The 6th World Conference on Photovoltaic Energy Conversion

PROGRAM

Joint Conference of

PVSEC-24
30th Anniversary
The 24th International Photovoltaic Science and Engineering Conference

41st IEEE PVSC
The 41st IEEE Photovoltaic Specialists Conference

30th EU PVSEC
The 30th European Photovoltaic Solar Energy Conference

Kyoto International Conference Center, Kyoto, Japan

November 23-27, 2014

WCPEC-6 Organizing Committee

Co-organized by

The Japan Society of Applied Physics
Research Institute for Applied Science
The European Commission
IEEE Electron Devices Society

Co-sponsors

Japan Society for the Promotion of Science, The 175th Committee on Innovative Photovoltaic Power Generation Systems

The Institute of Electrical Engineers of Japan

The Institute of Electronics, Information and Communication Engineers

The Japan Society for Aeronautical and Space Sciences

The Chemical Society of Japan

The Electrochemical Society of Japan

Japan Solar Energy Society

Kyoto Convention Bureau

Supporting Organizations

Ministry of Economy, Trade and Industry

Ministry of Education, Culture, Sports, Science and Technology

Japan Science and Technology Agency

New Energy and Industrial Technology Development Organization

Photovoltaic Power Generation Technology Research Association

National Institute of Advanced Industrial Science and Technology

Japan Photovoltaic Energy Association

Japan Aerospace Exploration Agency

The Japan Electrical Manufacturers' Association

New Energy Foundation

Japan Solar System Development Association

Optoelectronics Industry and Technology Development Association

We would like to express the deepest appreciation to Kyoto City.

Program Outline

Sunday, November 23

9:00 - 13:00	Registration	Asian Nations WS (Room B-1)					
13:00 - 17:00	Registration	Asian Nations WS (Room B-1)	Room F Tutorial	Room G Tutorial	Room H Tutorial	Room J Tutorial	Room K Tutorial
17:00 - 18:00	Registration						
18:00	Reception (Swan)						

Topics / Subtopics

1. New Concepts and New Materials for Future Technologies
2. Thin Film Silicon Based Photovoltaics
3. Thin Film Compound Semiconductor Based PV
4. Wafer-Based Crystalline Silicon
5. Concentrator Photovoltaics, III-V and Space PV Technologies
6. Organic, Dye Sensitized and Perovskite Solar Cells
7. Characterization and Modules Reliability
8. Systems, BOS components and Grid Integration
9. PV Deployment; Industry, Market and Policy

Monday, November 24 / Tuesday, November 25

	Mon Room A	Mon Room B-1	Mon Room B-2	Mon Room E	Tue Room A	Tue Room B-1	Tue Room B-2	Tue Room E	Annex	Annex	Annex	Annex	Annex	Annex	
8:30 - 10:00	Opening Plenary (Annex)				Plenary Session (Room A)										
10:15 - 11:30	Opening Ceremony (Annex)				3TuO.1	2TuO.5	5TuO.9	7TuO.13	1TuPo.1			4TuPo.7			IEA/PVPS Workshop
13:00 - 14:25	Plenary Session (Room A)				4sTuO.2	2TuO.6	5TuO.10	7TuO.14	1TuPo.2						IEA/PVPS Workshop
14:45 - 16:10	4sMoO.1	3MoO.3	1MoO.5	6sMoO.7	4TuO.3	1TuO.7	8TuO.11	6TuO.15		2TuPo.3	3TuPo.5		5TuPo.8	7TuPo.10	IEA/PVPS Workshop
16:30 - 17:55	J1MoO.2	3MoO.4	1MoO.6	6sMoO.8	4TuO.4	1TuO.8	8TuO.12	6TuO.16		2TuPo.4	3TuPo.6		5TuPo.9	7TuPo.11	IEA/PVPS Workshop
18:30 - 20:00		3MoRu.9					7TuRu.17 (-20:30)								

Wednesday, November 26 / Thursday, November 27

	Wed Room A	Wed Room B-1	Wed Room B-2	Wed Room E	Wed Room D	Annex	Annex	Annex	Annex	Annex	Annex	Thu Room A	Thu Room B-1	Thu Room B-2	Thu Room E	Thu Room D
8:30 - 10:00	Plenary Session (Room A)											Plenary Session (Room A)				
10:15 - 11:30	J2WeO.1	9WeO.5	J3WeO.9	2WeO.13			3WePo.5	4WePo.7	6WePo.2	8WePo.8		7ThO.1	J4ThO.4		6ThO.9	
13:00 - 14:25	1WeO.2	9WeO.6	J3WeO.10	2WeO.14	4WeO.17		3WePo.6		6WePo.3	8WePo.9		7ThO.2	3ThO.5	J1ThO.7	6ThO.10	4sThO.12
14:45 - 16:10	5WeO.3	9WeO.7	8WeO.11	3WeO.15	4WeO.18				6WePo.4		7WePo.10	7ThO.3	3ThO.6	2ThO.8	6ThO.11	4ThO.13
16:30 - 17:55	5WeO.4	7WeO.8	8WeO.12	3WeO.16	4WeO.19	1WePo.1					9WePo.11	Closing Ceremony (16:15 - 17:00)				
19:00 - 21:00	Banquet (Event Hall)															

Session Code

1 Mo O . 1

- 1: Area
- Mo: Day Code
- O: Session Type
- 1: Session Number

Session Type

- O Oral Session
- Pl Plenary Session
- Po Poster Session
- Ru Rump Session

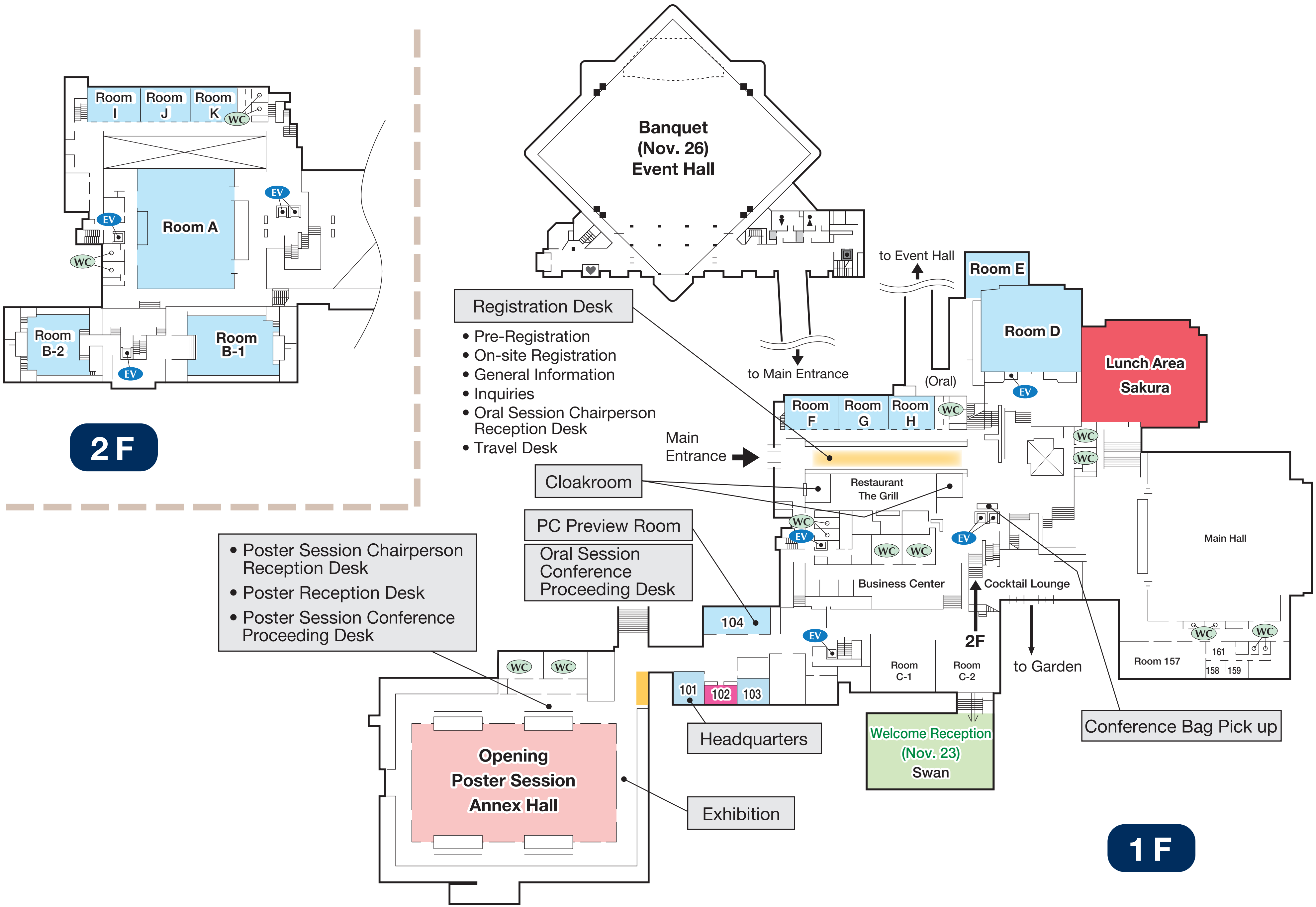
Day Code

- Mo Monday, November 24
- Tu Tuesday, November 25
- We Wednesday, November 26
- Th Thursday, November 27

Area

- 4s : Special Session, Area4
- 6s : Special Session, Area6
- J1 : Joint Session, Area2 & 4
- J2 : Joint Session, Area1 & 5
- J3 : Joint Session, Area7 & 8
- J4 : Joint Session, NEDO's PV R&D Projects & High Efficiency Solar Cells

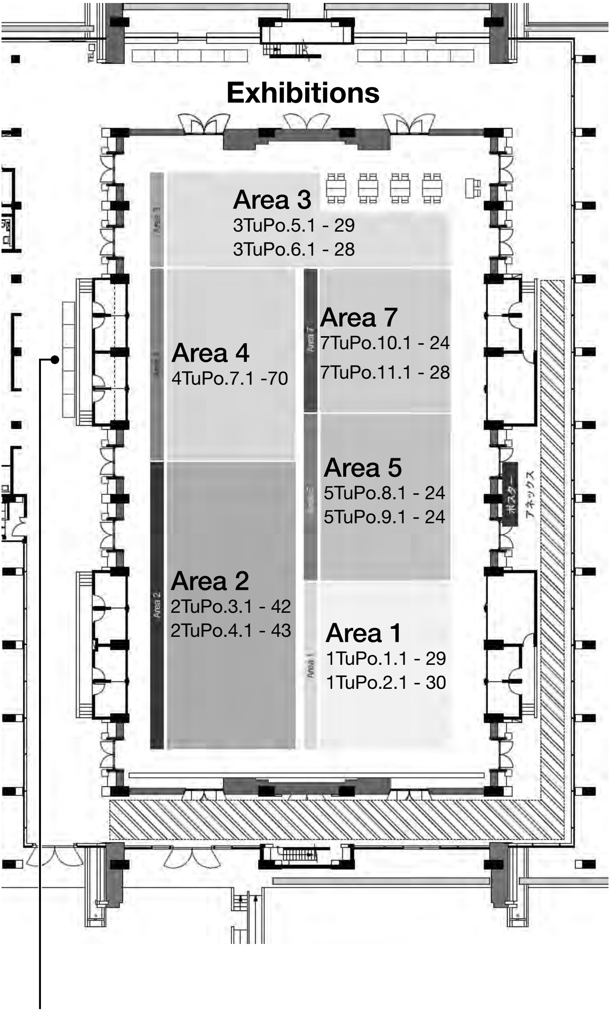
Floor Map



Room I
Room J
Room K
WC
EV
Room A
Room B-2
Room B-1
2 F
Banquet
(Nov. 26)
Event Hall
to Event Hall
Room E
Room D
Lunch Area
Sakura
Registration Desk
• Pre-Registration
• On-site Registration
• General Information
• Inquiries
• Oral Session Chairperson Reception Desk
• Travel Desk
to Main Entrance
(Oral)
Room F
Room G
Room H
Main Entrance
Cloakroom
Restaurant
The Grill
PC Preview Room
Oral Session Conference Proceeding Desk
• Poster Session Chairperson Reception Desk
• Poster Reception Desk
• Poster Session Conference Proceeding Desk
Business Center
Cocktail Lounge
Main Hall
104
2F
to Garden
Room C-1
Room C-2
Room 157
161
158
159
101
102
103
Headquarters
Welcome Reception
(Nov. 23)
Swan
Conference Bag Pick up
Opening
Poster Session
Annex Hall
Exhibition
1 F

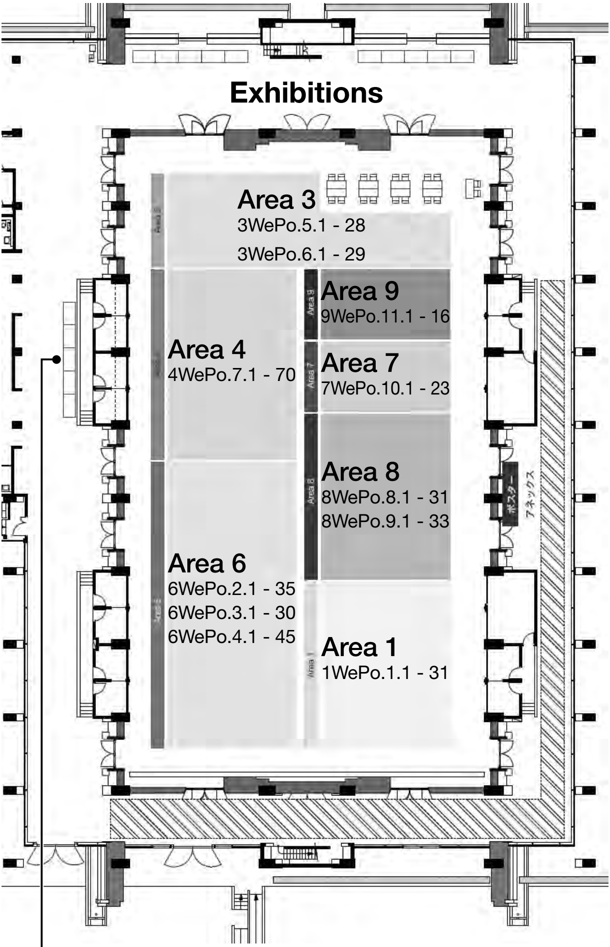
Poster Layout Map

Tuesday, November 25



- Poster Reception Desk
- Poster Session Chairperson Reception Desk
- Poster Session Conference Proceeding Desk

Wednesday, November 26



- Poster Reception Desk
- Poster Session Chairperson Reception Desk
- Poster Session Conference Proceeding Desk

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Chairpersons' Message

Message from the Conference Chair

It is our great pleasure to invite you to participate in the 6th World Conference on Photovoltaic Energy Conversion (WCPEC-6). This event will begin with opportunities for educational enhancement through a variety of tutorial topics on Sunday 23rd November, 2014. The conference proper will take place from Monday 24th to Thursday 27th November, 2014, at the Kyoto International Conference Center in Kyoto, Japan. Although previous WCPEC events have been held over 5 days, from Monday to Friday, this one is scheduled to last 4 days, from Monday to Thursday.

The conference, hosted by the WCPEC Organizing Committee, is a joint conference of the 24th Asia/Pacific PVSEC (PVSEC-24), the 41st IEEE PVSC and the 30th European PVSEC. We look forward to submissions of excellent papers, not only in the traditional areas of photovoltaics such as c-Si, thin-film materials (Si, CIGS, CdTe), III-V materials and organic materials, but also in fundamentals and new materials, modules and system development, concentrators, space applications and national programs and policies.

Japan's energy supply system is now facing a fundamental review as a result of the nuclear power plant accident following the 2011 East Japan Earthquake and Tsunami. This has led to a new recognition of the importance of photovoltaics. In Japan, there is currently a great deal of activity in photovoltaic research and development, such as the development of next-generation solar cells, and innovative solar cell development as part of the Fukushima recovery operation, beginning with PV introductory measures such as grant-aided projects for domestic solar power systems, and so-called "feed-in tariff" fixed-price power buyback schemes. The holding of the WCPEC-6 event in November 2014 will no doubt serve as an excellent opportunity to convey the results of these various projects to the wider world.

Kyoto is in the heart of Japan and is a city with over a thousand years of history. The Kyoto International Conference Center, which will serve as the conference venue in 2014, was also the venue for the COP3 (Kyoto Protocol Climate Conference) in 1997, at which climate change and global warming were discussed. As participants, let's all take this opportunity to discuss the future of photovoltaics, which are extremely effective in reducing CO_2. Late November in Kyoto is a time when the autumn colors are really beautiful. We invite you to come and enjoy the ancient city of Kyoto – a World Heritage site – while discussing the new form of energy that is photovoltaics.

Makoto Konagai (TokyoTech, Japan)

Message from the EU-PVSEC Vice-Chair

As European Co-Chair of the 6th World Conference on Photovoltaic Energy Conversion (WCPEC-6) it is my honour and pleasure to invite you to participate in this joint conference of the 24^{th} Asia/Pacific PVSEC (PVSEC-24), the 41^{st} IEEE PVSC and the 30^{th} European PVSEC.

When we meet in Kyoto cumulative PV capacity will most likely have exceeded 170 GW, showings that PV is on the right track to become a major electricity source. The fact that in some countries the share of PV electricity generation has reached already now up to 30% of electricity generation at certain hours not only shows the huge potential but also increases the urgency to provide cost effective solutions to integrate this PV electricity into the grid and increase its dispatchability.

The world photovoltaic community will gather on the occasion of the WCPEC-6 to meet and debate about the most recent scientific and technological progresses, industrial news, cost reductions, financial and policy issues and offer a unique opportunity for networking and knowledge exchnage.

I personally look forward to meeting you in Kyoto to exchange about the latest trends and developments in photovoltaics.

A. Jäger-Waldau (EC JRC, Italy)

Message from the IEEE Vice-Chair

Our global community of PV technologists has no more prestigious opportunity to share and publish our work than the World Conference provides us only once every three years. On behalf of the 41^{st} IEEE PV Specialists Conference Cherry Committee, I invite and encourage you to join us in the lovely and historic city of Kyoto for the 6th WCPEC, marking the 20^{th} year since the 1^{st} WCPEC.

The Conference Chair has graciously accommodated the Thanksgiving holiday tradition in the United States, since the WCPEC-6 Thursday closing ceremonies in Kyoto are on Wednesday east of the International Date Line! Please join us in Japan for the world's most important PV technical conference to be held in 2014.

B.J. Stanbery (Heliovolt, USA)

Message from Program Chair, WCPEC-6

On behalf of the Program Committee, I would like to express my sincere thanks to all the participants for their contribution to the WCPEC-6.

We have accepted nearly 1000 papers including Plenary and Invited talks for 9 different areas. More than 100 international experts in different areas devoted themselves for reviewing abstract.

Due to the limitation of the venue and time, it was tough job to formulate the program, and we have to select only 25% papers for oral presentation out of significant number of excellent papers. We are convinced that the program will be satisfactory for attendee.

The general scope of the WCPEC-6 is Terawatt Challenge beyond Grid Parity".

The PV business has changed significantly in this decade and the electricity cost has reached grid parity in many places in the world. The cumulative installation will exceed 160 GW this year. The next target is, therefore, Terawatt scale PV in coming decades, implying that the PV plays an important role as a pillar of electricity.

We hope this conference will be fruitful for attendee to obtain new idea and to establish global network for the PV innovation.

Michio Kondo (FREA, Japan)

General Information

Registration

Registration fee for the Conference includes admission to all technical sessions, entrance to the Exhibition and Welcome Reception as well as a copy of the Program book let and Technical Digest (DVD). Please refer to page 9 for more information.

Name Badge

A name badge will be issued to all participants. It is an admission passes to all sessions, exhibition and Welcome Reception.

Please wear your name badge all times during the conference for identification and security purposes.

Official Language

English is the official language of the conference and will be used for all printed materials, presentations, and discussions.

Technical Programs

WCPEC-6 2014 technical programs will consist of parallel sessions with Oral Presentations (November 24-27) and Poster Sessions (November 25-26).

Poster Sessions

The Poster Sessions will be held at Annex Hall of conference venue for 2 days (November 25-26).

All presenters are requested to set up their posters on the allotted boards prior to the session.

Poster sessions will give all conference participants the opportunity for Question and Answers.

*Please refer to page 14 for more information.

Exhibition

The exhibition will be held in the Lobby, Annex Hall during the conference.

Date & Time:	November 24 (Mon.)	12:00-18:00
	November 25 (Tue.)	9:00-18:00
	November 26 (Wed.)	9:00-18:00

PC Preview Room

All speakers are requested to bring their presentation data to the PC Preview Room 30 minutes prior to the presentation.

Location: Room 104

PC Preview Room will be opened during the following hours:

Date & Time:	November 24 (Mon.)	8:00-18:00
	November 25 (Tue.)	8:00-18:00
	November 26 (Wed.)	8:00-18:00
	November 27 (Thu.)	8:00-16:00

Note: Please bring your conference proceedings and copyright form. (Please refer to page 12.)

Welcome Reception

Date: Sunday, November 23

Time: 18:00-20:00

Location: Banquet Hall “Swan”, 1F, Kyoto International Conference Center

All participants are invited. Light meals and beverages (alcohol & soft drinks) will be served.

Banquet

Date: Wednesday, November 26

Time: 19:00-21:00

Location: Event Hall, 1F, Kyoto International Conference Center

Fee: 8,000.- JPY

Style: Buffet style

Registration fee does not include the banquet ticket. The ticket can be purchased at the registration desk.

Please note that banquet tickets are handled on a first come, first serve basis.

Coffee Breaks

As a service for participants, coffee breaks are served in front of Room A, B-1, B-2 and E during the conference.

Lunch Box

Please present the Lunch Box Ticket at Banquet Hall “Sakura” (1F) for those who purchased in advance.

Date	Time	Lunch Area
November 24 (Mon.)	11:00-14:00	Sakura,Room A,B-1,B-2,E
November 25 (Tue.)		Sakura,Swan, Room A,B-1,B-2,E
November 26 (Wed.)		Sakura,Swan, Room A,B-1,B-2,E,D
November 27 (Thu.)		

Lunch Area: Banquet Hall "Sakura" 1F, "Swan" 1F (November 25-27) and every Conference Room for Oral Presentation.

Cloakroom

Cloakroom is located on 1F, in front of the registration desk.

Opening Hours:

Date & Time:	November 23 (Sun.)	9:00-18:30
	November 24 (Mon.)	8:00-18:30
	November 25 (Tue.)	8:00-18:30
	November 26 (Wed.)	8:00-18:30
	November 27 (Thu.)	8:00-16:30

Business Center

Printing and photocopying services are available at the business center located at 1F in Kyoto International Conference Center.

For more details, please visit the following website: http://www.icckyoto.or.jp/en/other/businesscenter.html

Internet Access

Wireless internet service is available in all Lobby Area of the conference venue and in the Foyer at Annex Hall (Exhibition area).

Cellular Phone

Using cellular phones during the session is prohibited. Cellular phones must be turned off or set to silent mode during the sessions.

Future Conferences

PVSEC-25, Busan, Korea, November 15-20, 2015

The 42nd IEEE PVSC, New Orleans, USA, June 14-19, 2015

The 31st EU PVSEC, Hamburg , Germany, September 14-18, 2015

Registration Desk

Date & Time:	November 23 (Sun.)	9:00-18:00
	November 24 (Mon.)	8:00-18:00
	November 25 (Tue.)	8:00-18:00
	November 26 (Wed.)	8:00-18:00
	November 27 (Thu.)	8:00-16:00

Location: 1F near the main entrance.

Registration Fees

	Early bird From March 20 until September 30, 2014	On-Site
Regular	65,000 JPY	75,000 JPY
Student	25,000 JPY	30,000 JPY
Tutorial (Nov. 23)	5,000 JPY	
Banquet (Nov. 26)	8,000 JPY	

Cancellation Policy

To cancel your registration, a written request must be sent to the Registration Secretariat by September 30, 2014.

Registration fees are refundable as specified below. Please kindly note that all refunds will be made after the conference.

Cancellation/Refund Request Date	Refund
Must be on or before September 30, 2014	25% of registration fee per person will be deducted as a cancellation fee.
After October 1, 2014	No refund

Method of Payment

All payments on-site may use either Japanese yen (cash) or one of the following credit cards:

Visa, MasterCard, JCB, American Express

Climate

Autumn in Kyoto is comfortable, pleasant and throughly enjoyable. A light coat, sweater or something you can wear additionally in the cool time, should be quite adequate.

Money Exchange

Cash or travelers checks can be exchanged at any “Authorized Foreign Exchange Bank” (signs are displayed in English), major hotels, department stores or main post offices. In Kyoto, most major banks (including Citibank) are located near the Shijo-Karasuma intersection, two stops north of Kyoto Station on the Karasuma subway line.

Electricity

The voltage used throughout Japan is 100 volts AC. In Kyoto and western Japan, the frequency of electric current is 60Hz.

Two-pronged outlets are used in Japan.

Travel Information

JTB travel desk will be opened daily during the conference. For travel and accommodation informations, please feel free to visit travel information desk.

Shopping

Shops in Japan are generally opened on Saturday, Sunday and national holidays as well as weekdays from 10:00-20:00.

Tipping

In Japan, tipping is not necessary.

Emergencies

In case of emergency, please contact the Registration Desk near the main entrance.

Insurance

The organizers cannot hold responsible for injury to Conference attendees or for damage to, or loss of their personal belongings, regardless of cause. Attendees are advised to make their own insurance arrangements.

Guidelines for Oral Presentations

1. Time Allocation

Plenary Presentations	30 minutes including discussion
Invited Presentations	20 or 25 minutes including discussion
Oral Presentations	15 minutes including discussion

2. PC Preview

All speakers are requested to bring their presentation data to the PC Preview Room 30 minutes prior to the presentation.

Location: Room 104

PC Preview Room will be opened during the following hours:

Date & Time:	November 24 (Mon.)	8:00 - 18:00
	November 25 (Tue.)	8:00 - 18:00
	November 26 (Wed.)	8:00 - 18:00
	November 27 (Thu.)	8:00 - 16:00

Please bring your USB storage device or your own laptops to the PC preview room prior to the presentation. Our technical staffs will copy and save your presentation data. The copied data will be deleted after your presentation.

* If presentation data is made by Macintosh, please bring your own laptop.

Please also do not forget to submit your conference proceedings and Copyright form at the PC preview desk.

3. Technical Digest

Technical Digest will be published in DVD format after the conference. Conference proceedings should be submitted on-site during the conference at the PC preview room together with the Copyright form with consent of author and all co-authors in case of jointly authored works.

