysis of Junction Box on Silicon Photovoltaic Modules Based on Finite Element Analysis
Shoushou Lyu[1], Qijun Peng[2], Huili Han[3], Zhao Wu[1]
[1]National Center of Supervision and Inspection on Solar Photovoltaic Product Quality, Wuxi Institute of Supervision & Testing on Product Quality, China
[2]Zhejiang Xinhui Photovoltaic Technology Co., Ltd, China
[3]ShunDe SYSU Institute for Solar Energy, China

10ThP.13/273
Effect of the Shingled Technology on the Performance of Photovoltaic Modules
Gang Wang[1], Chenxu He[2]
[1]Chint Solar (Zhejiang) Co. Ltd., China
[2]Chint New Energy Technology (Haining)Co.Ltd., China

10ThP.14/207
Research on the Indium Recycling Technology of (HIT) Solar Cells
Shukui Yu, Lei Wang, Weiheng Pan, Zhangzhe Hong, Shibo Cui, Zhen Zhang, Zhengqi Tai
The college of mechanical and electrical engineering, Hohai University, China

10ThP.15/419
Formation of Glass Layer on Cover Glass as Anti-Potential Induced Degradation Technique of p-Type Multi-crystalline Si Photovoltaic Modules
Fumitaka Ohashi[1], Ryo Fuseya[1], Taishi Furuya[1], Go Sian Huai[1], Nobukazu Kameyama[1], Yasushi Sobajima[1], Yasushi Tachibana[2], Hiroki Yoshida[1], Atsushi Masuda[3], Shuichi Nonomura[1]
[1]Gifu University, Japan
[2]Industrial Research Institute of Ishikawa, Japan
[3]National Institute of Advanced Industrial Science and Technology, Japan

10ThP.16/881
Selection of Junction Box Under the Condition of Grid Parity
Jun Lv, Wei Ding, Zhifu He, Chen Zhu
Longi Solar Technology Co., Ltd., China

10ThP.17/712
Potential-induced Degradation and Recovery Behaviors of Photovoltaic Modules with n-type front-emitter Crystalline Si Cells without SiO_2
Tomoyasu Suzuki[1], Seira Yamaguchi[1], Kyotaro Nakamura[2], Atsushi Masuda[3], Keisuke Ohdaira[1]
[1]Japan Advanced Institute of Science and Technology, Japan
[2]Toyota Technological Institute, Japan
[3]National Institute of Advanced Industrial Science and Technology, Japan

10ThP.18/846
Analysis of Water Penetration, Acetic Acid Generation and Diffusion in Photovoltaic Module Based on Finite Element Method
Kentaro Iwami*[1], Shota Asano[1], Takanori Morimoto[1], Yukiko Hara[2], Sachiko Jonai[2], Atsushi Masuda[2], Norihiro Umeda[1]
[1]Tokyo University of Agriculture and Technology, Japan
[2]National Institute of Advanced Industorial Science and Technology, Japan

10ThP.19/558
Suitable Range of Average Photon Energy in Spectral Mismatch Correction for Thin Photovoltaic Modules
Masaki Tsuji*[1], Koichi Nakayama[1], Kota Takeguchi[1], Jakapan Chantana[1], Yu Kawano[1], Yoshihiro Hishikawa[2], Takashi Minemoto[1]
[1]Ritsumeikan University, Japan
[2]National Institute of Advance Industrial Science and Technology, Japan

10ThP.20/547
Study On Optical Gain Of Photovoltaic Reflective Ribbon and Light Redirecting Film
Xiaoqiang Zhao, Chao Zhong, Zhifu He, Chen Zhu, Xiaochun Tan, Yongfei Wang, Jialin Shen, Qiangzhong Zhu, Jun lv
Longi Solar Technology Co., Ltd.China

10ThP.21/538
Improvement of PV Characterization for Perovskite Solar Devices
Hiromi Tobita[1], Keishi Tada[2], Fumiyasu Awai[2], Takeru Bessho[3], Satoshi Uchida[3], Hiroshi Segawa*[4]
[1]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo / JET, Japan
[2]Graduate School of Arts and Sciences, The University of Tokyo, Japan
[3]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan
[4]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo / Graduate School of Arts and Sciences, The University of Tokyo, Japan

10ThP.22/526
Minutely Outdoor Measurements of Bifacial Gains of Silicon Heterojunction Solar Cells in Relation to Diffuse Irradiance in Tokyo
Hiroshi Noge*, Makoto Konagai
Tokyo City University, Japan

10ThP.23/760
Investigation of the Module Operation Temperature in Long-term Evaluation of Rooftop PV Systems
Tanokkorn Chenvidhya*, Yaowanee Sangpongsanont, Dhirayut Chenvidhya, Chamnan Limsakul, Krissanapong Kirtikara
King Mongkut's University of Technology Thonburi, Thailand, Thailand

10ThP.24/596
A Novel Temperature Model for Determination PV Module Temperature
Li Feng*, Sebastian.Hempelmann, Cem.Basoglu, Frank.U. Hamelmann
University of Applied Science Bielefeld, Germany