The Digest will be delivered by postal mail to the participants after the conference. If the manuscript is not available during the conference, your paper can not be published in the Technical Digest and are not eligible to receive awards.

4. Presentation Equipment

Preparing Presentation Data

OS and Applications

OS	Windows 7
Applications	PowerPoint or PDF Full Screen
Version	2007 / 2010
Movies	Windows Media Player
Fonts	Windows standard fonts (Arial, Arial Black, Arial Narrow, Century, Century Gothic, Courier New, and Georgia)

* If presentation data is made by Macintosh, you are required to bring your own laptop.

Please note that using any other font may cause letters to become unreadable.

To avoid the possible spread of computer viruses, always scan your presentation files beforehand with updated anti-virus software.

5. Oral Session Procedures

For Speakers:

1) Please follow the Chairperson's instructions.

2) Please be seated in the "Next Speaker's Seat" (located in the first row of the room) at least 15 minutes prior to your presentation.

3) Please check the time allotted for your presentation and finish your presentation within the designated time.

Note: There will be a "Digital Time Indicator" on the podium, which will alert you the remaining time.

For Session Chairpersons:

1) Please complete your registration and come to the chairpersons' reception desk near the registration desk.
2) Please be seated at the "Next Chairperson's Seat" at least 15 minutes prior to your session.
3) Please ensure that the session starts and finishes on time.
4) Please hand in the presentation evaluation form at the Chairpersons' Reception Desk.

Guidelines for Poster Sessions

1. Venue and Schedule

Venue: Annex Hall

Schedule:

	Set-up Time	Q & A	Removal Time
November 25 (Tue)			
1TuPo.1.1 - 29	8:00 - 10:00	10:15 - 11:30	18:00 - 19:00
1TuPo.2.1 - 30		13:00 - 14:25	
2TuPo.3.1 - 42		14:45 - 16:10	
2TuPo.4.1 - 43		16:30 - 17:55	
3TuPo.5.1 - 29		14:45 - 16:10	
3TuPo.6.1 - 28		16:30 - 17:55	
4TuPo.7.1 - 70		10:15 - 11:30	
5TuPo.8.1 - 24		14:45 - 16:10	
5TuPo.9.1 - 24		16:30 - 17:55	
7TuPo.10.1 - 24		14:45 - 16:10	
7TuPo.11.1 - 28		16:30 - 17:55	
November 26 (Wed)			
1WePo.1.1 - 31	8:00 - 10:00	16:30 - 17:55	18:00 - 19:00
3WePo.5.1 - 28		10:15 - 11:30	
3WePo.6.1 - 29		13:00 - 14:25	
4WePo.7.1 - 70		10:15 - 11:30	
6WePo.2.1 - 35		10:15 - 11:30	
6WePo.3.1 - 30		13:00 - 14:25	
6WePo.4.1 - 45		14:45 - 16:10	
7WePo.10.1 - 23		14:45 - 16:10	
8WePo.8.1 - 31		10:15 - 11:30	
8WePo.9.1 - 33		13:00 - 14:25	
9WePo.11.1 - 16		16:30 - 17:55	

Notes

If you fail to put up your poster within the scheduled times, your poster will be considered to be withdrawn and the Presentation will be cancelled.

All posters left after the removal time will be disposed of.

Please submit your conference and Copyright form at the conference proceeding desk in the Lobby at Annex Hall for Technical Digest (see “Technical Digest” in p.13 for more information).
We will then give you a “Ribbon” to wear on your chests.

2. Poster Session Procedures

For Poster Presenters

1) Poster panel size (prepared at the site) : height 2100mm × width 900mm.
2) Poster number (200mm × 300mm) will be placed on the top left of the panel in advance.
3) The size of poster board allows A0 format (841mm × 1189mm, upright format).
   Make sure that the poster meets the above space requirements. In addition, each poster must include a Title, Author’s Names and Affiliations.
4) Pushpins will be provided by the Registration Secretariat.
   Please use the pushpins to place your poster on the Panel.
5) All presenters will be given a “Ribbon” prepared by the Registration Secretariat to wear on their chests.
6) All presenters are required to stand by their poster panel during the session to make themselves available for discussion with participants.

For Session Chairpersons:

1) Please complete your registration and come to the chairperson reception desk in the Lobby at Annex Hall to show up yourself. We will give you a “Ribbon” to wear on your chests.
2) Please come to the assigned area in scheduled presentation time.

Conference Proceedings

Journal Papers:

Authors of WCPEC-6 papers are encouraged to submit their original papers presented at WCPEC-6 to (1) the Special Issues of Japanese Journal of Applied Physics (JJAP) or (2) IEEE Journal of Photovoltaics (J-PV). Please read carefully the instructions for the manuscript preparation of these two journals, then you can choose one of them. The review process for the journals is completely separate from the WCPEC-6 review process. In addition, exact copies of the Technical Digest cannot be accepted as journal papers.

- **Special Issues of Japanese Journal of Applied Physics (JJAP)**

The Special Issue of Japanese Journal of Applied Physics (JJAP) accepts original papers presented at WCPEC-6 as a "regular paper" in JJAP. The standard JJAP review will be done on the submitted manuscripts. The length of the manuscript is recommended to be more than 5 published pages.

The deadline for the submission of the manuscripts is December 19th, 2014.

Online publishing on the website will be started from June 2015.

Online manuscript submission site is already available on the JJAP website.

(http://journals.jsap.jp/jjap/special-issues/online-submission-to-jjap-special-issues)

Instructions for preparing of manuscript and MS-word templates can be downloaded from the following website.

Instructions for preparation of manuscript

(http://journals.jsap.jp/wp-content/uploads/instruction_e.pdf)

MS-Word Templates for preparing a manuscript (Regular Paper & Review Paper)

(http://journals.jsap.jp/wp-content/uploads/template-RP.docx)

When authors submit the manuscript, authors need to input the session number and to select the area number of the presentation.

Plenary speakers select "0" as area number on submission the manuscript of plenary presentation.

Guidelines for preparing a manuscript are also available on the following website.

(http://journals.jsap.jp/jjap/special-issues/submission-guideline)

IEEE Journal of Photovoltaics

As you are likely aware, the Institute of Electrical and Electronics Engineers (IEEE) has launched the Journal of Photovoltaics (J-PV) in response to the rapid growth of research in this area.

We would like to invite you to submit your very best research findings to this new journal. This can be done at any time through the J-PV website (http://eds.ieee.org/jpv.html). If you are presenting a paper at the WCPEC-6, you may submit a manuscript to the J-PV that is an enhancement of your conference proceedings paper. Guidelines for preparing an enhanced manuscript are available on the J-PV website (http://eds.ieee.org/images/files/Publications/jpv_info_for_authors.pdf). In summary, it is required that you cite the WCPEC-6 Technical Digest article in the enhanced version, briefly explain the extent of the enhancement in the introduction, and include at least one third additional material not published in the proceedings.

We hope that the possibility to publish in a peer-reviewed, archival journal will encourage you to bring your highest quality research results to the WCPEC-6.

Awards

WCPEC Award

The International Advisory Committee for the WCPEC has decided to establish the WCPEC Award for advancement of photovoltaic science and technology on occasion of the 6th World Conference on photovoltaic energy conversion with co-sponsorship of the IEEE Electron Device Society, European Commission and the PVSEC Advisory Committee, Japan.

According to nominations, the recipient is selected by the WCPEC Award Committee which is organized by 21 active members selected from the three societies of IEEE PVSC, EC-PVSEC and PVSEC.

The WCPEC Award 2014 will be presented to:

Professor Masafumi Yamaguchi

For his outstanding contributions to advancement of photovoltaic science and technology.

Dr. Yamaguchi is a Professor of Toyota Technological Institute since 1994 and Director of the Research Center of the Smart Energy Technology. His remarkable research achievements span the fields of semiconductor materials, devices and solar cells, and notably include the discovery of minority-carrier injection defect annealing in InP-related materials and solar cells, invention of double hetero structure tunnel diode for multi-junction applications, development of high efficiency III-V multi-junction including III-V/Si tandem, and concentrator solar cells.

Professor Yamaguchi is the Supervisor of the Creative Clean Energy Generation using Solar Energy of the Japan Science and Technology Agency (JST) and Project Leader of the Next Generation High Performance Photovoltaics R&D Project, New Energy and Industrial Technology Development Organization of Japan (NEDO). He is the Acting Leader of the EU-Japan Joint R&D Project on Concentrator Photovoltaics aiming at developing the world's highest efficiency concentrator solar cells, modules and systems.

He has received several awards such as Becquerel Prize from the European Commission in 2004 and William Cherry Award from the IEEE in 2008 for his outstanding contributions to the development of science and technology of photovoltaics such as high-efficiency multi-junction solar cells, space solar cells, concentrator solar cells and as one of the world leaders of the development of photovoltaics and as one of the driving forces for international co-operation, as illustrated in the PV World Conferences (WCPEC).

PVSEC Award

The PVSEC Award will be presented for outstanding contributions to the development of photovoltaic science and technology. The recipient is selected by the PVSEC Award Committee (PVSEC National Advisory Committee) according to nominations.

The PVSEC Award 2014 will be presented to:

Dr. Tatsuya Takamoto

For his outstanding contributions to photovoltaic science and technology development.

Dr. Tatsuya Takamoto has been one of the top, leading researchers in III-V compound high efficiency multi-junction solar cells in the world. He entered in the field of photovoltaic science with the development of InP space solar cells in 1987 (PVSEC-3, Tokyo). Since then, he has made many substantial contributions for high efficiency cells applied to space use and concentrator systems. His outstanding achievements of record efficiency include 30.3% efficiency dual-junction cell in 1997, 37.9% triple-junction cell and 44.4% concentrator cell in 2013. In his recent work for inverted multi-junction solar cells, not only high efficiency higher than 30% but also lightweight flexible structure have been demonstrated and realized for the first time. This technology holds massive potential for high efficiency solar cell applications.

His contribution is not only related to R&D area. He has been responsible for triple-junction solar cells at SHARP Corp. He is now working for applying the high-performance lightweight inverted triple-junction cells to space use. And also, he is working for realization of concentrator photovoltaic and terrestrial use of high efficiency III-V compound cells.

Dr. Tatsuya Takamoto is now Department General Manager of Compound Photovoltaic Cell Development Department, Energy System Solution Division, Sharp Corporation. He graduated from the University of Tsukuba in 1987 and joined Nippon Mining Corp. (now JX Holdings Inc.). He received PhD from Toyota Technological Institute in 1998. He moved to Sharp Corporation in 2001. He has won PVSEC Paper Award five times (at 9th, 11th, 13th 15th and 17th PVSEC).

PVSEC Special Award

The Organizing Committee of the PVSEC has also decided to institute the PVSEC Special Award that will be presented to outstanding contributions for technology development and the promotion of photovoltaic solar energy conversion. The recipient is also selected by the PVSEC Award Committee (PVSEC National Advisory Committee) according to nominations.

The PVSEC Special Award 2014 will be presented to:

Dr. Michio Kondo

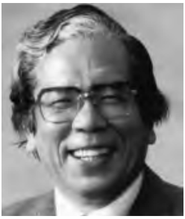
For his outstanding contribution to photovoltaic technology development and project management.

Dr. Michio Kondo is currently Deputy Director General of Fukushima Renewable Energy Institute, National Institute of Advanced Industrial Science and Technology (FREA). He received Ph.D. in material science at Osaka University in 1987. He joined University of Tokyo as a research associate in 1987 and Agency of Industrial Science and Technology in 1993. He directed Solar Photovoltaic research in AIST for 10 years and he is now deputy-director general in newly established institute, Fukushima Renewable Energy He has conducted more than 10 national projects for photovoltaic research upon thin film solar cells and high efficiency solar cells with an efficiency higher than 40%. He has also contributed to the strategic planning of solar photovolatics for NEDO as a committee member.

His research interest is mainly silicon thin film and related processes as well as its application to device such as TFT and solar cells including not only thin film device but also hetero junction devices with crystalline silicon and germanium.

He has published more than 200 scientific papers and 80 patents (48 filed). He received Keidanren-award for his contribution to the industrialization of thin film solar cells in collaboration with the company in 2008. He has also received the JSAP (The Japan Society of Applied Physics) Fellow Award in 2014 for his long-term activity upon basic research and its industrialization for solar cells.

Hamakawa Award



Professor Yoshihiro Hamakawa, a founder of the PVSEC community

This award is named in honor of Professor Yoshihiro Hamakawa, a founder of the photovoltaic community in Japan and the Asia/Pacific PV Conference (PVSEC). The Hamakawa Award is instituted in 2014 on the occasion of the 6th World PV Conference (WCPEC-6) because he is also a founder of the WCPEC and the occasion of the 30th anniversary of the PVSEC because he has served as the General Chair of the PVSEC-1 held in Kobe, Japan in 1984..

Dr. Yoshihiro Hamakawa is an Emeritus Professor of Osaka University since 1996. He has performed a number of remarkable research achievements in the field of semiconductor physics, optoelectronics, and solar photovoltaic conversion, particularly invention of the amorphous silicon multi-layer tandem solar cells and the success of valence electron control of amorphous silicon carbide films and their application to high efficiency Si thin-film solar cells.

In addition to these scientific activities, Professor Hamakawa has made many key contribution to the promotion of PV technology development. He was also an active leader in the industrial development of PV energy as an initiator of the Sunshine Project and served the Chairman of the Solar Energy Division in the New Energy Section of the Industrial Development Council, Ministry of International Trade and Industry, Japan.

For his distinguished contributions, he received numerous awards such as the William Cherry Award from the IEEE in 1994, the 1995 Purple Ribbon Prize from Japanese Emperor and WCPEC Award in 2003.

The purpose of the award is to recognize scientists and engineers who have made outstanding research and technological accomplishment, and creativity of PV energy conversion, especially outstanding contributions to developments of new concepts, new materials, new devices, ultra high efficient solar cells. The recipient is also selected by the PVSEC Award Committee (PVSEC National Advisory Committee) according to nominations.

The Hamakawa Award 2014 will be presented to:

Professor Makoto Konagai

For his outstanding contributions to seminal studies on GaAs, concentrator, organic solar cells and Peeled Film Technology.

Makoto Konagai is Professor of Physical Electronics at Tokyo Institute of Technology. He received the B.E., M.E. and D.E. degrees in Electronic Engineering from Tokyo Institute of Technology in 1972, 1974 and 1977, respectively. Since 1977, he has been with Tokyo Institute of Technology, where he has been engaged in the development of solar cell materials and devices. In 1972, he began to investigate GaAs solar cells and proposed several novel techniques to improve the energy conversion efficiency. He demonstrated pioneering work on GaAs thin-film concentrators prepared by the Peeled Film Technology. In 1979, he began to investigate polyacetylene solar cells and amorphous Si based thin film solar cells. In 1986, he initiated $CuInSe_2$ thin film solar cells for the first time in Japan. In addition to these solar cell materials and devices, he developed ZnO transparent conducting oxides for thin film solar cell applications. He is currently working on bulk and thin-film Si Si solar cells, thin-film full-spectrum solar cells and nano-wire Si solar cells. He has authored over 400 publications in international journals and over 500 international presentations.

In addition to these scientific activities, he has made many key contributions to the promotion of photovoltaic research and development, especially in Asian countries. He organized PVSEC-9 (1996) and WCPEC-6(2014). He is currently the chairman of the Japan Society for the Promotion of Science, The 175th Committee on Innovative Photovoltaic Power Generation Systems and the chairman of International Advisory Committee, International PVSEC. He has received prestigious awards, including the PVSEC Award (1999), The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Prizes for Science and Technology (2009), and Medal with Purple Ribbon (2013). He is now a member of Science Council of Japan.

The Hamakawa Award 2014 will also be presented to:

Professor Hironori Katagiri

For his outstanding contributions to pioneering studies on new, earth abundant CuZnSn(S,Se) solar cells and materials.

Dr. Katagiri is a Professor of Nagaoka National College of Technology since 2001. He has focused on the development of Cu_2ZnSnS_4 (CZTS) thin film solar cells. All of the constituents of CZTS are earth-abundant. From the viewpoint of resource strategy in the forthcoming future, CZTS is one of the most promising materials.
He demonstrated the conversion efficiency of 0.66% using CZTS thin film as an absorber at the PVSEC-9 held at Miyazaki, Japan in 1996. This is the first report of CZTS thin film solar cells. To improve the conversion efficiency, many experiments have been conducted since then. He achieved 6.77% by the end of 2008. One of the most outstanding results is concerned with the active composition. He confirmed that in order to obtain high conversion efficiency, CZTS with the off stoichiometric composition of Cu-poor and Zn-rich is preferable to the stoichiometric CZTS. He named those composition regions as the active composition.
Professor Katagiri has worked as an engineering educator in his college. All students in his laboratory are undergraduate. In the educational system of Japan, they are regarded to be the youngest researchers. Professor Katagiri says that both the development of CZTS solar cells and the education of young students are his lifework.

Social Program

Welcome Reception

Sunday, 6:00PM-8:00PM, at room “Swan”

Welcome Reception is held on Sunday, November 23rd, 6:00PM-8:00PM at the room “Swan” in conference venue. Any participant can attend free of charge. You can enjoy discussions with beer, wine, juice and snacks.

Conference Banquet

Wednesday, 7:00PM-9:00PM at “Event Hall”

Conference Banquet will be held on Wednesday, November 26th, from 7:00PM to 9:00PM at “Event Hall” in conference venue. Participants can enjoy night at Kyoto with eating and drinking as well as dance by Kyoto ladies. Although it is on a first come, first serve basis, banquet ticket can be purchased at the “Registration Desk”.

Exhibition

Du Pont Kabushiki Kaisha
ESPEC CORP.
JFE Techno-Research Corporation (JFE-TEC)
Nisshinbo Mechatronics Inc.
The Japan Society of Applied Physics
Japan Science and Technology Agency (JST)
JAPAN ELECTRICAL SAFETY & ENVIRONMENT TECHNOLOGY LABORATORIES (JET)
Airlight Energy
EIKO Corporation
EKO INSTRUMENTS CO., LTD.
FUJIFILM Corporation
KIKUSUI ELECTRONICS CORPORATION
SCREEN Finetech Solutions Co., Ltd.
Seishin Trading Co., Ltd.
Semilab Japan KK
Silvaco Japan Co., Ltd.
Sinton Instruments
TEIJIN LIMITED

WCPEC-6 Tutorials

November 23rd, 2014 (Sunday)

The WCPEC-6 tutorials will be held at the conference venue, " Kyoto International Conference Center ", on Sunday, November 23rd, 2014. The sites are Room F, G, H, J, K and the maximum number of each room is 48 persons.

The tutorial topics and time schedules are listed below. Please register for the tutorials using the normal conference registration process on this web site.

Topic A ; Crystalline Silicon Solar Cells

Crystalline silicon solar cells hold a dominant share of the solar cell market, and this situation is expected to continue at least for a decade. This tutorial will outline the current standard technologies in mass production flow of crystalline silicon solar cells: from crystallization through sawing and cell processes to module production. In addition, leading technologies for further improvement in the efficiency and reduction of the production cost will be also reviewed.

(1) A-1 ; Crystalline Silicon Solar Cells - 1

(13:00 ~ 14:50, Room F, 1F)

Instructor ; **Prof. Kyotaro Nakamura**, Meiji University, Japan

Synopsis ; Crystalline silicon solar cell has been playing the central role of PV industry for a long time and the crystalline silicon solar cell technology also will continue to be dominant in solar cell production for some time in the future. This tutorial will cover all aspects of production in crystalline silicon solar cell from the present and into the future. At first, we will instruct device physics and some basic techniques of crystalline silicon solar cells, for example, Texturization, BSF (Back Surface Field) and so on. Then, the fabrication process of conventional crystalline silicon solar cells will be introduced. The fundamental fabrication process flow of conventional solar cell is as follows; (1) Sow damage removal and texturing, (2) Phosphorus diffusion and PSG removal, (3) ARC (Anti-Reflection Coating) formation, and (4) Metallization. We will explain these steps with showcasing an example of manufacturing line. On the other hand, there are also a number of advanced technologies which will dominate the next wave of large scale deployment on manufacturing lines and in field installation. So, we will also show some advanced technologies for high efficiency crystalline silicon solar cell and some important achievements in recent years in this field. Additionally, summary of the current situation and future prospect of crystalline silicon PV industry will be presented in brief.

(2) A-2 ; Crystalline Silicon Solar Cells - 2

(15:00 ~ 16:50, Room F, 1F)

Instructor ; **Dr. Kentaro Kutsukake**
Physics of Crystal Defects Laboratory, Institute for Materials Research,Tohoku University, Japan

Synopsis ; Crystalline quality of silicon wafers directly influences performance of the solar cells. This tutorial will instruct material science and technology of silicon crystals, which will cover crystal growth, wafer characterization, and fundamental science of crystal defects. As the crystal growth topics, new concept growth methods, i.e., mono-like silicon and high performance multicrystalline silicon will be introduced, in addition to standard growth methods, i.e., Czochralski method for single-crsytalline silicon and casting method for multicrystalline silicon. Secondly, principle and feature, in particular detection error and limit, will be discussed for various characterization techniques, such as micro-PCD, PL imaging, FTIR, and etch pit observation, for silicon wafers and bulk ingots. Furthermore, lecture of fundamental science of crystal defects will be presented. This lecture will cover generation and propagation mechanism of dislocations and incorporation mechanism of impurities during the crystal growth process that will be a help to develop the growth technologies of silicon ingots.

Topic B ; Thin Film Silicon Solar Cells

In this tutorial, there will be three main topics on Si thin film PV, that is, preparations of amorphous and microcrystalline Si, fundamental physics of thin film silicon solar cells including transparent conducting oxides (TCO) and future outlook of the type of cells. In the future outlook, some recent hot topics on improvements of efficiency exceeding 10 % both in amorphous and microcrystalline Si single cells will be presented from viewpoints of growth of high quality films, device structure and optical confinement in TCO. Furthermore, fundamental physics and preparation techniques of quantum dot and nanowire solar cells will be described.

(3) B-1 ; Fundamentals of Quantum Dot Solar Cells

(13:00 ~ 14:50, Room G, 1F)

Instructor ; **Prof. Dr. Takashi Tayagaki**
Institute for Chemical Research, Kyoto University, Japan

Synopsis ; This tutorial will present a survey of quantum dot solar cell technologies under development for achieving cell efficiencies exceeding 40%. The conversion efficiencies in commercial single junction solar cells are only one-fourth the value of the theoretical limit of solar energy conversion over 85%. This suggests that the performance of solar cells could be improved 2-3 times if fundamentally different new concepts were used in their design. In addition, there would be an enormous impact on economics if the new concepts could be implemented in thin-film form, making photovoltaics one of the cheapest energy resource. Nanostructured photovoltaics, such as quantum dot solar cells, are proposed as a potential candidate to demonstrate high performance, low-cost photovoltaics. To date, while some characteristic operations, such as an enhanced photocurrent generation due to quantum dots, have been confirmed, the conversion efficiency of quantum dot solar cells has remained less than those of conventional single junction solar cells without quantum dots.

In this tutorial, new physical mechanisms for high conversion efficiency will be presented, including multi-exciton generation (impact ionization), intermediate-bands, and hot carrier solar cells. The tutorial will provide fundamental physics and preparation techniques of quantum dots. The principle in quantum dot solar cell operations will be discussed, along with a survey of quantum dot solar cell technologies. In addition, current status and prospects of quantum dot solar cells for meeting future global energy demands will be presented.

(4) B-2 ; Thin Film Silicon Solar Cells - 2

(15:00 ~ 16:50, Room G, 1F)

Instructor ; **TBD**

Synopsis ; Improvement of energy conversion efficiency of solar cells is an important issue for resolving energy-supply problems in the world. One of the promising materials for realizing solar cells with higher efficiency and lower cost seems to be Si thin film. In this tutorial, outline and fundamental topics of silicon (Si) thin film solar cells are lectured and the contents will be as follows:

1 Introduction of Si thin film solar cells

2 Characteristics of hydrogenated amorphous and microcrystalline Si films

3 Fundamental theory of p-i-n junction type solar cells

4 Preparation method of Si thin film solar cells by Plasma Enhanced Chemical Vapor Deposition (PECVD) and Hot-Wire Chemical Vapor Deposition (HWCVD)

5 A brief history and recent topics of the develop-

ment of Si thin film solar cells with an energy conversion efficiency of > 15 % (including tandem type Si thin film solar cells)

6 Problems and views of Si thin film solar cells to achieve an efficiency of > 20 % from viewpoints of growth of high quality films, device structure and optical confinement in transparent conducting oxides (TCO)

The details of this tutorial will be updated in the near future.

Topic C ; Compound Semiconductor Solar Cells - 1

Compound semiconductors are the critical materials for today's thin film photovoltaic technologies. In particular, chalcogenide materials such as CIGS, CZTS, etc. are highly interesting due to their uniquely high absorbance. The session C-1 will describe both fundamental properties and the recent progress in the characterization methods of the chalcogenide materials for solar cell application, and discuss the material properties to be improved to enhance device performance further. The session C-2 will present an overview of the recent progress in the development of the device fabrication technique of compound solar cells, placing special emphasis on the chalcogenide solar cells such as CIGS, CZTS, etc. Also, non-vacuum process will be presented for future low cost cells.

(5)C-1 ; Compound Semiconductor Solar Cells - 1

(13:00 ~ 14:50, Room H, 1F)

Instructor ; **Dr. Paul Pistor**
Photovoltaic Group, Institute of Physics, Martin-Luther-University, Germany

Synopsis ; Growth and characterization of chalcogenide thin film solar cell absorbers．The C-1 will describe both fundamental properties and recent progress in the characterization methods of chalcogenide materials for solar cell applications. Chalcopyrite solar cell absorber growth techniques and their development will be briefly introduced. The fundamentals of the growth mechanisms of chalcopyrites will be reviewed and compared to other thin film absorbers including kesterite and perovskite absorbers.

Different characterization methods and fundamental material properties to be monitored will be discussed, e.g. photoluminescence. A focus will be the structural characterization of thin film growth by X-ray diffraction (XRD). The in-site detection of crystal phases during the deposition opens valuable optimization pathways, as the formation, transitions and evolutions of different phases can be monitored in real-time. Different technological approaches concerning the implementation of in-site XRD and an overview of results obtained by this powerful technique will be presented and discussed.

(6)C-2 ; Compound Semiconductor Solar Cells - 2

(15:00 ~ 16:50, Room H, 1F)

Instructor ; **Prof. Takashi Minemoto**
College of Science and Engineering, Ritsumeikan University, Japan

Synopsis ; Cu(In,Ga)Se_2 (CIGS) solar cells already achieve 21% efficiency. In this lecture, basic material properties of CIGS and fabrication methods of component layers (Mo back contact, CIGS absorber layer, buffer layer and window layers) will be reviewed. Also, operation mechanism of CIGS solar cells will be explained and physics parameters to improve short-circuit current and open-circuit voltage will be revealed. In addition, recent progresses of CIGS solar cells will be summarized. Finally, potential of other chalcogenide materials without rare metals will be discussed with some experimental data.

Topic D ; Organic, Dye Sensitized and Perovskite Solar Cells

Organic solar cells are a promising candidate for the next generation solar cells, which develop novel indoor and outdoor applications. The tutorial presents the recent progress and future perspectives of dye-sensitized solar cells, and overviewing of the organic-inorganic hybrid solar cells, particularly focusing on one of the fastest growing organic photovoltaic technology based on organometal halide compounds with the perovskite structure.

(7) D-1 ; Dye Solar Technology; towards market introduction and new mesoscopic concepts

(13:00 ~ 14:50, Room J, 2F)

Instructor ; **Dr. Andreas Hinsch**,
Fraunhofer Institute for Solar Energy Systems ISE, Federal Republic Germany

Synopsis ; Recently first commercial dye solar cell (DSC) products based on the mesoscopic principle have successfully been launched for electronic integrated photovoltaics. The market introduction is accompanied by a strong increase in patent applications in the field during the last 4 years which is a good indication that further commercialization activities are undertaken. Materials and cell concepts have been developed to such extend that an uptake by industrial manufacturers is possible. A laboratory DSC efficiency of 13% has been shown [1]. The critical phase for a broad market acceptance is therefore reached which implies to focus on standardization related research topics like electroluminescence mapping and accelerated testing. In parallel the amount of scientific publications on DSC is growing further (larger 3500 since 2012) and the range of new or renewed more fundamental topics, like solid-state p-conductors and cobalt or organic radical based redox electrolytes, is broadening, as will be explained in the tutorial. In this sense a growing divergence between market introduction and research could be the consequence. In this tutorial an effort is undertaken to show, that such an unwanted divergence can be prevented by developing suitable reference type cell and module concepts as well as manufacturing routes which can be applied to mesoscopic based solar cells in a broader sense. As a guideline for developing future mesoscopic cell and module concepts, perovskite solar cells being a prominent example here, our recent work on up-scaling large area glass frit sealed DSC modules [2] for efficiency studies (6.6% active area efficiency) and for outdoor analyses is explained in detail. Another important point addressed in the tutorial is the issue of sustainability both affecting market introduction as well as the direction of fundamental research.

[1] S. Mathew, A. Yella, P. Gao, R. Humphry-Baker, B.F.E. Curchod, N. Ashari-Astani, I. Tavernelli, U. Rothlisberger, Md.K. Nazeeruddin and M. Grätzel, *Dye-sensitized solar cells with 13% efficiency achieved through the molecular engineering of porphyrin sensitizers, Nature Chemistry* 6, 242–247 (2014), doi:10.1038/nchem.1861

[2] A. Hinsch, W. Veurman, B. Brandt, K. Flarup-Jensen, S. Mastroianni, *Status of Dye Solar Cell Technology as a Guideline for Further Research, ChemPhysChem.* 15 (6) 2014, 1076-1087, http://dx.doi.org/10.1002/cphc.201301083

(8) D-2 ; Perovskite Solar Cells

(15:00 ~ 16:50, Room J, 2F)

Instructor ; **Prof. Dr. Seigo Ito**
Department of Electrical Engineering and Computer Sciences, Graduate School of Engineering, University of Hyogo, Japan

Synopsis ; Very recently, organic-inorganic leads halide based perovskites have emerged as a new class of light absorbers, achieving exceptional progress in solar cell performance. The structure of perovskite solar cells has been close to that of dye-sensitized solar cells. These types of perovskites have favourable bandgap for photovoltaic applications and large extinction coefficients. The organic–inorganic hybrid perovskite structure has advantage over other crystal structures as for the sensitizer, since it has high light absorption property as well as thermal stability. Discovery of its solution processability and stability combined with the earth abundance of the constituent materials has made the lead halide perovskites among the most promising solar cell materials. Perovskite semiconductor $CH_3NH_3PbX_3$ (X: Cl, Br, or I) has been used for the solar cell exceeding an η value of 15% under one sun. The $CH_3NH_3PbX_3$ perovskite can be formed by three different methods. The first method is based on in-situ formation (one-step deposition) on a nanocrystalline TiO_2 surface from spin coating of the CH_3NH_3X and PbX_2 mixed solution. The second method is characterized by sequential (two-steps) deposition where an initially formed PbX_2 layer is immersed into a CH_3NH_3X solution, resulting in the transformation to $CH_3NH_3PbX_3$ perovskite layer. During dipping process of the PbI_2 layer into the CH_3NH_3X solution, the CH_3NH_3X molecule can transform the PbX_3 crystal to $CH_3NH_3PbX_3$ perovskite layer. The third mehod relies on vacuum evaporation deposition using dual source pods with PbX_2 and CH_3NH_3X, which can produce very thin smooth layers on flat substrates.

These perovskite solar cells have typically employed a wide variety of organic hole conductors. Most notable as the hole-conducting materials is 2,2´,7,7´-tetrakis(N,N-di-p-methoxyphenylamine) 9,9´-spirobifluorene (spiro-OMeTAD). Although high η value has been obtained using spiro-OMeTAD as a hole conductor in the perovskite solar cells, the relatively high cost may hamper the implementation in the future commercialization. In fact, the current commercial price of high purity spiro-OMeTAD is over ten times that of gold and platinum. While increased demand lowers this cost in some extent, it is still likely to remain expensive due to its high purity needed for photovoltaic applications. On the other hand, inorganic copper-based p-type semiconductors, such as CuSCN and CuI, are highly promising as hole conductors, because of their solution processablilty, wide band gap with high conductivity, and lower cost.

In this tutorial, the history, the devise principal, the variation of devise structure and the fabrication methods will be presented for the beginners of prerovskite solar cells.

Topic E ; Photovoltaic Systems

Terrestrial Photovoltaic (PV) power generation is one of the widespread countermeasures to solve environmental and energy problems and is recently becoming the mainstream of energy economy. Many countries maintain high rates of installed PV capacity, which seems to be the trend for the foreseeable future. With this background, the technologies of efficient PV evaluation grow rapidly in importance. The problems of PID (Potential Induced Degradation) in large scale PV systems are also getting attention. Furthermore, the decline in gird power quality caused by mass PV introduction is a growing issue in our society. In this tutorial, we focus on the above topics and explain their current status and future perspective.

(9) E-1 ; Photovoltaic System Characterization and Integration Tutorial

(13:00 ~ 14:50, Room K, 2F)

Instructor ; **Dr. Joshua S. Stein**,
Sandia National Laboratories, Albuquerque, NM USA

Synopsis ; Photovoltaic systems are intermittent generation resources and their performance depends on the PV technology and local irradiance, weather, and environmental conditions. This tutorial will provide a technical overview of how PV technologies are characterized and how energy produced from PV systems is predicted. This will be done by covering a series of PV performance modeling steps including: irradiance translation, shading, surface reflection, spectral mismatch, IV curve models, array mismatch, inverter performance, and other performance factors. Participants will be introduced to open source tools that will allow them create detailed, physically-based PV performance models. If time allows, we will also examine power output characteristics from operating PV systems including: variability, ramp rates, and power quality and discuss how these features influence the integration of PV systems into the electrical grid.

(10) E-2 ; Photovoltaic Systems: Landscape Design Issues

(15:00 ~ 16:50, Room K, 2F)

Instructor ; **Dr. arch. Alessandra.Scognamiglio,**
ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) Photovoltaic Technologies Area, Portici Research Centre, Portici (NA), Republic of Italy

Synopsis ; ARCHITECTURE AND LANDSCAPE DESIGN ISSUES

The target of running the places we inhabit by using only renewable energy generation technologies (net zero energy buildings, net zero energy communities) challenge us to find ways how to give them a form. Whatever the device we think to use, it has a certain form, that will influence the way we will design it, or, at the end of the process, the shape of our living environment. Thanks to their features, photovoltaic system offer the designer the possibility of envisioning the use of photovoltaic at the architectural scale (building integrated photovoltaic), as well as at the landscape scale. Different technological and design issues are related to these uses of photovoltaic.

In the first case, photovoltaic components are used as parts of the building envelopes, and this implies a relevant importance in developing special BIPV technological elements, which could ensure the desired building performances; or in finding appropriate solutions in order to use standard components on the envelope, in an innovative way. This topic has been largely investigated in the past 20-25 years, and the tutorial will give an overview on the general topic of the building integration of photovoltaic, and on the design fundamentals.

In the second case, photovoltaic modules are arranged in the form of solar arrays, without exploiting any other function than generating energy. They can be understood as a tangible image of an increasing need of energy from renewables to significantly reduce the pollution caused by traditional energy generation systems, but anyway they generate a diffuse concern about the land use and transformation that they cause. PV and crops are kinds of opposing needs that should share the same limited resource: the land. Because of this reason in many countries local authorities prohibited the installation of PV in agricultural areas; and due to this barrier, in recent years companies working in the PV development have been experimenting with solutions for producing energy and food in the same land area. Such experiences will be presented and the issue of PV power generation will be addressed from the landscape design point of view (PV landscapes).

Access

About 75 minutes by Airport Shuttle Train “Haruka” from Kansai International Airport to Kyoto Station.

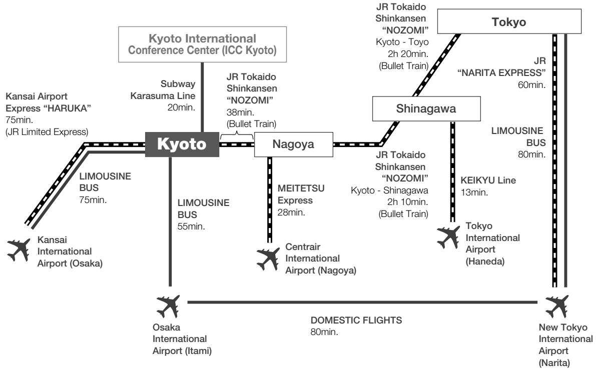
About 55 minutes by Limousine bus from Osaka (Itami) Airport to Kyoto Station.

2 hours 15 minutes by Shinkansen (Bullet Train) from Tokyo Station to Kyoto Station.

Easy International Access

Located on the main Shinkansen (Bullet Train) Line, Kyoto is directly accessible from NARITA (Tokyo) , HANEDA (Tokyo) , Centrair (Nagoya) and KANSAI (Osaka) International Airports.

Access Map



Access

<table>
<tr><td rowspan="5">Access by rail</td><td>From Tokyo, Shinagawa, Nagoya</td><td>JR Tokaido Shinkansen →</td><td rowspan="3">JR Kyoto station</td><td rowspan="4">Subway: Karasuma Line → (From Kyoto station, 20min.,; From Karasuma station, 16min.)</td><td rowspan="9">ICC Kyoto Kokusaikaikan station</td></tr>
<tr><td>From Kyushu and Chugoku</td><td>JR Sanyo Shinkansen →</td></tr>
<tr><td rowspan="3">From Osaka and Kobe</td><td>JR Kyoto Line →</td></tr>
<tr><td>Hankyu Kyoto Line →</td><td>Karasuma station</td></tr>
<tr><td>Keihan Main Line →</td><td>Sanjo station</td><td>Subway: Tozai Line & Karasuma Line → (From Sanjo station, about 20min.)</td></tr>
<tr><td rowspan="3">Access by air</td><td>Kansai International Airport</td><td>JR Haruka Airport Express → (75min.)</td><td rowspan="3">JR Kyoto station</td><td rowspan="3">Subway: Karasuma Line → (20min.)</td></tr>
<tr><td>Osaka Inernational Airport (Itami)</td><td>Limousine bus → (approx. 55min.)</td></tr>
<tr><td>Centrair International Air Port (Nagoya)</td><td>Meitetsu Express + JR Tokaido Shinkansen → (approx. 80min.)</td></tr>
<tr><td>Access by road</td><td>Meishin Expressway</td><td colspan="3">Take the Kyoto Sauth or Kyoto East exit and follow the signs to “Kyoto International Conference Center“ → (40min.)</td></tr>
</table>

Approximate Flight Times to Japan

From Asia

- Bangkok [5hrs]
- Beijing [1.5hrs]
- Busan [1hr]
- Hong Kong [3hrs]
- Kuala Lumpur [6hrs]
- Manila [4hrs]
- New Delhi [8hrs]
- Seoul [1.5hrs]
- Shanghai [1.5hrs]
- Singapore [6hrs]
- Taipei [2hrs]

From Oceania

- Christchurch [12hrs]
- Sydney [10hrs]

From Europe

- Amsterdam [12hrs]
- Frankfurt [10hrs]
- London [11hrs]
- Moscow [8hrs]
- Paris [11hrs]
- Rome [11hrs]

From Africa

- Cairo [11hrs]
- Johannesburg (via Hong Kong) [17hrs]

From Canada

- Toronto [13hrs]
- Vancouver [8hrs]

From USA

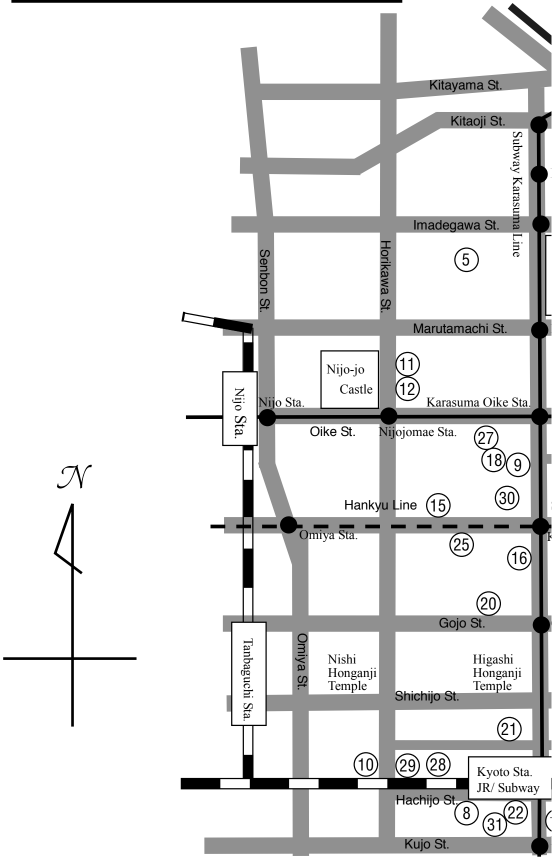
- Chicago [13hrs]
- Los Angeles [11hrs]
- New York [13hrs]
- Seattle [11hrs]
- Washington DC [13hrs]

From South America

- Sao Paulo (via LA) [22hrs]

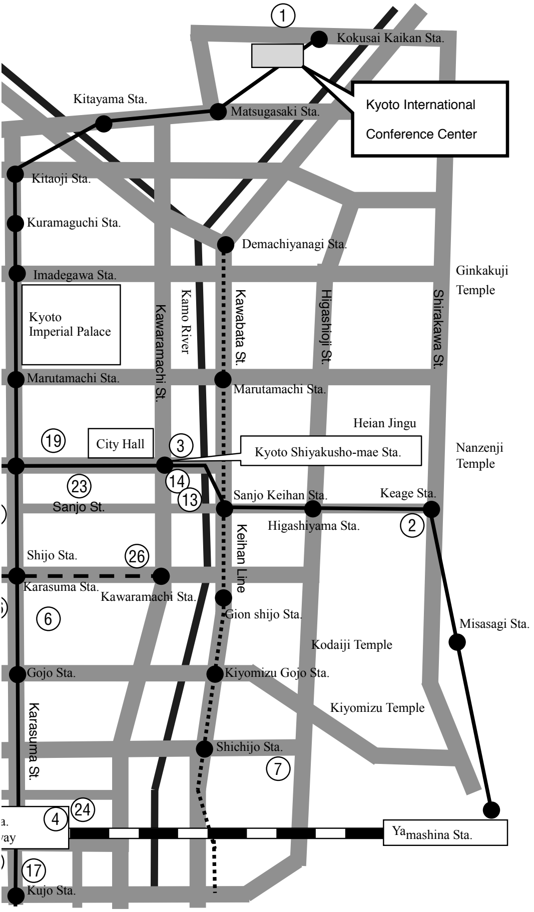
Hotel Accomodation

Map of Kyoto



1	Grand Prince Hotel Kyoto	9	Hotel Montery Kyoto
2	The Westin Miyako Kyoto	10	Rihga Royal Hotel Kyoto
3	Kyoto Hotel Okura	11	Kyoto Kokusai Hotel
4	Hotel Granvia Kyoto	12	ANA Crown Plaza Hotel Kyoto
5	Kyoto Brighton Hotel	13	Royal Park Hotel the Kyoto
6	Hotel Nikko Princess Kyoto	14	Kyoto Hotel Royal & Spa
7	Hyatt Regency Kyoto	15	Hotel Mystays Kyoto Shijo
8	New Miyako Hotel	16	Karasuma Kyoto Hotel

Hotel Accomodation



17	Daiwa Roynett Hotel .Kyoto Hachijoguchi	25	Hotel Oaks Kyoto Shijo
18	Mitsui Garden Hotel Kyoto Sanjo	26	Kyoto Central Inn
19	Hearton Hotel Kyoto	27	Kyoto Garden Hotel
20	Aranvert Hotel Kyoto	28	APA Hotel Kyoto Ekimae
21	Hotel Hokke Club Kyoto	29	APA Hotel Kyotoeki Horikawatori
22	Ibis Styles Kyoto Station	30	Viainn Kyoto Shijo Muro-machi
23	Hotel Gimmond Kyoto	31	Kyoto Daiichi Hotel
24	Kyoto Dai-ni Tower Hotel		

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Memo

Program

Opening Plenary
Monday, November 24
8:30 - 10:00 Annex

Chairpersons:
Julio Cárabe (CIEMAT, Spain)
Michio Kondo (FREA, AIST, Japan)
Ryne Patrick Raffaelle (Rochester Institute of Technology, USA)

8:30-9:00 0MoPl.1

[Plenary] The Future of PV Based on Next-Generation Fabs

Eicke R. Weber[1,2] and Ralf Preu[1]

[1]Fraunhofer Institute for Solar Energy Systems,
[2]Institute of Physics and Faculty of Engineering, Albert-Ludwigs University, Germany

9:00-9:30 0MoPl.2

[Plenary] Global Renewable Energy Outlook

Paolo Frankl

IEA

9:30-10:00 0MoPl.3

[Plenary] Introduction of Recent Japanese Science and Technology Innovation Policy

Kazuo Kyuma

Council for Science, Technology and Innovation, Cabinet Office, Japan

Opening Ceremony
Monday, November 24
10:15 - 11:30 Annex

Master of Ceremony:
Mayumi Matsumoto (The University of Tokyo)

10:15 – 10:20

Greeting

10:20 - 10:35

Opening Address

M. Konagai, Tokyo Tech
B.J. Stanbery, Heliovolt
A. Jäger-Waldau, EC JRC

10:35 – 10:45

Guest Speeches

Kyoto City
M.Hashimoto (NEDO)

10:50 – 11:30

Award Presentation

WCPEC Award

10:50-10:51

Introduction: A. Luque (WCPEC Award Vice-Chair)

10:51-10:53

Laudatio: D. Flood (WCPEC-1 General Chair)

10:53-10:55

Award Presentation: S. Bailey (WCPEC-6 IACChair, WCPEC-4 General Chair)

10:55-11:03

Memorial Lecture: M. Yamaguchi

PVSEC Award

11:04-11:06

Introduction and Laudatio: M. Yamaguchi (PVSEC Award Chair)

11:06-11:08

Award Presentation: K. Kurokawa (WCPEC-3General Chair)

11:08-11:15

Memorial Lecture: T. Takamoto

PVSEC Special Award

11:15-11:17

Introduction and Laudatio: M. Yamaguchi (PVSEC

Award Chair)

11:17-11:19

Award Presentation: K. Kurokawa (WCPEC-3General Chair)

Hamakawa Award

11:20-11:22

Introduction and Laudatio: M. Yamaguchi (PVSEC Award Chair)

11:22-11:25

Award Presentation: Y.Hamakawa (Founder,PVSEC, WCPEC)

Plenary
Monday, November 24
13:00 - 14:30 Room A

Chairperson:
Wim C. Sinke (ECN Solar Energy, The Netherlands)

13:00-13:30 **4MoPl.4** **Area 4**

[Plenary] Recent Technological Progress on HIT®

Shingo Okamoto

Panasonic Corporation

13:30-14:00 **3MoPl.5** **Area 3**

[Plenary] Current Status and Future Prospect of CIS-based Thin-film PV Technology through the Activity of Solar Frontier K.K.

Katsumi Kushiya

Solar Frontier K.K., Japan

14:00-14:30 **1MoPl.6** **Area 1**

[Plenary] Perovskite-based Hybrid Solar Cells Capable of High Voltage Outputs

Tsutomu Miyasaka

Toin-Yokohama University

Monday, November 24
14:45 - 16:10 Room A Area 4

4sMoO.1 Crystalline Silicon Solar Cells; Past, Present and Future 1

Chairpersons:
Martin A. Green (University of New South Wales, Australia)
Katsuhiko Shirasawa (AIST, Japan)

14:45-15:10 4sMoO.1.1

⟨Invited⟩ The Bell Telephone Laboratories Discovery 60-Years Later: *The mW-Foundation for Our Multi-GW Industry*

Lawrence L. Kazmerski

National Renewable Energy Laboratory

15:10-15:30 4sMoO.1.2

⟨Invited⟩ The History of Hit® and Future Prospects of Photovoltaic Power Generation

Yukinori Kuwano

PVTEC

15:30-15:50 4sMoO.1.3

⟨Invited⟩ Crystalline Silicon Solar Cells - Towards the Auger-limit and beyond

Stefan Glunz

Fraunhofer Institute for Solar Energy Systems

15:50-16:10 4sMoO.1.4

⟨Invited⟩ Strategy, Development and Mass Production of High-Efficiency Crystalline Si PV Modules

Pierre J. Verlinden, Weiwei Deng, Xueling Zhang, Yang Yang, Jianmei Xu, Yunhua Shu, Peng Quan, Jian Sheng, Shu Zhang, Jian Bao, Feilin Ping, Yingbin Zhang and Zhiqiang Feng

State Key Laboratory of PV Science and Technology, Trina Solar, Changzhou, China

Monday, November 24
16:30 - 17:50 Room A **J1 (Area 2 & 4)**

J1MoO.2 Silicon Heterojunction Solar Cells

Chairpersons:
Christophe Ballif (EPFL IMT & CSEM PV-center, Switzerland)
Junichi Nakamura (Sharp Corporation, Japan)

16:30-16:55 J1MoO.2.1

⟨Invited⟩ High Efficiency Si Solar Cell by Applying Thin Film Si Technology

Kenji Yamamoto

KANEKA Corporation

16:55-17:20 J1MoO.2.2

⟨Invited⟩ Passivated Tunneling Contacts to N-type Wafer Silicon and Their Implementation into High Performance Solar Cells

P. Stradins[1], S. Glunz[2] and A. Rohatgi[3]

[1]National Renewable Energy Laboratory, USA, [2]Fraunhofer Institute for Solar Energy Systems, Germany, [3]Georgia Institute of Technology, USA

17:20-17:35 J1MoO.2.3

Carrier Transport Characteristics of Crystalline Silicon Solar Cells with Widegap Heterojunction Emitter

T. Ogusu[1], M. Konagai[1,2] and S. Miyajima[1]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]Photovoltaic Research Center (PVSEC), Tokyo Institute of Technology, Japan

17:35-17:50 J1MoO.2.4

Increase of the Photogenerated Current in Amorphous/Crystalline Silicon Solar Cells

S. Martin de Nicolas, S. De Wolf, B. Demaurex, J. Geissbühler, N. Holm, P. Löper, B. Paviet-Salomon, J. P. Seif, A. Tomasi and C. Ballif

École Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Photovoltaics and thin-film electronics laboratory, Switzerland

Monday, November 24
14:45 - 16:10 Room B-1 Area 3

3MoO.3 CIGS 1

Chairpersons:
Shigeru Niki (RCPVT, AIST, Japan)
Kannan Ramanathan (NREL, USA)

14:45-15:10 3MoO.3.1

⟨Invited⟩ On the Role of Alkali Metals in Chalcogenide Solar Cells

P. Reinhard, M. Werner, B. Bissig, F. Pianezzi, C. Sutter-Fella, H. Hagendorfer, S. Nishiwaki, Y. Romanyuk, S. Buecheler, and A. N. Tiwari

Laboratory for Thin Films and Photovoltaics, Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland

15:10-15:25 3MoO.3.2

Selective Potassium and Sodium Diffusion Control in $CuGaSe_2$ Thin-Films Using Soda-Lime Glass Substrates

S. Ishizuka[1)], A. Yamada[1)], P. J. Fons[2)], H. Shibata[1)] and S. Niki[1)]

[1)]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)]Nanoelectronics Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Japan

15:25-15:40 3MoO.3.3

First-principles Study on Alkali-metal Effect of Li, Na, and K in $CuInSe_2$ and $CuGaSe_2$

T. Maeda, A. Kawabata and T. Wada

Department of Materials Chemistry, Ryukoku University, Japan

15:40-15:55 3MoO.3.4

Suppression of Recombination at a CdS/CIGS Interface by Inserting $Cu(In,Ga)_3Se_5$ for $Cu(In,Ga)Se_2$ Solar Cells

T. Nishimura[1)], Y. Hirai[1)], Y. Kurokawa[1)] and A. Yamada[1, 2)]

[1)]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2)]Photovoltaics Research Center (PVREC), Tokyo Institute of Technology, Japan

15:55-16:10 3MoO.3.5

Surface Sulfurization of MBE-Grown $Cu(In_{1-x},Ga_x)Se_2$ Thin Films and Devices

I. Khatri, I. Matsuyama, H. Yamaguchi and T. Nakada

Research Institute for Science and Technology, Photovoltaic Science and Technology Research Division, Tokyo University of Science, Japan

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Monday, November 24
16:30 - 17:45 Room B-1 Area 3

3MoO.4 CIGS: Chracterization

Chairpersons:
Bert Stegemann (PVcomB / HTW Berlin - University of Applied Sciences, Germany)
Akira Yamada (Tokyo Institute of Technology, Japan)

16:30-16:45 3MoO.4.1

Grain Boundary Carrier Interactions in $CuIn_{1-x}Ga_xSe_2$ Photovoltaics: Unraveling Grain Boundary Recombination