10ThP.25/592
Computing Nominal Module Operating Temperature of Half-cell PERC and Full-cell Al-BSF mc-Si Photovoltaic module based on FEA modeling
Jn Jaubert[1], Gang Yan[1], Yue Lu[1], Yuanjie Yu[1], Zhen Zhang*[2], Jianwei Xiao[1]
[1]Canadian Solar Inc, China
[2]Hohai University, China

10ThP.26/585
Study On Anti-PID Mechanism Of Poe Applied To Bifacial Double Glass Module
Yongfei Wang, Jialin Shen, Zhifu He, Chen Zhu, Shengkai Fan, Xiaochun Tan, Xiaoqiang Zhao, Chao Zhong, Qiangzhong Zhu, Jun Lv
Longi Solar Technology Co., Ltd, Xi'an 710018, China

10ThP.27/575
Performance of the Cell Module LeTID and Study on the Effect of LIR
Jiang Qian*
SPIC Xi'an Solar Power Co., Ltd., China

10ThP.28/705
Investigation of Degradation in Crystalline Silicon PV Mini-module with Glass-glass Structure by Pressure Cooker Test
Yuji Ino*, Shuichi Asao, Katsuhiko Shirasawa, Hidetaka Takato
National Institute of Advanced Industrial Science and Technology (AIST), Japan

10ThP.29/703
Optimal Installation of Photovoltaic Systems Based on Natural Ventilation
Xiao Zhi, Wenchao Miao, K. H. Lam, Philip W. T. Pong
The University of Hong Kong, China Hong Kong

10ThP.30/1092
Performance of Copper-Indium-Gallium-Selenide(CIGS) Flex Modules Under A Rooftop Grid Connected Systems
Yongyuan Xu*[1], Xiaoning Ru[1], Atiye Bayman[2], Ricky Dunbar[2], Tao Wei[1], Hehui Chen[1], ChaoHsiung Huang[1], Chihung Hsiao[1]
[1]Hanergy Thin Film Power Group, MiaSoléChina High-tech Equipment Manufacturing Company, Fujian, China
[2]MiaSolé Hi-Tech Corp., USA

10ThP.31/1023
Performance Evaluation of Light and Elevated Temperature Induced Degradation behavior of PV Modules with PERC Solar Cells
Peng Wang*, Shimeng Wei
TUV NORD, China

10ThP.32/987
Modeling of Cell Performance Variation in One Diode Model for Reference I-V Curve Calculation
Hiroto Koshirae*[1], Kanako Kawasaki[1], Yuzuru Ueda[1], Yoshihiro Hishikawa[2]
[1]Tokyo University of Science, Japan
[2]National Institute of Advanced Industrial Science and Technology, Japan

10ThP.33/986
I-V Simulation Based Accurate String Fault Detection Method for Large Scale Photovoltaic System
Tomoka Uchiyama*, Yuzuru Ueda
Tokyo University of Science, Japan

10ThP.34/948
Durability Benchmarking of a Light-weight Polymer-based PV Module
Rhett Evans*[1], Zhengrong Shi[2]
[1]UNSW, Australia
[2]Sunman Energy, China

10ThP.35/873
Investigation of Potential Induced Degradation of Bifacial PERC Solar Cells
Jianbin Fan*
Longi Green Energy Technology Co. Ltd., China

10ThP.36/725
Evaluation of Reliability and Field Performance of a Novel Shading-free PV Module
Tian shun Feng*, Jingna Jiang, Jianxiong Ni, Dandan Rong, Yabin Li
Yingli Group Company Limited, China

10ThP.37/668
Interconnect-shingling: Maximizing the Active Module Area to Surpass 22% Module Efficiency with Bifacial Contacted Solar Cells
Henning Schulte-Huxel*[1], Susanne Blankemeyer[1], Heiko Mehlich[2], Frank Allenstein[2], Marcel König[2], Rolf Brendel[3], Marc Köntges[1]
[1]ISFH, Germany
[2]Meyer Burger, Germany
[3]ISFH, Leibniz Universität Hannover, Germany

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Daily Photovoltaic Power Output Predictive Models Based on Gradient Boosting Regression
Xiaoyang Wang*[1], Duo Luo[2], Yunlin Sun[3], Chao Li[1]
[1]University of Electronic Science and Technology of China, Zhongshan Institute, China
[2]SINGYES Green Building Technology, China
[3]Shunde SYSU Institute for Solar Energy, China

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Development of Automatic Failure Factor Estimation Algorithm Using I-V Curve
Yoshimasa Suzuki[1], Kanako Kawasaki*[1], Hiroto Koshirae*[1], Yuzuru Ueda*[1], Osamu Takase*[2], Chiaki Kato*[2], Mitsuhiro Minoda[2], Satoru Maeshima[2]
[1]Tokyo University of Science, Japan
[2]EKO Instruments, Japan

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Accurate Voltage Measurement of PV Module and Cell by Non-contacting Electrostatic Voltmeter
Ryo Shimizu*, Kensuke Nishioka
University of Miyazaki, Japan

10ThP.41/609
A Novel Multi-parallel Cell Module Protecting Against Hot-spot
Guoqing Chen[1], Chen Zhu[1], Xin Cao[1], Baisheng Huang[1], Jun Lv*[2]
[1]LONGi Solar Tecnology Co., Ltd.China
[2]Longi Solar Technology Co., Ltd. /Electronic Information Engineering College of Sanjiang University / The School of Photovoltaic and Renewable Energy Engineering, The University of New South Wales, China

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Technologies for Profitable Recycling of Si Modules
C. Tao[1], W.-H. Huang[2], Z. Zhou[3], R. Lyu[3], L. Ricci[1], C. Tezak[2], J.-N. Jaubert[3], M. Tao[2]
[1]TG Companies, USA
[2]Arizona State University, USA
[3]Canadian Solar, China

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Verification of Accuracy in Spectrum-energy Model for Tandem Solar Cell
Hiromu Saiki*[1], Hiroki Tawa[1], Kenji Araki[2], Yasuyuki Ota[1], Kensuke Nishioka[1]
[1]University of Miyazaki, Japan
[2]Toyota Technological Institute, Japan

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Comparison between Indoor and Outdoor Test Results on Potential-induced Degradation Behavior for N-type Front-emitter Crystalline Si Photovoltaic Modules
Minoru Akitomi[1], Yasuo Chiba[1], Keisuke Ohdaira[2], Atsushi Masuda*[1]
[1]National Institute of Advanced Industrial Science and Technology, Japan
[2]Japan Advanced Institute of Science and Technology, Japan

10ThP.45/509
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Quanzhang An*, Tietun Sun, Qiang Liu
Changzhou EGing Photovoltaic Technology Co., Ltd., China

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Approaches to High Throughput Simulations of Photovoltaics
Karen Forberich
Helmholtz-Institute Erlangen-Nürnberg, Germany

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Nattakarn Sakarapunthip, Dhirayut Chenvidhya*, Surawut Chuangchote, Tanokkorn Chenvidhya, Krissanapong Kirtikara
King Mongkut's University of Technology Thonburi

10ThP.48/416
Energy Yield Simulator for Bifacial Solar Cell (BiFi-SORES)
Soo-Young Oh*, Woo Kyung Kim, Won-Sup So, Jae Hak Jung
Yeungnam University, South Korea

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Overall Analysis of Long-term Performance Degradation of Photovoltaic Modules with Different Technologies
Kai Zhang[1], Huili Han[1], Jiapei Huang[1], Rensheng Liu[1], Hui Shen*[2]

[1]Shunde SYSU Institute for Solar Energy, China
[2]Sun Yat-Sen University

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Investigation and optimization of PV module efficiency using halved MBB crystalline silicon cells
Ying Zhang*, Jianxiong Ni, Jingna Jiang, Dandan Rong, Yabin Li, Yafei Geng, Chao Ma, Jinchao Shi, Dengyuan Song
State Key Laboratory of Photovoltaic Materials and Technology, Yingli Group Company Limited, China

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Analysis of PID on the Back of P-PERC Bifacial PV Module
Yuanyuan Li*
SPIC Xi 'An Solar Power CO., LTD, China

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Minimum Requirements of the Solar Simulators for Curved PV Panels
Kenji Araki*, Daisuke Sato, Masafumi Yamaguchi
Toyota Technological Insitute, Japan

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Durability of Encapsulated Ni/Cu Plated Si Solar Cells: Influence of Partially-Ablated SiNx
Xiaowei Shen*[1], Pei-Chieh Hsiao[1], Jack Colwell[2], Benjamin Phua[1], Zhimeng Wang[1], Alex Stokes[3], Alison Lennon[1]
[1]School of Photovoltaic and Renewable Energy Engineering, The University of New South Wales, Australia
[2]SunDrive Solar, Australia
[3]Department of Physics, Macquarie University, Australia

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Assessment of Solar Photovoltaic Potential in Thailand using Self-developed Simulation Tool
Amornrat Limmanee*, Sasiwimon Songtrai, Perawut Chinnavornrungsee, Natthawan Suwannajit, Visut Savangsuk, Ekkachan Rattanalerdnusorn, Kobsak Sriprapha
NECTEC National Science and Technology Development Agency, Thailand

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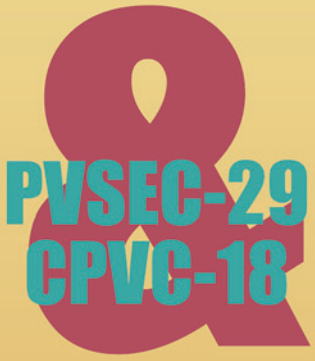
Aging Behavior and Degradation of Different Backsheets Used in the Field Under Various Climates in China
Huili Han1Ji Xia[2], Hongjie Hu[2], Hui Shen*[3], Rensheng Liu[3]
[1]Xin Yang Normal University, China
[2]DuPont (China) Research & Development and Management Co. LTD, China
[3]ShunDe SYSU Institute for Solar Energy, China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