Harvey L. Guthrey IV[1)], John Moseley[1,2)], Miguel Contreras[1)], Kannan Ramanathan[1)] and Mowafak Al-Jassim[1)]

[1)]National Renewable Energy Laboratory, Golden CO, United States, [2)]Colorado School of Mines, Golden CO, United States

16:45-17:00 3MoO.4.2

Explicit Calculation of Quantum Efficiency Spectra for $CuInGaSe_2$ Solar Cells Fabricated by 3 Stage Co-Evaporation

T. Hara[1)], T. Maekawa[2)], S. Minoura[1)], Y. Kamikawa[3)], H. Shibata[3)], S. Niki[3)] and H. Fujiwara[1)]

[1)]Center of Innovative Photovoltaic Systems (CIPS), Gifu University, Japan, [2)]Research and Development Headquarters, ROHM Co., Ltd., Japan

17:00-17:15 3MoO.4.3

LA-ICP-Mass Spectrometry of Impurities in Indium Feedstock Material and Their Influence on $Cu(In_x,Ga_{(1-x)})Se_2$ PV-Device Performance

V. Hinrichs, V. Handke, L. Chikhaoui and M. Ch. Lux-Steiner

Institut für Heterogene Materialsysteme, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany

17:15-17:30 3MoO.4.4

Picosecond and Nanosecond Laser Structuring of CIGSe Solar Cells

B. Stegemann[1)], M. Schüle[1)], C. Schultz[1)], K. Stelmaszczyk[1,2)], M. Weizman[1)], C. Wolf[2)], C. A. Kaufmann[2)], B. Rau[2)], R. Schlatmann[1,2)], V. Quaschning[1)] and F. Fink[1)]

[1)]PVcomB / HTW Berlin - University of Applied Sciences, Germany, [2)]PVcomB / Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

17:30-17:45 3MoO.4.5

$Cu_2ZnSnSe_4$-$Cu(In,Ga)Se_2$ Alloys for Solar Cells

Stefan Hartnauer, Leonard Wägele, Enrico Jarzembowski, Wolfgang Fränzel, Paul Pistor, Roland Scheer

Institute of Physics, Martin-Luther-University, Germany

Monday, November 24
18:30-20:00 Room B-1 Area 3

3MoRu.9 High-efficiency CIGS Solar Cells

Chairperson:
Shogo Ishizuka (AIST, Japan)

18:30-18:55 **3MoRu.9.1**

[Invited] Progress in the CIGS PV Technology

S. Niki[1), S. Ishizuka[1), Y. Kamikawa[1), J. Nishinaga[1), H. Tampo[1), K. Matsubara[1), H. Shibata[1), A. Yamada[1), K. Hara[2) , A. Masuda[2), N. Terada[3), T. Sakurai[4) and K. Akimoto[4)

[1)Research Center for Photovoltaic Technologies, AIST, Tsukuba, Ibaraki, Japan, [2)Research Center for Photovoltaic Technologies, AIST, Tosu, Saga, Japan, [3)Kagoshima University, Japan, [4)Tsukuba University, Japan

18:55-19:20 **3MoRu.9.2**

[Invited] Status of CIGS Research at NREL

K. Ramanathan, L. Mansfield, R. Garris, S. Glynn, B. Egaas and M.A Contreras

National Renewable Energy Laboratory, USA

19:20-20:00 **Discussion**

Monday, November 24
14:45 - 16:05 Room B-2 Area 1

1MoO.5 Hot Carrier Solar Cells

Chairpersons:

Jean-François Guillemoles (NextPV, Joint CNRS and RCAST Laboratory, France/Japan)
Yasuhiko Takeda (Toyota Central Research and Development Laboratories, Inc., Japan)

14:45-15:10 1MoO.5.1

⟨Invited⟩ Hot Carrier Solar Cells: Mechanisms and Materials

S.K. Shrestha, G. Conibeer, S. Huang, S. Chung, N. Gupta, Y. Liao, Y. Feng, H. Xia, S. Smyth, X. Wen

School of Photovoltaic and Renewable Energy Engineering, UNSW Australia, Australia

15:10-15:30 1MoO.5.2

⟨Extended Oral⟩ The Development of a Hot Carrier Photovoltaic Cell

J. A. R Dimmock[1,2], M. Kauer[1], K. Smith[1], P. Stavrinou[2] and N. J. Ekins-Daukes[2]

[1]Sharp Laboratories of Europe Ltd, UK, [2]Imperial College London, UK

15:30-15:50 1MoO.5.3

⟨Extended Oral⟩ Practical Concept of an All-Optical Hot Carrier Solar Cell

D. König, Y. Yao and J. Yang

Australian Centre of Advanced Photovoltaics (ACAP), University of New South Wales, Australia

15:50-16:05 1MoO.5.4

Improvement in Solar Cell Efficiency via Addition of Flexible Luminescent Down-shifting Phosphor PDMS Film as a Spectral Converter

Hau-Vei Han[1], Wen-Yi Lin[1], Tien-Lin Shen[1], Kuo-Ju Chen[1], Chien-Chung Lin[2], Yu-Lin Tsai[1], Hao-Chung Kuo[1] and Peichen Yu[1]

[1]Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan, [2]Institute of Photonic System, National Chiao

Tung University, Taiwan

Monday, November 24
16:30 - 17:55 Room B-2 **Area 1**

1MoO.6 Silicon Nanowires and Advanced Concepts

Chairpersons:
Dirk König (University of New South Wales, Australia)
Koji Matsubara (AIST, Japan)

16:30-16:55 1MoO.6.1

⟨Invited⟩ Radial Heterojunction c-Si Nanowire Solar Cells with 11.8% Conversion Efficiency

O. Isabella, A. Ingenito, F. T. Si, R. Vismara and M. Zeman

Delft University of Technology, PVMD, The Netherlands

16:55-17:10 1MoO.6.2

The Photovoltaic Properties of Aggregate Axial-Junction Silicon Nanowire Solar Cells

D. Kanematsu[1,2], S. Yata[1], A. Terakawa[1], M. Tanaka[1] and M. Konagai[2]

[1]Panasonic Corporation, Japan, [2]Tokyo Institute of Technology, Japan

17:10-17:25 1MoO.6.3

Photovoltaic Conversion in Solar Cells with Radial Junctions on Silicon Nanowires

A. Fejfar[1], M. Hyvl[1], A. Vetushka[1], M. Ledinsky[1], J. Kocka[1], A. Marek[2], J. Vyskocil[2], P. Klapetek[3] and J. Valenta[4], S. Misra[5], L. Yu[5], M. Foldyna[5] and P. Roca i Cabarrocas[5]

[1]Institute of Physics, Academy of Sciences of the Czech Republic, Physics, Academy of Sciences of the Czech Republic, Czech Republic, [2]HVM plasma s.r.o., Czech Republic, [3]Czech Metrology Institute, Czech Republic, [4]Faculty of Mathematics and Physics, Char

17:25-17:40 1MoO.6.4LN

Charge Carrier Dynamics in Quantum Dot Intermediate Band Solar Cells from Non-equilibrium Quantum Statistical Mechanics

U. Aeberhard

IEK-5 Photovoltaik, Germany

17:40-17:55 1MoO.6.5LN

Approaches for Silicon Solar Cells to Approach 50%

C.B. Honsberg, S.G. Bowden and S.M. Goodnick

Arizona State University, School of Electrical, Computer and Energy Engineering, USA

Monday, November 24
14:45 - 16:00 Room E Area 6

6sMoO.7 Hybrid Solar Cells 1

Chairpersons:
Giles Eperon (University of Oxford, UK)
Shuzi Hayase (Kyushu Institute of Technology, Japan)

14:45-15:10 6sMoO.7.1

⟨Invited⟩ Organohalide Lead Perovskites for Photovoltaic Applications

Mohammad Khaja Nazeeruddin

Laboratory of Photonics and Interfaces (LPI), Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

15:10-15:35 6sMoO.7.2

⟨Invited⟩ High Efficiency Perovskite Solar Cells by Material and Interfacial Engineering

Nam-Gyu Park

School of Chemical Engineering, Department of Energy Science, Sungkyunkwan University, Korea

15:35-16:00 **6sMoO.7.3**

⟨Invited⟩ Introduction to the In-situ Solar Cell Concept as Applied for Ultra-low-cost Perovskite Solar Cells

Andreas Hinsch, H. Brandt, W. Veurman, S. Mastroianni

Fraunhofer Institute for Solar Energy Systems ISE, Germany

Monday, November 24
16:30 - 17:45 Room E **Area 6**

6sMoO.8 Hybrid Solar Cells 2

Chairpersons:
Masahiro Hiramoto (Institute for Molecular Science, Japan)
Nam-Gyu Park (Sungkyunkwan University (SKKU), Korea)

16:30-16:55 **6sMoO.8.1**

⟨Invited⟩ Efficiency and Stability Challenges in Organic Solar Cells

James R Durrant

Centre for Plastic Electronics, Department of Chemistry, Imperial College London, and Specific IKC, Materials Science Centre, University of Swansea, U.K.

16:55-17:20 **6sMoO.8.2**

⟨Invited⟩ High Efficiency Printable Polymer Solar Cells Introducing Novel Functional Materials

Kwanghee Lee

Heeger Center for Advance Materials & Research Institute of Solar and Sustainable Energies, Gwangju Institute of Science and Technology(GIST), South Korea

17:20-17:45 6sMoO.8.3

⟨Invited⟩ Organic Semiconductors and Interlayers for Printed Solar Cells

Antonio Facchetti

Polyera Corporation / Northwestern University, USA

Plenary
Tuesday, November 25
8:30 - 10:00 Room A

Chairpersons:
Akira Terakawa (Panasonic Corporation, Japan)
Greg M. Wilson (NREL, USA)

8:30-9:00 **1TuPl.1** **Area 1**

[Plenary] Photonic Design Approaches for High Efficiency

Harry A. Atwater[1,2], Dennis M. Callahan[1], Sunita Darbe[1], Carissa N. Eisler[1], Cristofer Flowers[1], Katherine Fountaine[2], Emily D. Kosten[1], John Lloyd[1] and Emily Warmann[1]

[1]Thomas J. Watson Laboratories of Applied Physics, California Institute of Technology, USA, [2]Joint Center for Artificial Photosynthesis, California Institute of Technology, USA

9:00-9:30 **3TuPl.2** **Area 3**

[Plenary] Towards Energy Security through Mega Solar

Raffi Garabedian

First Solar

9:30-10:00 **2TuPl.3** **Area 2**

[Plenary] New Opportunities for Thin Film Silicon Technology

Christophe Ballif

EPFL

Tuesday, November 25
10:15 - 11:45 Room A **Area 3**

3TuO.1 CZTS & CTS

Chairpersons:
Hironori Katagiri (Nagaoka National College of

Technology, Japan)
Hajime Shibata (AIST, Japan)

10:15-10:30 3TuO.1.1

The Role of Potential Fluctuations in Voltage Limitations for CZTSSe Solar Cells

C. J. Hages[1)], W.-C. Yang[1)], N. J. Carter[1)], E. A. Stach[2)], T. Unold[3)] and R. Agrawal[1)]

[1)]Purdue University, USA, [2)]Brookhaven National Lab, USA, [3)]Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

10:30-10:45 3TuO.1.2

Fabrication of Cu_2ZnSnS_4 Thin Film Solar Cells Using Spray Pyrolysis Method

T. H. Nguyen, W. Septina, S. Ikeda, T. Harada and M. Matsumura

Research Center of Solar Energy Chemistry, Osaka University, Japan

10:45-11:00 3TuO.1.3

Modulation of Energy Band Diagram Around the Grain Boundaries in High Efficiency $Cu_2Sn_{1-x}Ge_xS_3$ (CTGS) Solar Cells

M. Umehara[1)], Y. Takeda[1)], K. Oh-ishi[1)], T. Motohiro[1)], T. Sakai[2)] and R. Maekawa[2)]

[1)]Toyota Central Research & Development Labs., Inc., Japan, [2)]Toyota Motor Corporation, Japan

11:00-11:15 3TuO.1.4

Fabrication of Cu_2SnS_3 Thin Film Solar Cells with Power Conversion Efficiency of Over 4%

Ayaka Kanai[1)], Kotoba Toyonaga[1)], Kotaro Chino[1)], Hironori Katagiri[1)] and Hideaki Araki[1,2)]

[1)]Nagaoka National College of Technology, Japan, [2)]Japan Science and Technology Agency, PRESTO, Japan

11:15-11:30 3TuO.1.5

On the Optimization of $Cu_2ZnSnSe_4$/CdS Heterojunction for High Efficiency and Sustainable Solar Cells

Y. Sánchez[1)], M. Neuschitzer[1)], S. López-Marino[1)], M. Placidi[1)], H. Xie[1)], V. Izquierdo-Roca[1)], A. Pérez-Rodríguez[1,2)] and E. Saucedo[1)]

[1)]Catalonia Institute for Energy Research (IREC), [2)]IN^{2}UB, Departament d´Electrónica, Universitat de Barcelona

11:30-11:45 3TuO.1.6LN

The Investigation of Ge Substitution Effects in $Cu_2ZnSnSe_4$ Thin Film Solar Cells

S. Kim, K. M. Kim, H. Tampo, H. Shibata and S. Niki

National Institute of Advanced Industrial Science and Technology (AIST), Research Center for Photovoltaics Technologies, Japan

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Tuesday, November 25
13:00 - 14:25 Room A Area 4

4sTuO.2 Crystalline Silicon Solar Cells: Past, Present and Future 2

Chairpersons:
Tatsuo Saga (Osaka University, Japan)
Paul Stradins (NREL, USA)

13:00-13:25 4sTuO.2.1

〈Invited〉 High Efficiency Crystalline Silicon Solar Cells: The Path to 25% Efficiency

Martin A. Green

Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, University of New South Wales

13:25-13:45 4sTuO.2.2

⟨Invited⟩ Development and Production of High Performance Silicon Cells for PV Panels and LCPV systems

D. Rose, D. Smith, and P. Cousins

SunPower Corporation, USA

13:45-14:05 4sTuO.2.3

⟨Invited⟩ Silicon Photovoltaics: Cat with Nine Lives

Wim C. Sinke

ECN Solar Energy, The Netherlands

14:05-14:25 4sTuO.2.4

⟨Invited⟩ 20.0% Average Efficiency n-type Bifacial Solar Cells by Using Industrial Mass-production Technology

Wei-Chih Hsu, Chie-Sheng Liu, Yu-Hong Huang, Ming-Yi Hsu, Yuan-Chih Lee, Wei-Ming Chen

Neo Solar Power Corporation (NSP), Taiwan

Tuesday, November 25
14:45 - 16:00 Room A Area 4

4TuO.3 c-Si PV: Simulation

Chairpersons:
Shinsuke Miyajima (Tokyo Institute of Technology, Japan)
Bernd Steinhauser (Fraunhofer ISE, Germany)

14:45-15:00 4TuO.3.1

Input Parameters for the Simulation of Silicon Solar Cells in 2014

A. Fell[1)], K. R. McIntosh[2)], P. P. Altermatt[3)],4), K. C. Fong[1)], G. J. M. Janssen[5)], I. G. Romijn[5)], M. Hermle[6)], H. Steinkemper[6)], R. Stangl[7)], S. Bowden[8)] and A. Ho-Baillie[9)]

[1]The Australian National University, Australia, [2]PV Lighthouse, Australia, [3]Leibniz University of Hanover, Germany, [4]Institute for Solar Energy Research, Germany, [5]Energy Research Centre of the Netherlands, [6]Fraunhofer Institute for Solar Energy, Germany,[7]Solar Energy Research Institute of Singapore, [8]Arizona State University, USA, [9]University of New South Wales, Australia

15:00-15:15 4TuO.3.2

Mercury: Modelling of IBC Cells with Front Floating Emitter

A. R. Burgers, I. Cesar, A. A. Mewe, N. Guillevin and D. Dekker

ECN Solar Energy, The Netherlands

15:15-15:30 4TuO.3.3

Influence of TCO/a-Si:H Contact Formation on Silicon Heterojunction Solar Cell Performance

L. Korte, R. Rößler, S. Kämpfer, C. Pettenkofer and B. Rech

Helmholtz-Zentrum Berlin, Institute Silicon Photovoltaics, Germany

15:30-15:45 4TuO.3.4

Efficiency Potential of Rear Heterojunction Stripe Contacts Applied in Hybrid Silicon Wafer Solar Cells

Zixuan Qiu[1,2], Jessica Wang[1], Armin Aberle[1,2] and Rolf Stangl[1]

[1]Solar Energy Research Institute of Singapore (SERIS), National University of Singapore (NUS), Singapore, [2]NUS Graduate School for Integrative Sciences and Engineering, National University of Singapore, Singapore

15:45-16:00 4TuO.3.5

Simulation of Interdigitated Back-Contact Silicon Heterojunction Solar Cells with Quantum Transport Model

T. Kamioka[1)], Y. Hayashi[1)], K. Nakamura[2)] and Y. Ohshita[1)]

[1)]Toyota Technol. Inst., Japan, [2)]Meiji Univ., Japan

Tuesday, November 25
16:30 - 17:55 Room A   Area 4

4TuO.4 c-Si PV: Cell 1

Chairpersons:
Emanuele Cornagliotti (imec, Belgium)
Yuichi Sakai (Mitsubishi Electric Corporation, Japan)

16:30-16:55 4TuO.4.1

⟨Invited⟩ Development of Heterojunction Back Contact Si Solar Cells

Junichi Nakamura[1)], Naoki Asano[1)], Takeshi Hieda[1)], Chikao Okamoto[1)], Tetsuya Ohnishi[1)], Masamichi Kobayashi[1)], Hiroyuki Tadokoro[1)], Rihito Suganuma[1)], Yuta Matsumoto[1)], Hiroyuki Katayama[1)], Kenichi Higashi[2)], Takeshi Kamikawa[2)], Kenji Kimoto[2)], Masatomi Harada[2)], Toshihiko Sakai[1)], Hiroaki Shigeta[2)], Tokuaki Kuniyoshi[2)], Kazuya Tsujino[2)], Liumin Zou[2)], Naoki Koide[2)] and Kyotaro Nakamura[3)]

[1)]Energy System Solutions Division, SHARP Corporation, Japan, [2)]Coporate Research & Development Division, SHARP Corporation, Japan, [3)]Meiji University, Japan

16:55-17:10 4TuO.4.2

Development of High Efficiency Interdigitated Back Contact Silicon Solar Cells and Modules with Industrial Processing Technologies

XueLing Zhang, Yang Yang, Wei Liu, KangPing Zhang, Yan Chen, ZhongLan Li, GuanChao Xu, HaiJun Jiao, Shu Zhang, ZhiQiang Feng and Pierre Verlinden

State Key Laboratory of PV Science and Technology, Changzhou Trina Solar Energy Co., Ltd., China

17:10-17:25 4TuO.4.3

High Efficiency Multicrystalline Silicon Solar Cells

T. Arima, T. Honma, S. Sugawara and Y. Matsubara

Kyocera Corporation, Japan

17:25-17:40 4TuO.4.4

Towards High Efficiency n-type UMG Solar Cells

F. E. Rougieux[1)], C Samundsett[1)], M. Forster[2)], R. Einhaus[2)] and D. Macdonald[1)]

[1)]Research School of Engineering, The Australian National University, [2)]Apollon Solar

17:40-17:55 4TuO.4.5

Optimized Cell Interconnection for PERC Modules Exceeding 300 W

J. Müller[1)], D. Hinken[1)], S. Blankemeyer[1)], R. Witteck[1)], K. Bothe[1)], M. Köntges[1)] and R. Brendel[1,2)]

[1)]Institute for Solar Energy Research Hamelin (ISFH), Germany, [2)]Institute of Solid-State Physics, University of Hanover, Germany

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Tuesday, November 25
10:15 - 11:25 Room B-1 **Area 2**

2TuO.5 Industrial Technologies

Chairpersons:
Onno Gabriel (PVcomB / Helmholtz-Zentrum Berlin, Germany)
Takashi Suezaki (Kaneka Corporation, Japan)

10:15-10:40 2TuO.5.1

⟨Invited⟩ Current Status and Future Prospect for Thin Film Si Based Solar Cell Technology in Hanergy

X. Xu, J. Zhang, X. Ru, A. Hu, and Y. Li

Hanergy Solar Group Chengdu R&D Center, China

10:40-10:55 2TuO.5.2

⟨Invited⟩ Progress in Thin-film Silicon Tandem (MICROMORPHTM) Photovoltaic Conversion Efficiencies for Large Area Modules

J. Cashmore[1)], M. Apolloni[1)], A. Braga[1)], O. Caglar[1)], V. Cervetto[1)], Y. Fenner[1)], S. G oldbach-Aschemann[1)], C. Goury[1)], J. Hötzel[1)], M. Klindworth[1)], M. Kupich[1)], G.-F. Leu[1)], M.-H. Lindic[1)], P. Losio[1)], B. Mereu[1)], X.-V. Nguyen[1)], I. Psimouli[1)], S. Ristau[1)], T. Roschek[1)], A. Salabas[1)], E. L. Salabas[1)], I. Sinicco[1)], S. Benagli[2)], L Fesquet[2)], J Steinhauser[2)],J. Meier[2)], J. Lin[3)] and D Matsunaga[3)]

[1)]TEL Solar AG., Switzerland, [2)]TEL Solar-Lab SA., Switzerland, [3)]Tokyo Electron Ltd., Japan

10:55-11:10 2TuO.5.3

PECVD Technologies for G5-size Thin Film Silicon Solar Cells

S. Nakao[1)], T. Masuda[1)], K. Tagashira[1)], T. Yamane[1)], E. Otsubo[1)], H. Sai[2)], T. Matsui[2)], I. Yoshida[3)] and Y. Takeuchi[1)]

[1)]Mitsubishi Heavy Industries (MHI), Ltd., Japan, [2)]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [3)]Photovoltaic Power Generation Technology Research Association (PVTEC), Japan

11:10-11:25 2TuO.5.4

Development of a Separated-function Type Textured ZnO Substrate for Improving Conversion Efficiency of Thin-film Si Solar Cells

H. Katayama[1)], H. Sai[2)], T. Koida[2)], K. Maejima[3)], I. Yoshida[3)], S. Yata[1)] and A. Terakawa[1)]

[1)]Panasonic Corporation, Japan, [2)]National Institute of Advanced Industrial Science and Technology, Japan, [3)] Photovoltaic Power Generation Technology Research Association, Japan

Tuesday, November 25
13:00 - 14:25 Room B-1 Area 2

2TuO.6 High-efficiency Devices

Chairpersons:
Takashi Itoh (Gifu University, Japan)
Miro Zeman (Delft University of Technology, The Netherlands)

13:00-13:25 2TuO.6.1

⟨Invited⟩ Light-management Strategies for Thin-film Silicon Multijunction Solar Cells

B. Niesen[1)], J.-W. Schüttauf[1)], E. Moulin[1)],S. Hänni[1)], M. Boccard[1)], E. Feuser[1)], X. Niquille, M. Stuckelberger[1)], N. Blondiaux[2)], R. Pugin[2)], E. Scolan[2)], F. Meillaud[1)], F.-J. Haug[1)], and C. Ballif[1,2)]

[1)]Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Photovoltaics and Thin Film Electronics Laboratory, Switzerland, [2)]Centre Suisse d'Electronique et de Microtechnique (CSEM) SA, Switzerland

13:25-13:40 2TuO.6.2

High-efficiency Amorphous Silicon Solar Cells Realized by Reduced Light-induced Degradation and Improved Device Design

T. Matsui[1)], A. Bidiville[1)], H. Sai[1)], T. Suezaki[2,3)], M. Matsumoto[2,4)], K. Saito[2,5)], I. Yoshida[2)] and M. Kondo[1)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)]Photovoltaic Power Generation Technology Research Association (PVTEC), Japan, [3)]Kaneka Corporation, Japan, [4)]Panasonic Corporation, Japan, [5)]Fukushima University, Japan

13:40-13:55 2TuO.6.3

High-V_{OC} Top-cells for Multi-junction Thin-film Silicon Photovoltaic Devices

E. V. Johnson[1)], F. Ventosinos[1)], S. Park[1)], D. Y. Kim[2)], R. A. C. M. M van Swaaij[2)] and P. Roca i Cabarrocas[1)]

[1]LPICM, CNRS, Ecole Polytechnique, France, [2]PVMD, Netherlands

13:55-14:10 2TuO.6.4

High V_{OC} Silicon-based Thin-film Quadruple-junction Solar Cells

F. T. Si[1], D. Y. Kim[1], R. Santbergen[1], H. Tan[1], R. A. C. M. M. van Swaaij[1], A. Bidiville[2], T. Matsui[2], A. H. M. Smets[1], O. Isabella[1] and M. Zeman[1]

[1]Photovoltaic Materials and Devices Laboratory, Delft University of Technology, the Netherlands, [2]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology, Japan

14:10-14:25 2TuO.6.5

Multi Junction Solar Modules Based On a-Si:H and C-si:h with High Stable Efficiency

S. Kirner[1], S. Neubert[1], C. Schultz[2], O. Gabriel[1], B. Stannowski[1], B. Rech[1] and R. Schlatmann[1,2]

[1]Helmholtz-Zentrum Berlin, Germany, [2]Hochschule für Wirtschaft und Technik, Germany

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Tuesday, November 25
14:45 - 16:15 Room B-1 Area 1

1TuO.7 Intermediate Band Solar Cells

Chairpersons:
Seth Hubbard (Rochester Institute of Technology, USA)
Yoshitaka Okada (The University of Tokyo, Japan)

14:45-15:10 1TuO.7.1

⟨Invited⟩ Novel Semiconductor Materials for Photovoltaics and Photoelectrochemical Cells

Wladek Walukiewicz

Materials Sciences Division Lawrence Berkeley National Laboratory, USA

15:10-15:25 1TuO.7.2

Recent Progress in Cr:ZnS Based Intermediate Band Solar Cells

M. Nematollahi, X. Yang, L. M. S. Aas, P. Kusterle, Z. Ghadyani, M. Kildemo, U. Gibson and T. W. Reenaas

Department of Physics, Norwegian University of Science and Technology, Norway

15:25-15:40 1TuO.7.3

ZnTeO-based Intermediate Band Solar Cells Using MBE-grown *n*-type ZnS Layers

Tooru Tanaka[1,2], Shin Haraguchi[1)], Kosuke Mizoguchi[1)], Toshiki Terasawa[1)], Katsuhiko Saito[1)], Qixin Guo[1)], Mitsuhiro Nishio[1)], Kin M. Yu[3)] and Wladek Walukiewicz[3)]

[1)]Department of Electrical and Electronic Engineering, Saga University, Japan, [2)]PRESTO, Japan Science and Technology Agency (JST), Japan, [3)]Materials Sciences Division, Lawrence Berkeley National Laboratory, U.S.A.

15:40-15:55 1TuO.7.4

Molecular Beam Epitaxy Growth of Intermediate Band Materials Based on GaAs:N δ-Doped Superlattices

T. Suzuki[1)], K. Osada[1)], S. Yagi[1)], S. Naito[2)], Y. Hijikata[1)], Y. Okada[2)] and H. Yaguchi[1)]

[1)]Graduate School of Science and Engineering, Saitama University, Japan, [2)]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

15:55-16:15 1TuO.7.5

⟨Invited⟩ Study of InAs Quantum Dots in a AlAsSb Matrix for Intermediate Band Solar Cell Application

Seth M. Hubbard[1)], Zachary S. Bittner[1)], Ramesh B. Laghumavarapu[2)], Staffan Hellstroem[1)], Diana Huffaker[2)] and Paul Simmonds[2)]

[1)]Rochester Institute of Technology, United States,

[2]University of California at Los Angeles, United States

Tuesday, November 25
16:30 - 17:55 Room B-1 Area 1

1TuO.8 Light Management Concepts and Emerging Technology

Chairpersons:
Masakazu Sugiyama (The University of Tokyo, Japan)
Wladek Walukiewicz (Lawrence Berkeley National Laboratory, USA)

16:30-16:55 1TuO.8.1

⟨Invited⟩ Hexagonal Metal Grating Structure for Broadband Enhancement of Near-infrared Absorption in Silicon Solar Cells

Qi Xu[1,2], Craig Johnson[1], Claire Disney[1], Martin Green[1] and Supriya Pillai[1]

[1]Australian Centre for Advanced Photovoltaics, The University of New South Wales, Australia, [2]Department of Electronic Engineering, Tsinghua University, China

16:55-17:10 1TuO.8.2

Photovoltaic/Photoelectrochemical Devices Based on Thin Film Silicon Alloys for Effective Hydrogen Evolution

L. Han[1], I. A. Digdaya[2], W. A. Smith[2], B. Dam[2], M. Zeman[1] and A. H. M. Smets[1]

[1]Photovoltaic Materials and Devices (PVMD) Laboratory, Delft University of Technology, the Netherlands, [2]Materials for Energy Conversion and Storage (MECS) Laboratory, Delft University of Technology, the Netherlands

17:10-17:25 1TuO.8.3

Solar-pumped Lasers for Photovoltaic Solar Energy Conversion

S. Mizuno[1], K. Hasegawa[1], T. Ichikawa[1], H. Ito[1], T.

Motohiro[2], T. Suzuki[3] and T. Ohishi[3]

[1]Toyota Central Research and Development Laboratories, Inc., Japan, [2]Nagoya University, Japan, [3] Toyota Technological Institute, Japan

17:25-17:40 1TuO.8.4

Enhancement of Light Absorption in Ge/Si Quantum Dot Solar Cells by Surface Photonic Nanostructures

T. Tayagaki[1], Y. Kishimoto[1], Y. Hoshi[2] and N. Usami[2]

[1]Kyoto University, Japan, [2]Nagoya University, Japan

17:40-17:55 1TuO.8.5

Effect of Large Bi-Exciton Binding Energy in CdSe/CdTe QD MEG Solar Cells

S. Tomić[1], J. Miloszewski[1] and D. Binks[2]

[1]University of Salford, UK, [2]University of Manchester, UK

Tuesday, November 25
10:15 - 11:35 Room B-2 Area 5

5TuO.9 Space Solar Cells

Chairpersons:
Ned Ekins-Daukes (Imperial College Lonodn, UK)
Mitsuru Imaizumi (JAXA, Japan)

10:15-10:40 5TuO.9.1

⟨Invited⟩ Development of Inverted Metamorphic Triple-Junction Solar Cell for Space Use

T. Sumita[1], T. Nakamura[1], M. Imaizumi[1], S. -i. Sato[2], H. Abe[2] and T. Ohshima[2]

[1]Japan Aerospace Exploration Agency (JAXA), Japan, [2]Japan Atomic Energy Agency (JAEA), Japan

10:40-10:55 5TuO.9.2

Flexible, High Specific Power Triple-Junction Solar Cell Sheets and Applications

H. Miyamoto, R. Chan, C. Stender, A. Hains, C. Youtsey, V. Elarde, J. Adams, R. Tatavarti, M. Osowski and N. Pan

MicroLink Devices, Inc., USA

10:55-11:10 5TuO.9.3

Reliability Tests of the New Type Solar Sheet For Space

Hiroshi Yamaguchi[1)], Ryo Ijichi[1)], Yoshiyuki Suzuki[1)], Sachiyo Ooka[1)], Keiji Shimada[1)], Naoki Takahashi[1)], Hidetoshi Washio[1)], Kazuyo Nakamura[1)], Tatsuya Takamoto[1)], Mitsuru Imaizumi[2)], Taishi Sumita[2)], Kazunori Shimazaki[2)] and Tetsuya Nakamura[2)]

[1)]SHARP Corporation, Japan, [2)]Japan Aerospace Exploration Agency(JAXA), Japan

11:10-11:35 5TuO.9.4

⟨Invited⟩ Solar Power for Future NASA Missions

Sheila Bailey[1)], Michael Piszczor[1)] and Charles Taylor[2)]

[1)]NASA Glenn Research Center, U.S.A., [2)]Langley Research Center, U.S.A.

Tuesday, November 25
13:00 - 14:30 Room B-2 Area 5

5TuO.10 Multijunction Cells

Chairpersons:
Andreas W. Bett (Fraunhofer ISE, Germany)
Nobuaki Kojima (Toyota Technological Institute, Japan)

13:00-13:15 5TuO.10.1

Investigation of InGaP/(In)AlGaAs/GaAs Triple Junction Top Cells for Smart Stacked Multijunction Solar Cells Grown Using Molecular Beam Epitaxy

T. Sugaya[1)], T. Mochizuki[2)], K. Makita[1)], R. Oshima[1)], K. Matsubara[1)], Y. Okano[2)] and S. Niki[1)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)]Tokyo City University, Japan

13:15-13:30 5TuO.10.2

Potential for Reaching 50% Power Conversion Efficiency Using Quantum Heterostructures

T. Thomas[1)], M. Führer[1)], D. Alonso Alvarez[1)], N. J. Ekins-Daukes[1)], D. Lackner[2)], P. Kailuweit[2)], S. P. Philipps[2)], A. W. Bett[2)], M. Sugiyama[3)] and Y. Okada[3)]

[1)]Department of Physics, Imperial College London, U.K., [2)]Fraunhofer ISE, Germany, [3)]Research Center for Advanced Science and Technology, University of Tokyo, Japan

13:30-13:45 5TuO.10.3

Progress on High-efficiency Inverted Compound Semiconductor Solar-cells

R. Onitsuka, T. Agui, K. Nakaido, T. Inoue, K. Sasaki, H. Juso and T. Takamoto

New Business Development Center, Energy Systems Solution Division, SHARP Corporation, Japan

13:45-14:00 5TuO.10.4

Monolithically Integrated Multi-Junction Cells built by Multiple Separate Growths in Different Epitaxy Reactors

D. Lackner[1)], S. P. Philipps[1)], F. Dimroth[1)], H. Sodabanlu[2)], K. Watanabe[2)], N. Miyashita[2)], M. Sugiyama[2)], Y. Okada[2)] and A. W. Bett[1)]

[1)]Fraunhofer Institute for Solar Energy System ISE, Germany, [2)]University of Tokyo, Research Center for Advanced Science and Technology, Japan

14:00-14:15 5TuO.10.5

Improved Carrier Collection in Thick GaInNAsSb Solar Cells

N. Miyashita, N. Ahsan and Y. Okada

Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

14:15-14:30 5TuO.10.6

Accurate Current-voltage Characteristics Measurement of CPV Cells with a High Intensity Pulsed Solar Simulator

T. Ueda and Y. Hishikawa

Research Center for Photovoltaic Technologies (RCPVT), National Institute of Advanced Industrial Science and Technology (AIST), Japan

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Tuesday, November 25
14:45 - 16:10 Room B-2 Area 8

8TuO.11 Outdoor Performance

Chairpersons:
Ryoichi Hara (Hokkaido University, Japan)
Steve Ransome (SRCL, UK)

14:45-15:10 8TuO.11.1

⟨Invited⟩ Regional Test Centers: Validation of PV Technologies in Different Climates

Joshua S. Stein

Sandia National Laboratories, USA

15:10-15:25 8TuO.11.2

Performance Analysis for BIPV in High-rise, High-density Cities: a Case Study in Singapore

C. Zomer[1)], A. M. Nobre[1,2)], T. Reindl[2)] and R. Rüther[1)]

[1)]Universidade Federal de Santa Catarina (UFSC), Brazil, [2)]Solar Energy Research Institute of Singapore (SERIS), National University of Singapore (NUS), Singapore

15:25-15:40 8TuO.11.3

"Counting the Sun" - a Dutch Public Awareness Campaign on PV Performance

W. G. J. H. M. van Sark[1,2], S. 't Hart[1,3], M. M. de Jong[1], P. de Rijk[1], P. Moraitis[2], B. B. Kausika[2] and H. van der Velde[2]

[1]Stichting Monitoring Zonnestroom, the Netherlands, [2]Utrecht University, Copernicus Institute, the Netherlands, [3]Holland Solar, the Netherlands

15:40-15:55 8TuO.11.4

Soiling Impact on the Energy Production of PV Pilot System Implemented in the Emirate of Abu Dhabi

E. Al Hammadi, S. Al-Yalyali and A. Al-Sabounchi

National Energy and Water Research Center (NEWRC), Abu Dhabi Water and Electricity Authority (ADWEA), UAE

15:55-16:10 8TuO.11.5

Prototype Robotic Crawler for On-site Inspection of Crystalline Silicon Photovoltaic Modules

N. Yamada[1], M. Yoshida[2], T. Machida[1], S. Kawamoto[1], K. Tada[1], H. Saitoh[1], K. Yamamoto, K. Okamoto[1], T. Kimura[1], M. Iwahashi[2], T. Tadaumi[3] and K. Kato[4]

[1]Department of Mechanical Engineering, Nagaoka University of Technology, Japan, [2]Department of Electrical Engineering, Nagaoka University of Technology, Japan, [3]Robotics Engineering Department, ATOX Co., Ltd., Japan, [4]Research Center for Photovoltaic Technologies (RCPVT), National Institute of Advanced Industrial Science and Technology(AIST), Japan

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Tuesday, November 25
16:30 - 17:55 Room B-2 Area 8

8TuO.12 Design and Operation

Chairpersons:
Roger H. French (SDLE Center, CWRU, USA)
Noboru Yamada (Nagaoka University of Technology, Japan)

16:30-16:55 8TuO.12.1

⟨Invited⟩ Performance and Failure Analysis of over 5,000 PV Modules after 10-year Operation - Lessons Learned from AIST "Mega-Solartown" -

T. Takashima, K. Ikeda and K. Kato

National Institute of Advanced Industrial Science and Technology(AIST), Japan

16:55-17:10 8TuO.12.2

PV Module Deterioration After 15 - Year Field Operation in Thailand

B. Wiengmoon[1,2], K. Kirtikara[1], C. Jivacate[1], T. Chenvidhya[1], R. Songprakorp[1] and D. Chenvidhya[1]

[1]CES Solar Cells Testing Center (CSSC), Pilot Plant Development and Training Institute (PDTI), King Mongkut's University of Technology Thonburi (KMUTT), Thailand, [2]Department of Physics, Faculty of Science, Naresuan University, Thailand

17:10-17:25 8TuO.12.3

Field Experience from Bifacial PV in Snow Region

K. Sugibuchi[1], S. Yamauchi[1], S. Goda[1], K. Hosokawa[2] and N. Ishikawa[1]

[1]PVG Solutions Inc., Japan, [2]Hokkaido University of Science, Japan

17:25-17:40 8TuO.12.4

Reduction of Installation Cost by Plastic & Metal Hybrid Fixation Parts without Bolts & Nuts

Y. Shitanoki[1] and M. Yonezawa[2]

[1]New Business Development Japan, DuPont Kabushiki Kaisha, Japan, [2]DuPont Performance Polymer, DuPont Kabushiki Kaisha, Japan

17:40-17:55 8TuO.12.5

Photovoltaic Greenhouses: A Feasible Solution for Islands? Design, Operation, Monitoring and Lessons Learned from a Real Case Study

A. Scognamiglio[1], F. Garde[2], T. Ratsimba[2], A. Monnier[3] and E. Scotto[3]

[1]ENEA, Italian National Agency for New Technologies, Energy and Sustainable Economic Development, Italy, [2]ESIROI, Université de La Réunion, France, [3] Akuoenergy, France

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Tuesday, November 25
18:30 - 20:30 Room B-2 Area 7

7TuRu.17 Rump Session upon PV Quality Assurance

Chairpersons:
Sarah Kurtz (NREL, USA)
Masaaki Yamamichi (AIST, Japan)

18:30-18:40 7TuRu.17.1

A Holistic View of PV Cell and Module Reliability

Homer Antoniadis, Andreas Meisel and William. J.Gambogi

DuPont, KK

18:40-18:50 7TuRu.17.2

Bending Load Testing to Evaluate the Interconnector Breakdown in c-Si PV Modules

Soh Suzuki, Tadanori Tanahashi, Takuya Doi, and Atsushi Masuda

PVTEC, AIST, ESPEC Corp.

18:50-19:00 7TuRu.17.3

PV Module Reliability in Terms of an Encapsulant Manufacturer and an Investor

Tsuyoshi Shioda

Mitsui Chemicals, Inc.

19:00-19:10 **7TuRu.17.4**

The Big Hammer Approach – Is This Really Useful?

Bengt Jaeckel

UL, Germany

19:10-19:40 **Break and Poster Presentation**

19:40-20:30 **Free Discussion**

This session is sponsored by Dupont KK, ESPEC Corp., Kaneka Corp., Mitsubishi Electric Corp., Mitsui Chemicals Inc., Toray Industries Inc., UL Japan, VDE Global Services Japan.

Tuesday, November 25
10:15 - 11:40 Room E Area 7

7TuO.13 PV Module Characterization 1

Chairpersons:
Yoshihito Eguchi (MITSUI CHEMICALS,INC., Japan)
Hung-Sen Wu (Industrial Technology Research Institute, Taiwan)

10:15-10:40 **7TuO.13.1**

⟨Invited⟩ Characterization from Manufacurers Point of View

Kazufumi Tanaka

Kyocera, Japan

10:40-10:55 **7TuO.13.2**

Photovoltaic Lifetime and Degradation Science: a Data Science Approach

Y. Xu, N. R. Wheeler, Y. Hu, M. A. Hossain, A. Gok, V. Y. R. Gunapati, Y. Hou, P. Zhao, H. M. Lemire, L. S. Bruckman, T. J. Peshek, G.-Q. Zhang, J. Sun and

R. H. French

Solar Durability and Lifetime Extension Center Case Western Reserve University, USA

10:55-11:10 7TuO.13.3

Intensity Modulation Transfer Function Spectroscopy of Solar Cell

A. Namin[1)], J. Thongpron[1)], D. Chenvidhya[2)], C. Jivacate[2)], K. Wattanavichean[2)] and K. Kirtikara[2)]

[1)]Rajamangala University of Technology Lanna, Thailand, [2)]King Mongkut´s University of Technology Thonburi, Thailand

11:10-11:25 7TuO.13.4

Development of Performance Estimation Method for Thin Film Silicon HYBRID Modules Under the Long Term Outdoor Exposure

N. Kadota, Y. Minami, T. Sasaki, T. Sawada and A. Nakajima

Solar Energy Division, Kaneka Corporation, JAPAN

11:25-11:40 7TuO.13.5

Development of the High-Efficiency Bifacial Photovoltaic Module and the Simulation Method for Its Power Generation

T. Nakamura, S. Fukumochi, Y. Maruyama, S. Tsujii, K. Yamada, T. Nishida, H. Yukawa, T. Yoshihara, T. Nakajima, T. Yoshida, M. Shima, T. Haga and S. Okamoto

Solar Business Unit, Eco Solutions Company, Panasonic Corporation, Japan

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Tuesday, November 25
13:00 - 14:25 Room E Area 7

7TuO.14 PV Module Components

Chairpersons:
Bengt Jaeckel (UL, Germany)

Haruhiko Nakaniwa (DuPont K.K., Japan)

13:00-13:25　7TuO.14.1

⟨Invited⟩ Degradation Phenomena of Crystalline Silicon Photovoltaic Modules

Atsushi Masuda

National Institute of Advanced Industrial Science and Technology, Japan

13:25-13:40　7TuO.14.2

PV Module Durability and Backsheet Performance

W. Gambogi[1)], Y. Heta[2)], J. Kopchick[1)], T. Felder[1)], S. MacMaster[1)], A. Bradley[1)], B. Hamzavytehrany[1)], B.-L. Yu[1)], K. Stika[1)], T. J. Trout[1)], L. Garreau-Iles[3)], O. Fu[4)] and H. Hu[4)]

[1)]DuPont, USA, [2)]DuPont K.K., Japan, [3)]Du Pont de Nemours Intl. S.A., Switzerland, [4)]DuPont (China) R&D and Management Co., Ltd., China

13:40-13:55　7TuO.14.3

Properties of Encapsulation Materials and Their Relevance for Quality Control and Recent Field Failures

J. Berghold[1)], S. Koch[1)], T. Shioda[2)] and P. Grunow[2)]

[1)]PI Photovoltaik-Insitut Berlin, Germany, [2)]Mitsui Chemicals, Inc., Japan

13:55-14:10　7TuO.14.4

Solder Joint Failure Modes in Crystalline Si PV Modules Operated in the Tsukuba, Japan for 10 Years -Ag and Cu Leaching

Uichi Itoh[1)], Tetsuro Nishimura[2)], Takuro Fukami[2)], Kenji Takamura[2)], Akira Kita[2)], Ryosuke Miyabayashi[3)] and Hideo Ohkuma[4)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)]Nihon Superior Co. LTD., Japan, [3)]NPC Incorporated, Japan, [4)]HTO Inc., Japan

14:10-14:25 7TuO.14.5

Development of a Nanostructured pH Sensor for Detecting Acetic Acid in Photovoltaic Modules

T. Asaka[1)], T. Itayama[1)], H. Nagasaki[1)], K. Iwami[1)], C. Yamamoto[2)], Y. Hara[2)], A. Masuda[2)] and N. Umeda[1)]

[1)]Tokyo Univ. of Agri. & Tech., Japan, [2)]AIST, Japan

Tuesday, November 25
14:45 - 16:15 Room E Area 6

6TuO.15 Dye Sensitized and Organic Photovoltaic Cells

Chairpersons:
Mohammad Khaja Nazeeruddin (EPF Lausanne(EPFL), Switzerland)
Atsushi Wakamiya (Institute for Chemical Research, Kyoto University, Japan)

14:45-15:00 6TuO.15.1

Optimization of Electrolyte Solution for Highly Efficient Black-Dye-Based Dye-Sensitized Solar Cells

R. Shimizu, Y. Tawaraya, H. Ozawa and H. Arakawa

Tokyo University of Science, Japan

15:00-15:15 6TuO.15.2

The I_3^- Ion Transport in the Electrolyte Solution of Dye-sensitized Solar Cells

M. Yanagida[1,2)] and L. Han[1)]

[1)]Photovoltaic Materials Research Unit, [2)]National Institute of Materials Science (NIMS), Global Research Center for Environment and Energy based on Nanomaterials Science (GREEN), Japan

15:15-15:30 6TuO.15.3

Fabrications of Flexible Dye-Sensitized Solar Cells Using Ultrasonic Spray Coating Technology: Synthesis of Organic Dyes for Flexible Dye-Sensitized Solar Cells

Hyun-Gyu Han[1)], Jeong Su Kim[1)], Hyun Oh Shin[1)], Hasitha C. Weerasinghe[2,3)], Eung Lee[1)], Yi-Bing Cheng[4)], David J. Johnes[2)], Andrew B. Holmes[2,3)] and Tae-Hyuk Kwon[1)]

[1)]Department of Chemistry, School of Natural Sciences, Ulsan National Institute of Science and Technology(UNIST), Republic of Korea, [2)]School of Chemistry, Bio[2)1)]Institute, University of Melbourne, Australia , [3)]Commonwealth Scientific and Industrial Research Organisation (CSIRO) Materials Science and Engineering, Australia, [4)]Department of Materials Engineering, Monash University, Australia

15:30-15:45 6TuO.15.4

Co-evaporant Induced Crystallization for Realization of Crystalline Ideal Structure of Organic Photovoltaic Cells

T. Kaji[1,2)], M. Katayama[1,2)], S. Nakao[1)] and M. Hiramoto[1)]

[1)]Institute for Molecular Science, National Institutes of Natural Sciences, Japan, [2)]JST-ALCA, Japan

15:45-16:00 6TuO.15.5

Crystal Structure Control for Organic Solar Cells

Tetsuhiko Miyadera[1,2)], Zhiping Wang[1)], Takeshi Sugita[1)], Yuji Yoshida[1)] and Masayuki Chikamatsu[1)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)]Japan Science and Technology Agency (JST), Japan

16:00-16:15 6TuO.15.6

Organic-silicon Heterojunctions: a Promising New Concept for High-efficiency Solar Cells

J. Schmidt[1,2)] and D. Zielke[1)]

[1)]Institute for Solar Energy Research Hamelin (ISFH), Germany, [2)]Institute of Solid-State Physics, Leibniz Universität Hannover, Germany

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Tuesday, November 25
16:30 - 18:00 Room E **Area 6**

6TuO.16 Organic Photovoltaic Cells

Chairpersons:
Tetsuhiko Miyadera (AIST, Japan)
Jan Schmidt (Institute for Solar Energy Research Hamelin (ISFH), Germany)

16:30-16:45 6TuO.16.1

Naphthobisthiadiazole Semiconducting Polymers for High-Efficiency Solar Cells

I. Osaka[1,2)], T. Kakara[3)], K. Kawashima[1,3)] and K. Takimiya[1,3)]

[1)]Center for Emergent Matter Science, RIKEN, Japan, [2)]Precursory Research for Embryonic Science and Technology (PRESTO), JST, Japan, [3)]Department of Applied Chemistry, Graduate School of Engineering, Hiroshima University, Japan

16:45-17:00 6TuO.16.2

Efficiency Enhancement of Bulk-heterojunction Organic Solar Cells by Using Sensitizer

Ashraf Uddin, Rui Lin and Matthew Wright

School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

17:00-17:15 6TuO.16.3

Development of Highly Efficient Polymer Blend Solar Cells Composed of Donor and Acceptor Polymers

H. Benten[1)], D. Mori[1)], I. Okada[1)], H. Ohkita[1,2)] and S. Ito[1)]

[1)]Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University, Japan, [2]Japan Science and Technology Agency, PRESTO, Japan

17:15-17:30 6TuO.16.4

Time-Resolved Photoluminescence and Light-Induced Electron Spin Resonance Studies of Photo-Induced Charge Transfer in new Polyazomethines:Fullerene for Organic Solar Cells

S. Grankowska[1], A. Iwan[2], K. Parafiniuk[2], A. Wolos[1], K. P. Korona[1] and M. Kaminska[1]

[1]Institide of Experimental Physics, University of Warsaw, Poland, [2]Division of Electrotechnology and Materials Science, Electrotechnical Institute, Poland

17:30-17:45 6TuO.16.5

Solution-processable Colloidal Quantum Dot-based Bulk-heterojunction Solar Cells Utilizing ZnO Nanowire Arrays

Takaya Kubo, Haibin Wang, Yoshitaka Sanehira, Jotaro Nakazaki and Hiroshi Segawa

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

17:45-18:00 6TuO.16.6

Module Composition for Reliability Test of OPV

H. Morita[1,2], M. Miyashita[2] and A. Masuda[3]

[1]Photovoltaic Power Generation Technology Research Association (PVTEC), Japan, [2]Toray Industries, Inc., Japan, [3]National Institute of Advanced Industrial Science and Technology (AIST), Japan

Plenary
Wednesday, November 26
8:30 - 10:00 Room A

Chairpersons:
Sheila Bailey (NASA Glenn Research Center, USA)
Kazuhiko Ogimoto (The University of Tokyo, Japan)

8:30-9:00 5WePl.1 Area 5

[Plenary] Advancements in High Efficiency Multijunction Solar Cells for Low-Cost Power Generation

Nasser H. Karam

Boeing Spectrolab Inc.

9:00-9:30 9WePl.2 Area 9

[Plenary] Photovoltaics Becoming Mainstream: Opportunities and Challenges for Technology, Markets and Policy from a Global Perspective

Stefan Nowak

Chairman, IEA PVPS

9:30-10:00 8WePl.3 Area 8

[Plenary] Renewable Energy Integration to Power Systems - National Projects in Japan -

S. Ashidate

Tokyo Electric Power Co. Inc., Japan

Wednesday, November 26
10:15 - 11:30 Room A J2 (Area 1 & 5)

J2WeO.1 Next Generation Concentrator Photovoltaic (NGCPV)

Chairpersons:
Ned Ekins-Daukes (Imperial College Lonodn, UK)
Kensuke Nishioka (University of Miyazaki, Japan)

10:15-10:40 **J2WeO.1.1**

⟨Plenary⟩ Recent Developments in CPV Technology

Andreas W. Bett, Frank Dimroth, Peter Fuss-Kailuweit, Stefan Heckelmann, Vera Klinger, David Lackner, Markus Niemeyer, Simon P. Philipps, Gerald Siefer, Maike Wiesenfarth

Fraunhofer Institute for Solar Energy Systems ISE, Germany

10:40-11:05 **J2WeO.1.2**

⟨Invited⟩ Spectrum and Light Absorption in Nanostructured Photovoltaics

Antonio Luque[1,2] and A.Martí[1]

[1]Technical University of Madrid (UPM), Spain, [2]Ioffe Physical-Technical Institute, Russia

11:05-11:30 **J2WeO.1.3**

⟨Invited⟩ Outline and Activities of Europe-Japan Collaborative Research on Concentrator Photovoltaics

Masafumi Yamaguchi[1] and Antonio Luque[2]

[1]Toyota Technological Institute, Japan, [2]University Polytechnic of Madrid, Spain

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Wednesday, November 26
13:00 - 14:20 Room A Area 1

1WeO.2 QD and QW Solar Cells

Chairpersons:
Sungjee Kim (POSTECH, Korea)
Shuhei Yagi (Saitama University, Japan)

13:00-13:20 **1WeO.2.1**

⟨Extended Oral⟩ Suppression of Thermal Carrier Escape and Efficient Photo-carrier Generation by Two-step Photon Absorption in Intermediate-band Solar Cells Using a Dot-in-well Structure

S. Asahi, H. Teranishi, N. Kasamatsu, T. Kada, T. Kaizu and T. Kita

Department of Electrical and Electronic Engineering, Faculty of Engineering, Kobe University, Japan

13:20-13:35 1WeO.2.2

Strong Absorption Exaltation in Ultrathin QDs and MQWs for Tandem and Intermediate Band Solar Cells

B. Behaghel[1,2,4], P. Rale[2], Y. Shoji[3], R. Tamaki[3], N. Vandamme[1], L. Lombez[2], C. Dupuis[1], A. Cattoni[1], K. Watanabe[3], H. Sodabanlu[3], M. Sugiyama[3], Y. Okada[3], S. Collin[1] and J-F. Guillemoles[2,4]

[1]Laboratory for Photonics and Nanostructures - (LPN-CNRS), France, [2]Institute of Research and Development on Photovoltaic Energy - (IRDEP-CNRS), France, [3]Research Center for Advanced Science and Technology - The University of Tokyo, Japan, [4]NextPV - The University of Tokyo and CNRS, Japan

13:35-13:50 1WeO.2.3

Thin-film InGaAs/GaAsP MQWs Solar Cell with Dielectric Micro-Hole Array Structure for Light Trapping Effect

K. Watanabe[1], T. Inoue[2], H. Sodabanlu[1], Y. Wang[1], M. Sugiyama[2] and Y. Nakano[1,2]

[1]Research Center for Advanced Science and Technology, the University of Tokyo, Japan, [2]Department of Electrical Engineering & Information System, School of Engineering, the University of Tokyo, Japan

13:50-14:05 1WeO.2.4

Layer-by-layer Assemblies of Semiconductor Quantum Dots and Surface Modification for Nanostructured Photovoltaic Devices

Sukyung Choi, Ho Jin and Sungjee Kim

Department of Chemistry, Pohang University of Science and Technology, South Korea

14:05-14:20 1WeO.2.5

Photofilling Effect on Optical Transitions in InGaAs/GaAs Quantum Dot Solar Cells

R. Tamaki, Y. Shoji, Y. Okada and K. Miyano

Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

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Wednesday, November 26
14:45 - 16:15 Room A Area 5

5WeO.3 Quantum Effect

Chairpersons:
Andreas W. Bett (Fraunhofer ISE, Germany)
Masakazu Sugiyama (The University of Tokyo, Japan)

14:45-15:00 5WeO.3.1

Strongly-carrier-density-dependent Luminescent Coupling in Multi-junction Tandem Solar Cells Revealed via Absolute-electroluminescence-efficiency Measurements

Shaoqiang Chen[1)], Lin Zhu[1)], Masahiro Yoshita[1)], Toshimitsu Mochizuki[1)], Changsu Kim[1)], Hidefumi Akiyama[1)], Tetsuya Nakamura[2)], Mitsuru Imaizumi[2)] and Yoshihiko Kanemitsu[3)]

[1)]Institute for Solid State Physics, University of Tokyo, and JST-CREST, Japan, [2)]Japan Aerospace Exploration Agency (JAXA), Japan, [3)]Institute for Chemical Research, Kyoto University, and JST-CREST, Japan

15:00-15:15 5WeO.3.2

InAs/GaAs Quantum Dot Solar Cell with 26.8% Efficiency Achieved Through Current Constraint Engineering

Tomah Sogabe, Yasushi Shoji, Chao-Yu Hung, Daniel J. Farrell and Yoshitaka Okada

Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, JAPAN

15:15-15:30 5WeO.3.3

Open-circuit Voltage Behavior in Multiple Quantum Well Solar Cells with Different Barrier Thickness Illuminated Under High Concentrated Sunlight

W. Yanwachirakul[1)], K. Toprasertpong[1)], H. Fujii[1)], K. Watanabe[2)], M. Sugiyama[1)] and Y. Nakano[1)]

[1)]Graduate School of Engineering, The University of Tokyo, Japan, [2)]Research Center for Advanced Science and Technology (RCAST), Japan

15:30-15:45 5WeO.3.4

Carriers Recombination Study of InGaP/InGaAsP Multiple-Quantum-Well Top Cell for High Efficiency Multi-Junction Solar Cells

K. -H. Lee[1,2)], K. W. J. Barnham[2)], J. S. Roberts[3)] and N. J. Ekins-Daukes[2)]

[1)]Toyota Technological Institute, Japan, [2)]Blackett Laboratory, Imperial College London, United Kingdom, [3)]National Center for III-V Technologies, UK

15:45-16:00 5WeO.3.5

Efficiency Improvement of InGaAs/GaAsP Multiple Quantum Well Solar Cells on Mis-oriented GaAs Substrates by Pulse Injection MOVPE

H. Sodabanlu[1)], Y. Wang[1)], K. Watanabe[1)], M. Sugiyama[2)] and Y. Nakano[1)]

[1)]Research Center for Advanced Science and Technology, the University of Tokyo, Japan, [2)]Department of Electrical Engineering & Information System, School of Engineering, the University of Tokyo, Japan

16:00-16:15 5WeO.3.6

Photo-charging Effects in High Efficiency Multi-quantum Wells and Wires Solar Cells

D. Alonso-Álvarez[1)], M. Fuhrer[1)], T. Thomas[1)], N. P. Hylton[1)], D. Lackner[2)], S. P. Philipps[2)], A. W. Bett[2)], M. Sugiyama[3)] and N. J. Ekins-Daukes[1)]

[1]Department of Physics, Imperial College London, United Kingdom, [2]Fraunhofer Institute for Solar Energy Systems ISE, Germany, [3]Department of Electrical Engineering and Information Systems, the University of Tokyo, Japan

Wednesday, November 26
16:30 - 18:00 Room A Area 5

5WeO.4 CPV

Chairpersons:
Kenji Araki (Daido Steel, Japan)
Kensuke Nishioka (University of Miyazaki, Japan)

16:30-16:45 5WeO.4.1

Development of the New DFK CPV Module by NGCPV Japan-EU Collaboration

H. Nagai[1], K. Araki[1], K. Hobo[1], P. Zamora[2], P. Benitez[2], J. C. Miñano[2], K. Nishioka[3], Y. Ota[3], I. Luque-Herdia[4], J. Hashimoto[5], T. Ueda[5], Y. Hishikawa[5], R. Herrero[6], S. Askins[6], Ignacio Antón[6], R. Núñez[6], G. Sala[6], G. Niemeyer[7], G. Siefer[7] and A. W. Bett[7]

[1]Daido Steel, Japan, [2]Universidad Politécnica de Madrid, Campus de Montegancedo, Spain, [3]University of Miyazaki, Japan, [4]BSQ Solar, Spain, [5]AIST, Japan, [6]Instituto de Energía Solar-Universidad Politécnica de Madrid, Spain, [7]Fraunhofer Institute for Solar Energy Systems, ISE, Germany

16:45-17:00 5WeO.4.2

Investigations on FLATCON® Modules Using IMM-Solar Cells

M. Steiner[1], G. Siefer[1], A. W. Bett[1], K. Sasaki[2], H. Juso[2] and T. Takamoto[2]

[1]Fraunhofer Institute for Solar Energy Systems ISE, Germany, [2]Sharp Cooperation, Japan

17:00-17:15 5WeO.4.3

Energetic Performances of the 50kW CPV Plant Realized within NGCPV Project

C. Cancro[1)], S. Ferlito[1)], G. Graditi[1)], R. Nunez[2)], I. Antón[2)], G. Sala[2)], M. Castro[2)] and K. Araki[3)]

[1)]ENEA -Italian national Agency for new technologies, Energy and Sustainable Economic Development - Research Center of Portici, Italy, [2)]Instituto de Energ-Solar - Universidad Politécnica de Madrid, Spain, [3)] Daido Steel Co., Japan

17:15-17:30 5WeO.4.4

High Efficiency Spectrum Splitting Prototype Submodule Using Commercial CPV Cells

Mark J Keevers[1)], Cho Fai Jonathan Lau[1)], Ian Thomas[2)], John B Lasich[2)], Richard R King[3)] and Martin A Green[1)]

[1)]School of Photovoltaic and Renewable Energy Engineering, UNSW, Australia, [2)]RayGen Resources Pty Ltd, Australia, [3)]Spectrolab Inc, USA

17:30-17:45 5WeO.4.5

Analysis of Thermo-mechanical Stress Effects on CPV Receiver Under High Intensity Light Cycles

V. Perez, I. Antón, R. Herrero, E. Nogueira, R. Núñez, C. del Cañizo and G. Sala

Instituto de Energía Solar-UPM, E.T.S.I. Telecomunicación, Spain

17:45-18:00 5WeO.4.6

InGaP/GaAs/Si Hybrid Triple-Junction Cells by Surface Activated Bonding of Invertedly-Grown III-V Heterostructures to Si-Based Bottom Cells

Naoteru Shigekawa[1)], Li Chai[1)], Masashi Morimoto[1)], Jianbo Liang[1)], Ryusuke Onitsuka[2)], Takaaki Agui[2)], Hiroyuki Juso[2)] and Tatsuya Takamoto[2)]

[1)]Graduate School of Engineering, Osaka City University, Japan, [2)]Sharp Corporation, Japan

Wednesday, November 26
10:15 - 11:30 Room B-1 Area 9

9WeO.5 Environmental & Ecnomic Aspects of PV

Chairpersons:
Keiichi Komoto (Mizuho Information & Research Institute, Inc., Japan)
Keiichiro Sakurai (AIST, Japan)

10:15-10:30 9WeO.5.1

Environmental Benefits of a Megasolar CdTe PV Project in Japan

P. Sinha[1)], M. J. de Wild-Scholten[2)], Y. Matsuno[3)], K. Brutsaert[4)] and I. Soga[4)]

[1)]First Solar, USA, [2)]SmartGreenScans, The Netherlands, [3)]The University of Tokyo, Japan, [4)]First Solar, Japan

10:30-10:45 9WeO.5.2

Development of the PV Recycling System for Various Kinds of PV Modules

M. Noda[1)], K. Kushiya[2)], H. Saito[3)], K. Komoto[4)] and T. Matsumoto[5)]

[1)]Kitakyushu Foundation for the Advancement of Industry, Science and Technology, Japan, [2)]Showa Shell Sekiyu K.K., Japan, [3)]Shinryo Corporation, Japan, [4)]Mizuho Information & Research Institute, Inc., Japan, [5)]The University of Kitakyushu, Japan

10:45-11:00 9WeO.5.3

Economics of Residential PV Systems in Europe

Arnulf Jäger-Waldau, Sandor Szabo and Thomas Huld

European Commission, Institute for Energy and Transport, Renewable Energy, Italy

11:00-11:15 9WeO.5.4

International Technology Roadmap for Photovoltaics: Challenging Perspectives

A. Metz[1], M. Fischer[2] and S. Raithel[3]

[1]h.a.l.m. elektronik GmbH, Germany, [2]Hanwha Q CELLS GmbH, Germany, [3]SEMI Europe, Germany

11:15-11:30 9WeO.5.5

Assessment of Photovoltaic Learning Curves and Model Parameterization of Module Efficiency Trend for Industrial Crystalline Silicon and Thin Film Technologies

Yifeng Chen, Zhiqiang Feng and Pierre Verlinden

State Key Laboratory of PV Science and Technology, Trina Solar, China

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Wednesday, November 26
13:00 - 14:35 Room B-1 Area 9

9WeO.6 National Program & R&D

Chairpersons:
John Benner (Stanford University, USA)
Izumi Kaizuka (RTS Corporation, Japan)

13:00-13:25 9WeO.6.1

⟨Invited⟩ The Long Term Vision for Solar in the United States

Robert Margolis

National Renewable Energy Laboratory, USA

13:25-13:50 9WeO.6.2

⟨Invited⟩ Trends in Photovoltaic Applications - the Latest Survey Results on PV Markets and Policies from the IEA PVPS Programme

Ir. Gaëtan Masson[1], Pius Hüsser[2], Vicente Salas[3], Robert Margolis and Izumi Kaizuka[4]

[1]IEA PVPS, Belgium, [2]Nova Energie, Switzerland, [3]Universidad Carlos III de Madrid, Spain, [4]National Renewable Energy Laboratory, USA, [5]RTS Corporation, Japan

13:50-14:05 9WeO.6.3

Assessment of China's Domestic Solar Policy Development in the Context of the 13th Five-Year-Plan (2016-2020) and Its Impact on the Domestic Market Demand

Frank Haugwitz

Asia Europe Clean Energy (Solar) Advisory Co. Ltd, Hong Kong

14:05-14:20 9WeO.6.4

Thailand PV Power Plants and Roof-Tops Status in 2014

T. Chenvidhya, K. Kirtikara and D. Chenvidhya

CES Solar Cells Testing Center, Pilot Plant Development and Training Institute, King Mongkut´s University of Technology Thonburi, Thailand

14:20-14:35 9WeO.6.5

Optimising PV Research Infrastructures in Europe: Lessons Learned from the SOPHIA Project

P. Malbranche[1)], J. Merten[1)], B. Assoa[1)], E. Gerritsen[1)], F. Bergeron[1)], M. Albaric[1)], R. Varache[1)], S. Cros[1)], G. Siefer[2)], M. Koehl[2)], M. Schubert[2)], W. Warta[2)], S. Misara[2)], W. Sprenger[2)], A. Pozza[3)], N. Taylor[3)], T. Sample[3)], F. Paletta[4)], I. J. Bennett[5)], J. Kroon[5)], J. Zhu[6)], R. Gottschalg[6)], S Zamini[7)], K. Berger[7)], P. Pugliatti[8)], A. Di Stefano[8)], F. Aleo[8)], F. Roca[9)], G. Graditi[9)], M. Pellegrino[9)], O. Zubillaga[10)], P. Cano[10)], I. Gordon[11)], S. Gevorgyan[12)], I. Lauermann[13)], V. Hinrichs[13)], M. Schmid[13)], J. Huepkes[14)], Y. Augarten[14)], I. Anton[15)], S. Rousu[16)], J. Hast[16)], T. Pettersen, M. Juel[17)], P. Basso[18)], G. Arrowsmith[19)], V. Valente[19)] and D. Craciun[20)]

[1)]CEA INES, France, [2)]Fraunhofer ISE & IWES, Germany, [3)]JRC, Italy, [4)]RSE, Italy, [5)]ECN, Netherlands, [6)]CREST, UK, [7)]Austrian Institute of Technology, Austria, [8)]ENEL, Italy, [9)]ENEA, Italy, [10)] Tecnalia, Spain, [1))]IMEC, Belgium, [12)]DTU, Denmark, [13)]HZB, Germany, [14)]FZ Jülich, Germany, [15)]UPM, Spain, [16)]VTT, Finland, [17)]Sintef, Norway, [18)]EPIA, Belgium, [19)]EUREC, Belgium,

[20]Derlab, Germany

Wednesday, November 26
14:45 - 16:20 Room B-1 **Area 9**

9WeO.7 PV in Energy System

Chairpersons:
Stefan Nowak (Chairman, IEA PVPS, Switzerland)
Hiroyuki Yamada (NEDO, Japan)

14:45-15:10 9WeO.7.1

⟨Invited⟩ Conceptual Considerations on Renewable Energy Mix to Moderate Next Generation Power Grids

K. Kurokawa

Tokyo Institute of Technology, Japan

15:10-15:35 9WeO.7.2

⟨Invited⟩ Impacts of the Feed-in Tariff Program on the PV Market in Japan

Hiroshi Matsukawa, Takashi Ohigashi, Haruki Yamaya, Izumi Kaizuka and Osamu Ikki

RTS Corporation, Japan

15:35-15:50 9WeO.7.3

North-East Asian Super Grid: Renewable Energy Mix and Economics

Christian Breyer[1], Dmitrii Bogdanov[1], Keiichi Komoto[2], Tomoki Ehara[3], Jinsoo Song[4] and Namjil Enebish[5]

[1]Lappeenranta University of Technology, Finland, [2]Mizuho Information & Research Institute, Japan, [3]E-konzal, Japan, [4]Korea Institute of Energy Research, Korea, [5]National University of Mongolia, Mongolia

15:50-16:05 9WeO.7.4

Energy Transition from Nuclear to Solar: The Case of Switzerland

A. V. Shah[1)], Jan Remund[2)] and Nicolas Wyrsch[1)]

[1)]PV Lab, IMT, EPFL, Switzerland, [2)]Meteotest, Switzerland

16:05-16:20 9WeO.7.5

Remote Markets 2.0 - The Next Wave of PV Expansion - An Update

W. B. Rever, III[1)] and P. J. Mints[2)]

[1)]WB Rever Associates, USA, [2)]SPV Market Research, USA

Wednesday, November 26
16:30 - 17:55 Room B-1 Area 7

7WeO.8 PV Module Characterization 2

Chairpersons:
Yoshihiro Hishikawa (AIST, Japan)
Gerald Siefer (Fraunhofer ISE, Germany)

16:30-16:55 7WeO.8.1

⟨Invited⟩ Optical Characterization of PV Modules

Ulrike Jahn, Werner Herrmann, Lorenz Rimmelspacher

TÜV Rheinland Energie und Umwelt GmbH, Germany

16:55-17:10 7WeO.8.2

Towards Modelling Realistic Ageing Rates of Amorphous Silicon Devices in Operational Environments

J. Zhu, M. Bliss, T. R. Betts and R. Gottschalg

Centre for Renewable Energy Systems Technology (CREST), Loughborough University, UK

17:10-17:25 7WeO.8.3

SmartWire Solar Cell Interconnection Technology

M. Despeisse[1)], A. Faes[1)], J. Levrat[1)], J. Escarré [1)], J. Champliaud[1)], V. Chapuis[1)], N. Badel[1)], T. Sörderström[2)], Y. Yao[2)], J. Ufheil[3)], P. Papet[4)], G. Cattaneo[5)], J. Cattin[5)],

Y. Baumgartner[5], A. Hessler-Wyser[5] and C. Ballif[1,5]

[1]CSEM SA, PV-center, Switzerland, [2]Meyer Burger AG, Switzerland, [3]Somont, Germany, [4]Roth&Rau Research AG, Switzerland, [5]Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Photovoltaics and thin film electronics laboratory (PV-Lab), Switzerland

17:25-17:40 7WeO.8.4

Day Light Electroluminescence Imaging of Photovoltaic Modules by Image Difference Technique

R. Dubey[1,2], S. Chattopadhyay[1,3], J. J John[1,2], V. Kuthanazhi[1,2], A. Kottantharayil[1,2], B. M. Arora[1,2], C. S. Solanki[1,3], K. L. Narasimhan[1,2] and J. Vasi[1,2]

[1]National Centre for Photovoltaic Research and Education, Indian Institute of Technology Bombay, India, [2]Department of Electrical Engineering, Indian Institute of Technology Bombay, India, [3]Department of Energy Science and Engineering, Indian Institute of Technology Bombay, India

17:40-17:55 7WeO.8.5

Quality Assurance Procedure and Calibration Results for Standard IV Curve Measurement

M. Seapan, D. Chenvidhya, C. limsakul, Y. Sangpongsanont and K. Kirtikara

CES Solar Cells Testing Center (CSSC), Pilot Plant Development and Training Institute, King Mongkut´s University of Technology Thonburi, Thailand

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Wednesday, November 26
10:15 - 11:30 Room B-2 J3 (Area 7 & 8)

J3WeO.9 Energy Rating

Chairpersons:
Yoshihiro Hishikawa (AIST, Japan)
Michael Koehl (Fraunhofer ISE, Germany)

10:15-10:30 J3WeO.9.1

Influence of Solar Spectrum on the Energy Production of Various Photovoltaic Technologies

T. Ishii[1,2], A. Masuda[2] and Y. Hishikawa[2]

[1]Central Research Institute of Electric Power Industry (CRIEPI), Japan, [2]National Institute of Advanced Industrial Science and Technology (AIST), Japan

10:30-10:45 J3WeO.9.2

Uncertainty in Energy Yield Estimation Based on c-Si Module Round-Robin Results

B. Mihaylov[1], J. W. Bowers[1], T. R. Betts[1], R. Gottschalg[1], T. Krametz[2], R. Leidl[2], K. A. Berger[2], S. Zamini[2], N. Dekker[3], G. Graditi[4], F. Roca[4], M. Pellegrino[4], G. Flaminio[4], P. M. Pugliatti[5], A. Di Stefano[5], F. Aleo[5], G. Gigliucci[5], W. Ferrara[5], G. Razongles[6], J. Merten[6], A. Pozza[7], A. A. Santamaría Lancia[7], S. Hoffmann[8], M. Koehl[8], A. Gerber[9], J. Noll[9], F. Paletta[10], G. Friesen[11] and S. Dittmann[11]

[1]CREST, Loughborough University, UK, [2]AIT GmbH, Austrian Institute of Technology, AT, [3]ECN, Petten, NL, [4]ENEA, IT, [5]ENEL Engineering and Research SpA, IT, [6]INES, National solar energy institute, FR, [7]JRC-ESTI Renewable Energy unit, European Solar Test Installation, IT, [8]Fraunhofer ISE, DE, [9]Forschungszentrum Juelich GmbH, DE, [10]RSE IT, [11]SUPSI, CH

10:45-11:00 J3WeO.9.3

Worldwide Energy Yield Sensitivity vs. PV Technology Coefficients Derived from the TEL/SRCL Loss Factors Model

Steve Ransome[1] and Juergen Sutterlueti[2]

[1]SRCL, London, UK, [2]TEL Solar, Switzerland

11:00-11:15 J3WeO.9.4

Photovoltaic System Model Calibration Using Monitored System Data

Clifford W. Hansen[1], Katherine A. Klise[1], Joshua S.

Stein[1)], Yuzuru Ueda[2)] and Keiichiro Hakuta[3)]

[1)]Sandia National Laboratories, United States, [2)]Tokyo Institute of Technology, Japan, [3)]NTT Facilities, Inc., Japan

11:15-11:30 J3WeO.9.5

Monitoring and Meteorological Analysis of PV Performance

E. Takeuchi, K. Shibayama, H. Kamoi and T. Hasegawa

EKO Instruments Co., LTD., Japan

Wednesday, November 26
13:00 - 14:35 Room B-2 J3 (Area 7 & 8)

J3WeO.10 PV Module Qualification Test & PID

Chairpersons:
Takuya Doi (AIST, Japan)
Manit Seapan (King Mongkut's University of Technology Thonburi (KMUTT), Thailand)

13:00-13:25 J3WeO.10.1

⟨Invited⟩ Extended Tests for Commercial PV Modules and Solar Cells

Hung-Sen Wu, Yu-Hsien Lee and Min-An Tsai

Photovoltaic Metrology laboratory, Center for Measurement Standards, Industrial Technology Research Institute, Taiwan

13:25-13:50 J3WeO.10.2

⟨Invited⟩ Testing Procedures for High Reliability of Photovoltaic Modules

K. Masuda[1)], H. Kato[1)], Y. Uchida[1)], T. Obayashi[1)], E. Yamada[1)], S. Kawai[2)], Y. Fukumoto[2)], F. Tamai[2)], T. Doi[3)], A. Masuda[3)] and M. Kondo[3)]

[1)]Japan Electrical Safety & Environment Technology Laboratories, Japan, [2)]Industrial Technology Center of Saga, Japan, [3)]National Institute of Advanced Industrial

Science and Technology, Japan

13:50-14:05 J3WeO.10.3

PV Module Soldering Reliability Investigation from Field and Experiment Result

Maoyi Chang, C. H. Hsueh, Chienyu Chen, Eva Yen, Maoyi Chang, Richard Lai, Changru Shiu, Haomin Chen, Polly YU, Kyle Wang and Kerry Ho

AU Optronics Corporation, Taiwan

14:05-14:20 J3WeO.10.4

Acceleration of Potential-Induced Degradation (PID) by Salt-Mist Preconditioning in c-Si Photovoltaic Modules

Soh Suzuki[1)], Naoki Nishiyama[2)], Seiji Yoshino[3)], Takumi Ujiro[2)], Shin Watanabe[3)], Takuya Doi[4)], Atsushi Masuda[4)] and Tadanori Tanahashi[1)]

[1)]ESPEC CORP., Japan, [2)]JFE Techno-Research Corp., Japan, [3)]NPC Inc., Japan, [4)]National Institute of Advanced Industrial Science and Technology (AIST), Japan

14:20-14:35 J3WeO.10.5

Potential Induced Degradation (PID) of P-type Crystalline Solar Cells and Modules

J. Bagdahn[1,2)], O. Breitenstein[3)], A. Graff[4)], Ch. Hagendorf[1)], A. Hänel[3)], D. Lausch[1,2)] and V. Naumann[1)]

[1)]Fraunhofer Center for Silicon Photovoltaics, Germany, [2)]Anhalt University of Applied Science, Germany, [3)]Max-Planck-Institute for Microstructural Physics, Germany, [4)]Fraunhofer Institute for Mechanics of Materials, Germany

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Wednesday, November 26
14:45 - 16:10 Room B-2 Area 8

8WeO.11 Forecast of Power Generation

Chairpersons:

Joao G.S. Fonseca Jr. (AIST, Japan)
Takashi Oozeki (AIST, Japan)

14:45-15:10 8WeO.11.1

⟨Invited⟩ Progress of PV Forecast Technology in Japan

K. Ogimoto[1)], Y. Miwa[2)], K. Takitani[3)], A. Usami[4)], T. Kaishima[5)], T. Deguchi[6)], M. Marta[7)], M. Tsurugai[8)], T. Oozeki[9)], T. Kobayashi[10)] and Y. Yamada[11)]

[1)]The University of Tokyo, Japan, [2)]Chubu Electric Power Co., Japan, [3)]Japan Weather Association, Japan, [4)]Central Research Institute of Electric Power Industry, Japan, [5)]ITOCHU Techno-Solutions, Japan, [6)]Solar Frontier, Japan, [7)]Mitsubishi Electric Co., Japan, [8)]Hitachi, Ltd., Japan, [9)]National Institute of Advanced Industrial Science and Technology, Japan, [10)]Gifu University, Japan, [11)]Meteorological Research Institute, Japan

15:10-15:25 8WeO.11.2

A Meteorological Sensing Network for Improved Short-term Solar Irradiance Forecasting for Photovoltaic Applications in Singapore

A. M. Nobre[1,2)], D. Yang[1)], C. A. Severiano Jr[3)], H. Du[1)], M. Kubis[1)], F. R. Martins[4)], R. Rüther[2)] and T. Reindl[1)]

[1)]Solar Energy Research Institute of Singapore (SERIS), National University of Singapore (NUS), Singapore, [2)]Universidade Federal de Santa Catarina (UFSC), Brazil, [3)]Universidade Federal de Minas Gerais (UFMG), Brazil, [4)]Universidade Federal de São Paulo (UNIFESP), Brazil

15:25-15:40 8WeO.11.3

Comparison of Forecasts of Global Horizontal Irradiance Obtained from Numerical Weather Prediction Models with Different Horizontal Resolutions

H. Ohtake[1)], J. G. S. Fonseca Jr[1)], T. Takashima[1)], T. Oozeki[1)] and Y. Yamada[2)]

[1)]National Institute of Advanced Industrial Science and Technology, Japan, [2]Meteorological Research Institute, Japan Meteorological Agency, Japan

15:40-15:55 8WeO.11.4

Development of Solar Radiation Estimation and Forecasting Method for Solar Power Generation

N. Yoshida, K. Takitani, N. Maeyama and R. Kodama

Japan Weather Association, Japan

15:55-16:10 8WeO.11.5

Demonstration and Validation of An Energy Yield Prediction Model Suitable for Non-steady State Non-uniform Conditions

D. Anagnostos[1], H. Goverde[2,3], B. Herteleer[2,3], F. Catthoor[2], D. Soudris[1], J. Driesen[3] and J. Poortmans[2,3]

[1]Department of computer science, National Technical University of Athens, Greece, [2]IMEC vzw, Belgium, [3] ESAT/ELECTA, KU Leuven, Belgium

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Wednesday, November 26
16:30 - 17:45 Room B-2 Area 8

8WeO.12 Grid Integration

Chairpersons:
Hiroyuki Hatta (Central Research Institute of Electric Power Industry, Japan)
Robert Hoeller (University of Applied Sciences Upper Austria, Austria)

16:30-16:45 8WeO.12.1

Comparison among Various Pumped Storage Systems for Large Amount of PV

N. Shabrina[1], S. Wakao[1] and O. Nagura[2]

[1]Waseda University, Japan, [2]Hitachi Mitsubishi Hydro Corporation, Japan

16:45-17:00 **8WeO.12.2**

Estimation of Power Output of Photovoltaic Systems in the Distribution Network

P. Attaviriyanupap, T. Hirata, Y. Kojima and M. Marmiroli

Mitsubishi Electric Corporation., Japan

17:00-17:15 **8WeO.12.3**

Pricing Method of Reactive Power for Distribution System with a Large Number of Pv Systems -Consideration of the Area Difference in Profit-

S. Ishida, A. Takahashi, J. Imai and S. Funabiki

Okayama University, Japan

17:15-17:30 **8WeO.12.4**

Utilization Method of Surplus Power of Photovoltaic Generation System by Using Heat Pump Water Heater and Battery Energy Storage System. - Improvement for Re-planning and Real Time Control of Heat Pump Water Heater and Electric Vehicle -

Eitaro Omine, Masahiro Asari and Hiromu Kobayashi

Central Research Institute of Electric Power Industry, Japan

17:30-17:45 **8WeO.12.5**

Transformerless Inverters - Challenges and Experience with High Efficient Topologies

Ch. Gehrke[1)], A. Gerdemann[1)], J. Laschinski[1)], M. Kawakami[2)] and M. Armstrong[3)]

[1)]SMA Solar Technology AG, Germany, [2)]SMA Japan K.K., Japan, [3)]SMA America LLC, U.S.A

Wednesday, November 26
10:15 - 11:25 Room E **Area 2**

2WeO.13 Light Management I

Chairpersons:
Bjoern Niesen (Photovoltaics and thin film electronics laboratory (PV-Lab) / Ecole polytechnique federale de Lausanne (EPFL), Switzerland)
Hitoshi Sai (AIST, Japan)

10:15-10:40 2WeO.13.1

⟨Invited⟩ Light Trapping and Modeling of Thin-Film Silicon Solar Cells

M. Zeman, A. Ingenito, F.T. Si, R. Santbergen, H. Tan, O. Isabella, A.H.M. Smets

Delft University of Technology, The Netherlands

10:40-10:55 2WeO.13.2

Optimization of Nano and Macro Scale Textures for High-performance Tandem Micromorph Solar Cells

J. Krc[1], E. Moulin[2], M. Kovacic[1], M. Sever[1], A. Campa[1], B. Lipovsek[1], M. Steltenpool[3], A. J. M. van Erven[3], F-J Haug[2], C. Ballif[2] and M. Topic[1]

[1]University of Ljubljana, Faculty of Electrical Engineering, Slovenia, [2]Ecole Polytechnique Fédéale de Lausanne (EPFL), Institute of Microengineering (IMT), Photovoltaics and Thin-Film Electronics Laboratory, Switzerland, [3]OM&T B.V., High Tech Campus, The Netherlands

10:55-11:10 2WeO.13.3

Critical Review on Plasmonic Light Trapping for Thin-film Solar Cells

R. Santbergen, H. Tan, M. Zeman and A. H. M. Smets

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

11:10-11:25 2WeO.13.4

Plasmon-enhanced Light-trapping in Microcrystalline Silicon Solar Cells

R. S. A. Sesuraj[1], D. M. Bagnall[1,2], H. Sai[3] and M. Kondo[3]

[1]Nano Research Group, University of Southampton, United Kingdom, [2]School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia, [3]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan

Wednesday, November 26
13:00 - 14:25 Room E **Area 2**

2WeO.14 Light Management II

Chairpersons:
Hiroyuki Fujiwara (Gifu University, Japan)
Arno Hendrikus Marie Smets (Delft University of Technology, The Netherlands)

13:00-13:25 2WeO.14.1

〈Invited〉 High-efficiency Thin-film Silicon Solar Cells Using Honeycomb Textured Substrates

H. Sai[1], K. Maejima[2], T. Matsui[1], T. Koida[1], M. Kondo[1], S. Nakao[2], Y. Takeuchi[2], H. Katayama[3] and I. Yoshida[4]

[1]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2]Mitsubishi Heavy Industries Ltd. (MHI), Japan, [3]Panasonic Corporation, Japan, [4]Photovoltaic Power Generation Technology Research Association (PVTEC), Japan

13:25-13:40 2WeO.14.2

Micro-textured Glass Combining Nano-textures and Highly Transparent Conductive Oxides for High-efficiency Multijunction Thin-film Silicon Solar Cells

H. Tan[1], F. -J. Haug[2], F. T. Si[1], C. Ballif[2], M. Zeman[1] and A. H. M. Smets[1]

[1]Photovoltaic Materials and Devices Laboratory, Delft University of Technology, The Netherlands, [2]Photovoltaics and Thin Film Electronics Laboratory,

EPFL, Switzerland

13:40-13:55 2WeO.14.3

Efficient Amorphous Silicon Solar Cells on Imprinted SiO_x Periodic Arrays of 3D Microstructure

C. Niikura[1,3] and M. Konagai[2,3]

[1]Photovoltaic Materials Unit, National Institute for Materials Sciences, Japan, [2]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [3]MEXT/FUTURE-PV Innovation Research, JST, Japan

13:55-14:10 2WeO.14.4

Novel Textured TCO Substrates and Their Applications to the Solar Cells

P. Sichanugrist[1], Y. Abe[1], M. Konagai[1,2], H. Konishi[3], Y. Tsuda[3], T. Shinagawa[3], H. Tokioka[3] and H. Fuchigami[3]

[1]Department of Physical Electronics, [2]Photovoltaics Research Center (PVREC), Tokyo Institute of Technology, Japan, [3]Advanced Technology R&D Center, Mitsubishi Electric Corporation, Japan

14:10-14:25 2WeO.14.5

Amorphous SiO_x:H as Antireflection Layer for Glass/ZnO Interface of Thin Film A-Si:H Solar Cell

Amartya Chowdhury[1], Porponth Sichanugrist[1] and Makoto Konagai[1, 2]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]Photovoltaic Research Center (PVREC), Tokyo Institute of Technology, Japan

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Wednesday, November 26
14:45 - 16:10 Room E Area 3

3WeO.15 CIGS : Module

Chairpersons:
Katsumi Kushiya (Solar Frontier, Japan)
Michael Powalla (Center for Solar Energy and Hydrogen

Research, Baden-Wuerttemberg, Germany)

14:45-15:10 3WeO.15.1

⟨Invited⟩ Thin-Film Solar Cells and Modules based on CIGS with High Efficiency and Manufacturability

M. Powalla

Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW), Germany

15:10-15:25 3WeO.15.2

Reliability of Laser Patterned CIGSe Solar Cells

M. Schüle[1)], C. Schultz[1)], K. Stelmaszczyk[2)], M. Weizman[1)], C. Wolf[2)], C. A. Kaufmann[2)], B. Rau[2)], R. Schlatmann[1,2)], V. Quaschning[1)], B. Stegemann[1)] and F. Fink[1)]

[1)]PVcomB / HTW Berlin - University of Applied Sciences, Germany, [2)]PVcomB / Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

15:25-15:40 3WeO.15.3

Sequential Processing of CIGSSe: Sulfurization After Selenization at Atmospheric Pressure Using Elemental Chalcogen Sources

C. Wolf[1)], E. Waack[1)], S. S. Schmidt[1)], H. Rodriguez-Alvarez[1)], N. Papathanasiou[1)], K. Mack2 F. Friedrich[2)], H-W. Schock[2)], C. A. Kaufmann[1)] and R. Schlatmann[1)]

[1)]PVcomB/Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany, [2)]PVcomB/Technical University Berlin, Germany

15:40-15:55 3WeO.15.4

Innovative Front End Processing for Next Generation CIS Module Production

V. Probst[1)], A. Jasenek[1)], C. Sandfort[1)], A. Letsch[2)], I. Kötschau[1)], T. Hahn[1)], J. Feichtinger[2)] and H. Eschrich[1)]

[1)]Bosch Solar CISTech GmbH, Germany, [2)]Robert Bosch GmbH, Corporate Research, Germany

15:55-16:10 3WeO.15.5

Potential-Induced Degradation of $Cu(In,Ga)Se_2$ Photovoltaic Modules

Seira Yamaguchi[1)], Kohjiro Hara[2)], Hironori Komaki[2)], Yukiko Shimizu-Kamikawa[2)], Hajime Shibata[2)], Shigeru Niki[2)], Yuji Kawakami[3)] and Atsushi Masuda[2)]

[1)]School of Materials Science, Japan Advanced Institute of Science and Technology (JAIST), Japan, [2)]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan, [3)]Department of Materials Science and Engineering, Kurume National College of Technology (Kurume-NCT), Japan

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Wednesday, November 26
16:30 - 17:55 Room E Area 3

3WeO.16 CZTS: Characterization

Chairpersons:
Takayuki Negami (Panasonic Corporation, Japan)
Ayodhya N. Tiwari (EMPA, Switzerland)

16:30-16:55 3WeO.16.1

⟨Invited⟩ Pioneering Achievement of Earth-abundant CZTS Thin Film Solar Cells

H. Katagiri[1,2)]

[1)]Nagaoka National College of Technology, Japan, [2)]JST-CREST,Japan

16:55-17:10 3WeO.16.2

In-situ Characterization of Band Alignment at CdS/CZTS Interface; Impact of Post-annealing

K. Chochi[1)], S. Yoshimoto[1)], T. Fukuyama[1)], M. Mitsunaga[1)], K. Obara[1)], T. Okuda[1)], T. Fukano[2)], S. Tajima[2)], K. Higuchi[2)] and N. Terada[1)]

[1)]Kagoshima Univ., Japan, [2)]Toyota Central R&D Labs., Inc., Japan

17:10-17:25 3WeO.16.3

Minority-carrier Lifetime in $Cu_2ZnSn(S, Se)_4$ Thin Films with Different Cu/Sn Ratio

Mohammad Abdul Halim[1)], Muhammad Monirul Islam[1)], Xianjia Luo[1)], Chong Xu[1)], Takeaki Sakurai[1)], Noriyuki Sakai[2)], Takuya Kato[2)], Hiroki Sugimoto[2)], Hitoshi Tampo[3)], Hajime Shibata[3)], Shigeru Niki[3)] and Katsuhiro Akimoto[1)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]Energy Solution Business Center, Showa Shell Sekiyu K.K., Japan, [3)]National Institute of Advanced Industrial Science and Technology (AIST), Japan

17:25-17:40 3WeO.16.4

Origin and Suppression of the Void Formation in CZTS Solar Cells

X. J. Hao and W. Li

School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

17:40-17:55 3WeO.16.5

The Observation of Intrinsic Defects in $Cu_2ZnSnSe_4$ Thin Film by Photoluminescence

Dan-Hua Hsieh[1)], Shou-Yi Kuo[2)], Jui-Fu Yang[2,3)], Fang-I Lai[3)] and Hao-Chung Kuo[1)]

[1)]Department of Photonic & Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan, [2)]Department of Electronic Engineering, Chang Gung University, Taiwan, [3)]Department of Photonic Engineering, Yuan-Ze University, Taiwan

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Wednesday, November 26
13:00 - 14:15 Room D Area 4

4WeO.17 c-Si PV: Electrode

Chairperson:
Tetsu Takahashi (NAMICS Corporation, Japan)

13:00-13:15 4WeO.17.1

Next Generation Printing Technologies for Fine-Line Metallization of Si Solar Cells

F. Clement, M. Pospischil, A. Lorenz, M. Linse, D. Erath, M. Kuchler, M. Klawitter, A. Spribille, R. Hoenig, R. Efinger, T. Fellmeth, B. Thaidigsmann and D. Biro

Fraunhofer Institute for Solar Energy Systems ISE, Germany

13:15-13:30 4WeO.17.2

Developing a High Throughput Rotational Metallization Technology for Silicon Solar Cells based on Flexographic Printing

A. Lorenz, A. Kalio, T. Barnes Hofmeister, S. Kroh, A. Kraft, J. Bartsch, F. Clement and D. Biro

Fraunhofer Institute for Solar Energy Systems ISE, Germany

13:30-13:45 4WeO.17.3

All-Screen-Printed Dopant Ink Interdigitated Back Contact Solar Cell

Daniel Inns, Dmitry Poplavskyy, Giuseppe Scardera, Shannon Dugan, Gonghou Wang, Elena Rogojina and Francesco Lemmi

DuPont Silicon Valley Technology Center, USA

13:45-14:00 4WeO.17.4

Advanced Metallization and Interconnection for Silicon Heterojunction Cells and Modules

M. Despeisse[1)], A. Faes[1)], A. Lachowicz[1)], N. Badel[1)], C. Allebé [1)], A. Descoeudres[1)], L. Barraud[1)], F. Debrot[1)], J. Champliaud[1)], J. Levrat[1)], P. J. Alet[1)], F. Galliano[1)], L. Perret-Aebi[1)], T. Söderström[2)], Y. Yao[2)] and C. Ballif[1)]

[1)]CSEM SA, PV-center, Switzerland, [2)]Meyer Burger AG, Switzerland

14:00-14:15 4WeO.17.5

Reliability of a Printed Cu Busbar Electrode on a Conventional Silicon Solar Cell

H. Tokuhisa, S. Ise, S. Morita, S. Tsukamoto, M. Tomita and M. Yoshida

National Institute of Advanced Industrial Science and Technology, Japan

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Wednesday, November 26
14:45 - 15:45 Room D Area 4

4WeO.18 c-Si PV: Passivation

Chairpersons:
Jan Haschke (Helmholtz-Zentrum Berlin GmbH, Germany)
Shinichi Satoh (University of Hyogo, Japan)

14:45-15:00 4WeO.18.1

Surface Passivation of Crystalline Silicon by Sputtered AlOx/AlNx Stacks toward Low-Cost and High-Efficiency Silicon Solar Cells

H. Lee[1,4), K. Ueda[2), Y. Enomoto[2), K. Arafune[2),4), H. Yoshida[2,4), S. Satoh[2,4), T. Chikyow[3) and A. Ogura[1,4)

[1)Meiji University, Japan, [2)University of Hyogo, Japan, [3)National Institute for Materials Science, Japan, [4)Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency(JST), Japan

15:00-15:15 4WeO.18.2

Activation of Cat-Doped Phosphorus Atoms by Flash Lamp Annealing

Keisuke Ohdaira[1,2), Trinh Cham Thi[1,2), Shogo Tsuzaki[1) and Hideki Matsumura[1,2)

[1)Japan Advanced Institute of Science and Technology (JAIST), Japan, [2)CREST, Japan Science and Technology Agency (JST), Japan

15:15-15:30 4WeO.18.3

PECVD Boron-doped Oxides as Diffusion Sources - Investigations of Diffusion Processes, and Integration in Silicon Solar Cell Concepts

N. Wehmeier[1)], B. Lim[1)], A. Merkle[1)], A. Tempez[2)], S. Legendre[2)], H. Wagner[3)] and P. P. Altermatt[3)]

[1)]Institute of Solar Energy Research Hameln (ISFH), Germany, [2)]Horiba Jobin Yvon SAS, Avenue de la Vauve, France, [3)]Department of Solar Energy Research, Univ. Hannover, Germany

15:30-15:45 4WeO.18.4

Plasma Enhanced Chemical Vapor Deposition of High PID-Resistance Silicon Nitride Film for Crystalline Silicon Solar Cells

K. Mishina[1)], A. Ogishi[1)], K. Ueno[2)], N. Ikeno[3)], T. Saruwatari[1)], K. Hara[4)], A. Ogura[3)], T. Yamazaki[2)], T. Doi[4)] and A. Masuda[4)]

[1)]Shimadzu Corporation, Semiconductor Equipment Division, Equipment Department, Japan, [2)]Choshu Industry Co., Ltd., Japan, [3)]Meiji University, Japan, [4)] National Institute of Advanced Industrial Science and Technology (AIST), Japan

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Wednesday, November 26
16:30 - 17:55 Room D Area 4

4WeO.19 c-Si PV: Cell 2

Chairpersons:
Kyotaro Nakamura (Meiji University, Japan)
Yang Yang (Trina Solar, China)

16:30-16:55 4WeO.19.1

⟨Invited⟩ Development of 25.6% Record Efficiency Silicon Heterojunction Solar Cell

N. Matsubara, K. Masuko, K. Fujishima, M. Kai, T. Tsunomura, T. Yamanishi, T. Takahama, M. Taguchi, E.

Maruyama and S. Okamoto

Solar Business Unit, Eco Solutions Company, Panasonic Corporation, Japan

16:55-17:10 4WeO.19.2

21% Efficiency of n-Type Monocrystalline Silicon Passivated Emitter and Rear Totally Diffused Photovoltaic Cell

S. Nishimura[1)], Y. Yuda[1)], D. Niinobe[1)], T. Watahiki[1)], T. Sato[1)], Y. Sakai[1)], H. Fuchigami[1)] and S. Kano[2)]

[1)]Advanced Technology R & D Center, Mitsubishi Electric Corporation, Japan, [2)]Manufacturing Engineering Center, Mitsubishi Electric Corporation, Japan

17:10-17:25 4WeO.19.3

High Volume Manufacturing of High Efficiency, N-type Cells and Modules for Space-constrained Applications

D. De Ceuster, D. Crafts, O. Schultz-Wittmann and A. Turner

First Solar, USA

17:25-17:40 4WeO.19.4

Large Area n-type c-Si Solar Cells Featuring Rear Emitter and Efficiency Beyond 21%

E. Cornagliotti[1)], A. Sharma[1,2)], L. Tous[1)], L. Black[3)], A. Uruena[1)], M. Aleman[1)], F. Duerinckx[1)], R. Russell[1)], P. Choulat[1)], J. John[1)], B. Dielissen[4)], R. Görtzen[4)] and J. Szlufcik[1)]

[1)]imec, Belgium, [2)]Katholieke Universiteit Leuven, Belgium, [3)]Centre for Sustainable Energy Systems, Australian National University, Australia, [4)]SolayTec, The Netherlands

17:40-17:55 4WeO.19.5

High-Efficiency Approach for NiCu-plated n-type Silicon Solar Cells

Bernd Steinhauser, J. Benick, M. Kamp, J. Bartsch and

M. Hermle

Fraunhofer ISE, Germany

Plenary
Thursday, November 27
8:30 - 10:00 Room A

Chairpersons:
Christiana Honsberg (Arizona State University, USA)
Arnulf Jäger-Waldau (European Commission, DG JRC, Italy)

8:30-9:00 2ThPl.1 Area 2

[Plenary] Next Generation Thin Film Silicon Solar Cells

Makoto Konagai

Tokyo Institute of Technology

9:00-9:30 7ThPl.2 Area 7

[Plenary] Moving to a Higher Level for PV Reliability through Comprehensive Standards Based on Solid Science

Sarah Kurtz

National Renewable Energy Laboratory

9:30-10:00 6ThPl.3 Area 6

[Plenary] Future Prospects of Organic and Hybrid Solar Cells for Next Generation Photovoltaics

Hiroshi Segawa

RCAST, The University of Tokyo, Japan

Thursday, November 27
10:15 - 11:40 Room A Area 7

7ThO.1 PV Performance Characterzation

Chairpersons:
Ulrike Jahn (TUV Rheinland, Germany)
Kengo Morita (TUV Rheinland Japan Ltd., Japan)

10:15-10:40 7ThO.1.1

⟨Invited⟩ Power Rating of CPV Modules

Gerald Siefer[1)], Matthew Muller[2)], Christoph Rapp[1)], Marc Steiner[1)] and Andreas W. Bett[1)]

[1)]Fraunhofer Institute for Solar Energy Systems ISE, Germany, [2)]National Renewable Energy Laboratory, USA

10:40-10:55 7ThO.1.2

Large-Area LED/Halogen Hybrid Solar Simulator and Silicon Heterojunction Solar Modules Indoor to Outdoor Performance Monitoring

M. Despeisse[1,2)], A. Lo[2)], M. Bonnet Eymard[1,2)], Y. Riesen[2)], J. Levrat[1)], P. J. Alet[1)] and C. Ballif[2)]

[1)]CSEM SA, PV-center, Switzerland, [2)]Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Photovoltaics and thin film electronics laboratory (PV-Lab), Switzerland

10:55-11:10 7ThO.1.3

IEC 60904-9 Spectral Classification and Impact on Industrial Rating of c-Si Devices

C. Monokroussos[1)], D. Etienne[1)], K. Morita[2)], C. Dreier[1)] and U. Therhaag[1)]

[1)]TÜV Rheinland (Shanghai) Co., Ltd., China, [2)]TÜV Rheinland Japan Ltd., Japan

11:10-11:25 7ThO.1.4

Photovoltaic Characterization for Various Light Conditions

Y. Nishikawa[1)], K. Imai[1)], K. Miyao[1)], S. Uchida[2)], S. Magaino[3)], K. Takagi[3)], S. Saitoh[3)] and D. Aoki[3)]

[1)]Konica Minolta, Inc., Japan, [2)]The University of Tokyo, Japan, [3)]Kanagawa Academy of Science and Technology, Japan

11:25-11:40 7ThO.1.5

A New Procedure to Measure Large Area CPV Modules

C. Rapp, M. Steiner, G. Siefer and A. W. Bett

Fraunhofer Institute for Solar Energy Systems ISE, Germany

Thursday, November 27
13:00 - 14:25 Room A Area 7

7ThO.2 PVQAT 1

Chairpersons:
Sarah Kurtz (NREL, USA)
Tadanori Tanahashi (ESPEC Corporation, Japan)

13:00-13:25 7ThO.2.1

⟨Invited⟩ Characterization Techniques for Studying PV Module's Reliability, Durability and Quality

Jaeckel Bengt

UL

13:25-13:40 7ThO.2.2

Rapid Thermal Cycle Test Consisting of Repeated Stress Based on IEC Qualification Test

M. Fujimori[1)], T. Kohno1 and K. Gokita[2)], P. Sochor[3)], K. Morita[3)]

[1)]Central Research Laboratory, Hitachi Ltd., Japan, [2)]Hitachi Works, Hitachi Ltd., Japan, [3)]TÜV Rheinland Japan Ltd., Japan

13:40-13:55 7ThO.2.3

Ultra-violet Radiation Testing of Various Back-sheets for PV-modules

Michael Koehl and Amal Ballion

Fraunhofer-Institut für Solare Energiesysteme (ISE), Germany

13:55-14:10 7ThO.2.4

UV Exposure Test and UV-DH-TC Sequential Test for 4 Cells Mini Modules

T. Doi[1)], H. Morita[2)], T. Amioka[2)], T. Shioda[3)], S. Suzuki[4)] and A. Masuda[1)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST)), Japan, [2)]Toray Industries, Inc., Japan, [3)]Mitsui Chemicals, Inc., Japan, [4)]Espec Corp., Japan

14:10-14:25 7ThO.2.5

Effect of Shading on the Reliability of PV Modules

N. G. Dhere, E. Schneller and N. S. Shiradkar

Florida Solar Energy Center, University of Central Florida, USA

Thursday, November 27
14:45 - 16:10 Room A

Area 7

7ThO.3 PVQAT 2

Chairpersons:
Neelkanth G Dhere (University of Central Florida, USA)
Masaaki Yamamichi (AIST, Japan)

14:45-15:10 7ThO.3.1

[Invited] A New Era of Quality Assurance for Solar Investability

Burkhard Holder

VDE Testing & Certification Institute, Germany

15:10-15:25 7ThO.3.2

Japanese Efforts in International PV Module Quality Assurance Task Force

M. Yamamichi[1)], Y. Eguchi[2)], T. Tanahashi[3)], T. Doi[1)], Y. Uchida[4)], T. Shioda[2)], M. Takani[5)], M. Kondo[1)]

[1)]National Institute of Advanced Industrial Science and

Technology (AIST), Tsukuba, Japan, [2]Mitsui Chemicals, Inc., Japan, [3]ESPEC Corp., Japan, [4]Japan Electrical Safety & Environment Technology Laboratories (JET), Japan, [5]Solar Frontier K.K., Japan

15:25-15:40 7ThO.3.3

Investigation of Thermo-mechanical Stresses on PV Modules: a Collaborative Research within the European Photovoltaic Infrastructure Research Project SOPHIA

K. A. Berger[1)], B. Kubicek[1)], G. Ujvari[1)], R. Leidl[1)], T. Krametz[1)], S. Zamini[1)], S. Hoffmann[2)], M. Koehl[2)], A. Pozza[3)], T. Sample[3)], D. Bertani[4)], F. Paletta[4)], I. J. Bennett[5)], E. Gerritsen[6)], P. Malbranche[6)], J. Zhu[7)], R. Gottschalg[7)], P. Pugliatti[8)], A. Di Stefano[8)], F. Aleo[8)], F. Roca[9)], G. Graditi[9)], M. Pellegrino[9)], O. Zubillaga[10)] and P. Cano[10)]

[1)]Austrian Institute of Technology, Energy Department (AIT), Austria, [2)]Fraunhofer ISE, Germany, [3)]JRC, Italy, [4)]RSE, Italy, [5)]ECN, Netherlands, [6)]CEA, France, [7)] CREST, UK, [8)]ENEL, Italy, [9)]ENEA, Italy, [10)]Tecnalia, Spain

15:40-15:55 7ThO.3.4

Correlation between Thermal Cycling Test and Outdoor Exposure for Major Degradation Modes of PV modules

K. Morita[1)], P. Sochor[1)], Y. Tsuno[1)], Y. Yasuda[1)], S. Kera[1)], T. Kohno[2)] and M. Fujimori[2)]

[1)]TÜV Rheinland Japan Ltd., Japan, [2)]Hitachi Ltd., Japan

15:55-16:10 7ThO.3.5

Effects of Light Exposure on Photovoltaic Modules in the Combined Acceleration Test of Light Irradiation and Damp Heat

T. Ngo[1)], Y. Heta[1)], T. Doi[2)] and A. Masuda[2)]

[1)]Photovoltaic Power Generation Technology Research Association (PVTEC), Japan, [2)]National Institute of

Advanced Industrial Science and Technology (AIST), Japan

Thursday, November 27
16:15-17:00 Room A

Closing Ceremony

Chairperson:
Akira Yamada (Tokyo Institute of Technology, Japan)

16:15-16:30

Overall Conference Summary

Michio Kondo (FREA, AIST, Japan)

16:30-16:45

Award Ceremony

Best Paper Award

Best Poster Award

Young Researcher Award

16:45-17:00

Greetings from the Future Conference Representatives

PVSEC-25

42nd IEEE PVSC

31st EU PVSEC

Thursday, November 27
10:15 - 11:45 Room B-1 J4

J4ThO.4 NEDO´s PV R&D Projects & High Efficiency Solar Cells

Chairpersons:
Hiroyuki Yamada (NEDO, Japan)
Masafumi Yamaguchi (Toyota Technological Institute, Japan)

10:15-10:30　J4ThO.4.1

Introductory

H. Yamada

NEDO, Japan

10:30-10:45　J4ThO.4.2

⟨Invited⟩ R&D on Ultimate Wafer-based Si Solar Cells under NEDO in Japan

K. Nakamura[1)], T. Sekiguchi[2)], A. Tanizaki[3)], K. Kakimoto[4)], A. Ogura[1)] and Y. Ohshita[4)]

[1)]Meiji University, Japan, [2)]National Institute for Materials Science, Japan, [3)]Komatsu NTC Ltd., Japan, [4)]Kyushu University, Japan, [5)]Toyota Technological Institute, Japan

10:45-11:00　J4ThO.4.3

⟨Invited⟩ Thin-film Si Solar Cells

H. Sai

AIST

11:00-11:15　J4ThO.4.4

⟨Invited⟩ CIGS Solar Cells

H. Sugimoto

Solar Frontier

11:15-11:30　J4ThO.4.5

⟨Invited⟩ World-record Efficiency Si Solar Cells

Naoteru Matsubara

Panasonic Corporation

11:30-11:45　J4ThO.4.6

⟨Invited⟩ World-record Efficiency III-V Compound Multi-junction Solar Cells

T. Takamoto

13:00 - 14:30 Room B-1 Area 3

3ThO.5 CIGS 2

Chairpersons:
Volker Probst (Bosch Solar CISTech GmbH, Germany)
Takahiro Wada (Ryukoku University, Japan)

13:00-13:15 3ThO.5.1

Wide-gap Solar Cells Using a Novel ZnCuGaSe2 Absorber

T. Yamamoto[1)], T. Negami[1)], K. Matsubara[2)] and S. Niki[2)]

[1)]Panasonic Corporation, [2)]National Institute of Advanced Industrial Science and Technology (AIST), Japan

13:15-13:30 3ThO.5.2

Importance of Precursor Deposition Temperature of Cu(In,Ga)Se_2 Films Under Multi-layer Precursor Method

J. Chantana[1)], D. Hironiwa[1)], Z. Tang[1)], T. Watanabe[2)], S. Teraji[2)], K. Kawamura[2)] and T. Minemoto[1)]

[1)]Department of Electrical and Electronic Engineering, Ritsumeikan University, Japan, [2)]Environment and Energy Research Center, Nitto Denko Corporation, Japan

13:30-13:45 3ThO.5.3

Cu(In,Ga)Se_2 Solar Cells with Transparent Amorphous Oxide Semiconducting Buffer Layers

T. Koida, H. Takahashi, Y. Kamikawa-Shimizu, A. Yamada, H. Shibata and S. Niki

National Institute of Advanced Industrial Science and Technology, Japan

13:45-14:00 3ThO.5.4

Flexible CIGS Solar Cells Fabricated Using a Polyimide-coated Soda-lime Glass Substrate

A. Sadono[1)], M. Hino[3)], M. Ichikawa[3)], K. Yamamoto[3)], Y.

Kurokawa[1], M. Konagai[1,2] and A. Yamada[1,2]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]Photovoltaics Research Center (PVREC), Tokyo Institute of Technology, Japan, [3]Kaneka Corporation, Japan

14:00-14:15 3ThO.5.5

10.7 % Efficient Cu(In,Ga)(S,Se)$_2$ Thin Film Solar Cell from Selenization of Spray Pyrolysed Sulfide Precursor Film

Wilman Septina[1], Masaaki Kurihara[2], Toshiyuki Hirano[2], Yasuhiro Nakajima[2], Yoshihito Kawasaki[1], Takashi Harada[1], Shigeru Ikeda[1] and Michio Matsumura[1]

[1]Research Center for Solar Energy Chemistry, Osaka University, Japan, [2]Renewable Energy Material Development Group, Energy & Environment R&D Center, Corporate Research & Development, Asahi Kasei Corporation, Japan

14:15-14:30 3ThO.5.6

Effect of Selenium Partial Pressure during Annealing on CuInSe$_2$ Thin Films Prepared by Electrodeposition

Y. I. Park[1,3], D. H. Kim[1,2] and H. Kim[3]

[1]Green School, Korea University, Korea, [2]Department of Material Engineering, Korea University, Korea, [3] National Agenda Research Division, Korea Institute of Science & Technology, Korea

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Thursday, November 27
14:45 - 15:30 Room B-1 Area 3

3ThO.6 CdTe and Novel Materials

Chairperson:
Takashi Minemoto (Ritsumeikan University, Japan)

14:45-15:00 3ThO.6.1

Characterization of Narrow Bandgap CIGSe Solar Cells Under Concentration in Tandem Conditions

Zacharie Jehl Li Kao, Hirofumi Fukai, Isamu Matsuyama and Tokio Nakada

Tokyo University of Science, Research Institute for Science & Technology, Photovoltaic Science and Technology Research Division, Japan

15:00-15:15 3ThO.6.2

14.26% Efficiency of CdTe Solar Cells by Radio-frequency Magnetron Sputtering

H. Li, X. Liu and B. Yang

The Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Engineering, China

15:15-15:30 3ThO.6.3

Fabrication of High Efficient Cu_2ZnSnS_4 Based Thin Film Solar Cells from Electro-deposited Metallic Stacks

Feng Jiang, Shigeru Ikeda, Takashi Harada and Michio Matsumura

Research Center for Solar Energy Chemistry, Osaka University, Japan

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Thursday, November 27
13:00 - 14:35 Room B-2 J1 (Area 2 & 4)

J1ThO.7 Karfless Thin Crystalline Silicon Solar Cells

Chairpersons:
Keisuke Ohdaira (Japan Advanced Institute of Science and Technology, Japan)
K. Yamamoto (Kaneka Corporation, Japan)

13:00-13:25 J1ThO.7.1

⟨Invited⟩ i^x-module Concept: Where Thin Crystalline Si and Thin-film Crystalline Si Meet

J. Poortmans[1,2,3], I. Gordon[1], T. Bearda[1], H. Sivaramakrishnan Radhakrishnan[1], J. Govaerts[1], K. Van Nieuwenhuysen[1], Valerie Depauw[1], L. Tous[1], S. Granata[1], R. Martini[1], C. Trompoukis[1], O. El Daif[1], Y. Abdulraheem[4], A. Hajjiah[4], F. Alajmi[4], R. Mertens[1]

[1]IMEC, Belgium, [2]KUL, Departement Elektrotechniek, ESAT, Belgium, [3]University Hasselt, Belgium, [4]Kuwait University, Kuwait

13:25-13:50 J1ThO.7.2

⟨Invited⟩ Epitaxial Layer Transfer Technology and Application - Review and Outlook for PV -

Takao Yonehara

Applied Materials Inc., USA

13:50-14:05 J1ThO.7.3

Epitaxially Grown Wafer Based Silicon Heterojunction Cells

E. Kobayashi[1], N. Kusunoki[1], Y. Watabe[1], R. Hao[2] and T. S.Ravi[2]

[1]Choshu Industry Co., Ltd., Japan, [2]Crystal Solar Co., Ltd., USA

14:05-14:20 J1ThO.7.4

Kerfless Wafering by Mechanically Induced Spallation - Observation of the Process Dynamics with Digital Image Correlation

S. Kajari-Schröder[1], J. Hensen[1], R. Niepelt[1] and R. Brendel[2]

[1]Institute for Solar Energy Research Hamelin, Germany, [2]Institute for Solid State Physics, Leibniz Universität Hannover, Germany

14:20-14:35 J1ThO.7.5

Recent Progress in Back Contacted Thin-Film Crystalline Silicon Heterojunction Solar Cells on Glass

J. Haschke, D. Amkreutz, T. Hänel, L. Korte, F. Ruske and B. Rech

Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Institute for Silicon-Photovoltaics, Germany

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Thursday, November 27
14:45 - 16:05 Room B-2 Area 2

2ThO.8 Innovative Approach

Chairpersons:
Jun Lin (Tokyo Electron Limited, Japan)
Pauls Stradins (NREL, USA)

14:45-15:10 2ThO.8.1

⟨Invited⟩ Crossover of Crystalline Silicon and Thin Film Silicon Technology for Next Generation Solar Cells

Michio Kondo[1,2)]

[1)]Fukushima Renewable Energy Institute, AIST, Koriyama, Japan, [2)]Fukushima University, Fukushima Japan

15:10-15:35 2ThO.8.2

⟨Invited⟩ From a-Si:H/μc-Si:H to Liquid-phase Crystallized Silicon on Glass: Towards Production of Next-generation Thin Film Silicon PV Modules

Onno Gabriel[1)], Tim Frijnts[2)], Simon Kirner[1)], Sebastian Neubert[1)], Sonya Calnan[1)], Sven Ring[1)], Matthias Zelt[1)], Björn Rau[1)], Jens-Hendrik Zollondz[2)], Andreas Heidelberg[2)], Daniel Amkreutz[3)], Jan Haschke[3)], Stefan Gall[3)], Bernd Stannowski[1)], Bernd Rech[3)], Rutger Schlatmann[1)]

[1)]PVcomB, Helmholtz-Zentrum Berlin für Materialien

und Energie GmbH, Germany, [2)]Masdar PV GmbH, Germany, [3)]Institute for Silicon Photovoltaics, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

15:35-15:50 2ThO.8.3

Highly Crystalline Microcrystalline Silicon Solar Cells for Enhanced Near-Infrared Absorption

S. Hänni[1)], J. Persoz[1)], B. Niesen[1)], M. Boccard[1)], J.-W. Schüttauf[1)], M. Ledinsky[1)], L. Lüfgren[2)], J. Bailat[2)], F.-J. Haug[1)], F. Meillaud[1)] and C. Ballif[1,2)]

[1)]Ecole Polytechnique Fédéale de Lausanne (EPFL), Institute of Microengineering (IMT), Photovoltaics and Thin Film Electronics Laboratory (PVLab), Switzerland, [2)]CSEM SA, Photovoltaic Division (PV-Center), Switzerland

15:50-16:05 2ThO.8.4

Addressing the Key Challenges in the Successful Implementation of High Efficiency Porous Silicon-based Layer-transferred Epitaxial Solar Modules

H. Sivaramakrishnan Radhakrishnan[1)], V. Depauw[1)], R. Martini[1,2)], K. Van Nieuwenhuysen[1)], T. Bearda[1)], J. Govaerts[1)], I. Gordon[1)], J. Szlufcik[1)] and J. Poortmans[1,2,3)]

[1)]IMEC, Belgium, [2)]KU Leuven, Belgium, [3)]Universiteit Hasselt, Belgium

Thursday, November 27
10:15 - 11:30 Room E Area 6

6ThO.9 Perovskite Solar Cells 1

Chairpersons:
Andreas Hinsch (Fraunhofer ISE, Germany)
Hideo Ohkita (Kyoto University, Japan)

10:15-10:30 6ThO.9.1

Air Stable Cocktail Sn/Pb Halide Perovskite Sensitized Solar Cells for Near Infrared Photoconversion

Yuhei Ogomi[1)], Atsushi Morita[1)], Shota Tsukamoto[1)], Takahiro Saitho[1)], Naotaka Fujikawa[1)], Shen Qing[2,4)], Taro Toyoda[2,4)], Kenji Yoshino[3,4)], Shyam S. Pandey[1)], Tingli Ma[1)] and Shuzi Hayase[1,4)]

[1)]Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Japan, [2)]Graduate School of Informatics and Engineering, University of Electro-Communications, Japan, [3)]Department of Electrical and Electronic Engineering, University of Miyazaki, Japan, [4)]CREST, Japan Science and Technology Agency (JST), Japan

10:30-10:45 6ThO.9.2

Charge Transfer and Recombination at the Metal Oxide/Perovskite/Spiro-OMeTAD Interfaces: Uncovering the Mechanism behind High Efficiency Perovskite-based Solar Cells

Qing Shen[1,5)], Yuhei Ogomi[2,5)], Syota Tsukamoto[2)], Kenji Kukihara[2)], Jin Chang[1)], Takuya Oshima[1)], Naoya Osada[1,3)], Kenji Yoshino[4,5)], Kenji Katayama[3)], Taro Toyoda[1,5)] and Shuzi Hayase[2,5)]

[1)]The University of Electro-Communications, Japan, [2)]Kyushu Institute of Technology, Japan, [3)]Chuo University, Japan, [4)]Miyazaki University, Japan, [5)] CREST, Japan Science and Technology Agency (JST), Japan

10:45-11:00 6ThO.9.3

High Photoluminescence Efficiency, Ultrafast Free Charge Generation and Optically-Pumped Lasing in Solution Processed Halide Perovskite Semiconductors

Michael Price[1)], Felix Deschler[1)], Sandeep Pathak[1,2)] and Richard H Friend[1)]

[1)]Cavendish Laboratory, UK, [2)]Clarendon Laboratory,

UK

11:00-11:15 6ThO.9.4

Dynamics of Photocarriers in Organic-inorganic Hybrid Perovskite $CH_3NH_3PbI_3$ for Solar-cell Applications

Y. Yamada[1)], M. Endo[1)], A. Wakamiya[1,2)] and Y. Kanemitsu[1,3)]

[1)]Kyoto University, Japan, [2)]JST-PRESTO, Japan, [3)]JST-CREST, Japan

11:15-11:30 6ThO.9.5

Photoemission Studies of $CH_3NH_3PbI_{3-x}Cl_x$ Films by Vapor Deposition

Lili Wu[1,2)], Mehmet Baran Bas[2)], Philip Reckers[2)], Eric Mankel[2)] and Wolfram Jaegermann[2)]

[1)]College of Materials Science and Engineering, Sichuan University, China, [2)]Department of Materials and Earth Sciences, Technische Universität Darmstadt, Germany

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Thursday, November 27
13:00 - 14:30 Room E Area 6

6ThO.10 Perovskite Solar Cells 2

Chairpersons:
Tsutomu Miyasaka (Toin Univerity of Yokohama, Japan)
Lili Wu (Sichuan University, China)

13:00-13:15 6ThO.10.1

Film Morphology Control for High Efficiency Perovskite Solar Cells

L. Han[1)], Y. Wu[1)], X. Yang[1)], H. Chen[2)], J. Liu[1)], C. Qin[1)] and A. Islam[1)]

[1)]Photovoltaic Materials Unit, National Institute for Materials Science, Japan, [2)]State Key Laboratory of Metal Matrix Composites, Shanghai Jiaotong University, China

13:15-13:30 6ThO.10.2

Cloride Assisted Perovskite Solar Cells with High Efficiency

Ludmila Cojocaru[1)], Satoshi Uchida[2)], Ajay Kumar Jena[3)], Tsutomu Miyasaka[3)], Kazuteru Nonomura[1)], Takaya Kubo[1)] and Hiroshi Segawa[1)]

[1)]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan, [2)]Komaba Organization for Educational Excellence (KOMEX), The University of Tokyo, Japan, [3)]Graduate School of Engineering, Toin University of Yokohama, Japan

13:30-13:45 6ThO.10.3

Si-based Tandem Solar Cells with Organometallic Lead Halide High-band Gap Top-cells

P. Löper[1)], S. J. Moon[2)], S. Martin de Nicolas[1)], M. Ledinsky[1)], B. Niesen[1)], J. Bailat[2)], S. Nicolay[2)], J. H. Yum[2)], S. De Wolf[1)] and C. Ballif[1,2)]

[1)]Photovoltaics and Thin Film Electronics Laboratory (PVLab), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, [2)]CSEM, Switzerland

13:45-14:00 6ThO.10.4

Cation Replacement in Lead Trihalide Perovskites: Broad Bandgap Tunability for Highly Efficient Planar Heterojunction Solar Cells

Giles E. Eperon, Samuel D. Stranks, Christopher Menelaou, Michael B. Johnston, Laura M. Herz and Henry J. Snaith

Department of Physics, University of Oxford, Clarendon Laboratory, UK

14:00-14:15 6ThO.10.5

Inorganic Hole Conductor Based 12.4% Efficient Printed Photovoltaic Using MesoporousTiO_2, Lead-halide Perovskite, and CuSCN

Soichiro Tanaka[1)], Peng Qin[2)], Seigo Ito[1)], Nicolas Tetreault[2)], Kyohei Manabe[3)], Hitoshi Nishino[3)], Mohammad Khaja Nazeeruddin[2] and Michael Grätzel[2]

[1]Department of Electric Engineering and Computer Science, Graduate School of Engineering, University of Hyogo, Japan, [2]Laboratory of Photonics and Interfaces, Department of Chemistry and Chemical Engineering, Swiss Federal Institute of Technology, Switzerland, [3]Energy Technology Laboratories, Osaka Gas Co., Ltd., Japan

14:15-14:30 6ThO.10.6

Organometallic Perovskite Toward High Performing and Upscale Solar Cell

Soo-Jin Moon, Jun-Ho Yum, Larent Sansonnens, Linus Löfgren, Sylvain Nicolay, Julien Bailat and Christophe Ballif

PV-center, Switzerland

Thursday, November 27
14:45-15:45 Room E Area 6

6ThO.11 Perovskite Solar Cells 3

Chairpersons:
Hironori Arakawa (Tokyo University of Science, Japan)
Liyuan Han (National Institute for Materials Science(NIMS), Japan)

14:45-15:00 6ThO.11.1

The Chemical and Electronic Structure of Lead-iodide Perovskite and Its Interfaces

M. Bär[1,2,3], G. Sadoughi[4], D. E. Starr[1], E. Handick[1], F. Meyer[5], A. Benkert[5,6], W. Yang[7], M. Gorgoi[1], M. Blum[3], L.. Weinhardt,[3,6,8], C. Heske,[3,6,8], R. G. Wilks[1] and H. Snaith[4]

[1]Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany, [2]Institut für Physik und Chemie, Brandenburgische Technische Universität Cottbus-Senftenberg, Germany, [3]Department of Chemistry, University of Nevada, USA, [4]Department

of Physics, Clarendon Laboratory, University of Oxford, UK, [5]Experimentelle Physik 7, Universität Würzburg, Germany, [6]Institute for Photon Science and Synchrotron Radiation, Karlsruhe Institute of Technology, Germany, [7]Advanced Light Source, Lawrence Berkeley National Laboratory, USA, [8]ANKA Synchrotron Radiation Facility, Karlsruhe Institute of Technology, Germany

15:00-15:15 6ThO.11.2

Highly Stable Hole-transporting Layer for Perovskite Solar Cells Based on Functionalized Single-walled Carbon Nanotubes

Severin N. Habisreutinger, Tomas Leijtens, Giles E. Eperon, Samuel D. Stranks, Henry J. Snaith and Robin J. Nicholas

Clarendon Laboratory, Department of Physics, University of Oxford, United Kingdom

15:15-15:30 6ThO.11.3

Materials Development for Perovskite-based DSSC

K. Kawata, K. Tamaki, T. Goto and K. Kato

Merck Ltd., Japan

15:30-15:45 6ThO.11.4

Kelvin Probe Force Microscopy Study of Perovskite-Based Solar Cells

J. Yun[1)], S. Woo[1)], J. Seidel[2)], A. Ho-Baillie[1)] and M. Green[1)]

[1)]School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Australia, [2)]School of Materials Science and Engineering, University of New South Wales, Australia

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Thursday, November 27
13:00 - 14:25 Room D

Area 4

4sThO.12 Crystalline Silicon Solar Cells: Past, Present and Future 3

Chairperson:
Noritaka Usami (Nagoya University, Japan)

13:00-13:25 4sThO.12.1

⟨Invited⟩ Solar Power Generation: a Huge Contribution to the Human Beings

Hiroshi Morimoto

Sharp Corporation

3:25-13:45 4sThO.12.2

⟨Invited⟩ Crystal Growth Technologies for Si Solar Cells on the View Point of Dislocations

Kazuo Nakajima

FUTURE-PV Innovation, JST Koriyama Site, Japan

13:45-14:05 4sThO.12.3

⟨Invited⟩ Recent Progress of Multi-crystalline Silicon for Photovoltaic Industry

C. W. Lan[1)], Y. M. Yang[2)], A. Yu[2)], B. Hsu[2)], W. C. Hsu[2)], A. Yang[3)]

[1)]Department of Chemical Engineering, National Taiwan University, Taiwan, [2)]Sino-American Silicon Productions Inc., Taiwan, [3)]Solartech Energy Inc., Taiwan

14:05-14:25 4sThO.12.4

⟨Invited⟩ Activities of Korea Photovoltaic Development Organization (KPVDO, 2004~2008) and the Evolution of PV Technology and Industry in Korea

Donghwan Kim[1)], Hae-Seok Lee[1)], and Yoonmook Kang[2)]

[1)]Department of Materials Science and Engineering, Korea University, Seoul, Korea, [2)]KU-KIST Green School, Graduate School of Energy and Environment Korea University, Seoul, Korea

14:45 - 16:10 Room D Area 4

4ThO.13 c-Si PV: Crystallization, Feedstock

Chairpersons:
Koji Arafune (University of Hyogo, Japan)
Chung Wen Lan (National Taiwan University, Taiwan)

14:45-15:10 4ThO.13.1

⟨Invited⟩ Characterization of Dislocations and Oxygen Precipitates in Photovoltaic Si by Deep-Level Photoluminescence

M. Tajima[1,2], G. Kato[1,2], Y. Iwata[1], K. Komatsu[1], H. Toyota[1] and A. Ogura[2]

[1]Institute of Space and Astronautical Science / JAXA, Japan, [2]Meiji University, Japan

15:10-15:25 4ThO.13.2

Application of Three-dimensional Alexander-haasen Model to Analyzing Experimental Dislocation-density Distribution in Single-crystal Silicon

B. Gao[1], J. Karolin[2], S. Nakano[1], H. Harada[2], Y. Miyamura[2], T. Sekiguchi[2] and K. Kakimoto[1]

[1]Research Institute for Applied Mechanics, Kyushu University, Japan, [2]National Institute for Materials Science, Japan

15:25-15:40 4ThO.13.3

Characterization of Silicon Ingots: Mono-like vs. HP Multicrystalline

K. Kutsukake[1,2], M. Deura[1], Y. Ohno[1] and I. Yonenaga[1]

[1]Tohoku University, Japan, [2]JST PRESTO, Japan

15:40-15:55 4ThO.13.4

Comparison of Phosphorus Gettering Effect in Faceted Dendrite and Small Grain of Multicrystalline Silicon Wafers Grown by Floating Cast Method

S. Joonwichien, I. Takahashi, S. Matsushima and N. Usami

Graduate School of Engineering, Nagoya University, JAPAN

15:55-16:10 4ThO.13.5

Update on Recent Results and Development from Ingot to Module Level for the Compensated Elkem Solar Silicon (ESS®) Feedstock

K. Friestad[1)], J. O. Odden[1)], A. K. Soiland[1)], T. Buseth[2)], H. Date[3)] and T. Ulset[1)]

[1)]Elkem Solar AS, Norway, [2)]Elkem Technology, Norway, [3)]Elkem Japan KK, Japan

Tuesday, November 25
10:15 - 11:30 Annex   Area 1

1TuPo.1 Si-Based Novel Technologies and Light Management Concepts

Chairpersons:
Seth Hubbard (Rochester Institute of Technology, USA)
Koji Matsubara (AIST, Japan)

1TuPo.1.1

Effect of Anodization Process of Aluminum Oxide Template on Selective Growth of Si Nanowires

Van Hoang NGUYEN[1,2], Sergii TUTASHKONKO[1,2], Yusuke HOSHI[1] and Noritaka USAMI[1,2]

[1]MEXT, FUTURE-PV Innovation, Japan Science and Technology Agency (JST), [2]Graduate School of Engineering, Nagoya University

1TuPo.1.2

Efficiency Enhancement of Si Solar Cells through a Downshifting and Antireflective Oxysulfide Phosphor Layer

Wen-Bin Hung and Teng-Ming Chen

Phosphor Research Laboratory, Department of Applied Chemistry National Chiao Tung University, Taiwan

1TuPo.1.3

The Next Generation Coating Material for PV

Yasukazu Kishimoto[1], YingYing Fan[1] and Toru Yoshida[2]

[1]KIES New Energy Co., Ltd., China, [2]MORESCO Corporation, Japan

1TuPo.1.4

A Versatile Optical Model for Optimization of Advanced Solar Cell Concepts

R. Santbergen[1], J. M. Veerhoek[2], J. L. Linden[2], V. Geyer[2], A. H. M. Smets[1] and M. Zeman[1]

[1]Photovoltaic Materials and Devices laboratory, Delft University of Technology, the Netherlands, [2]Scheuten, the Netherlands

1TuPo.1.5

A Proposal of Photonic Nanostructures Coupled with Textured Si Substrates for Advanced Light Trapping

Y. Hoshi[1], T. Tayagaki[2], Y. Kishimoto[2] and N. Usami[1]

[1]Graduate School of Engineering, Nagoya University, Japan, [2]Institute for Chemical Research, Kyoto University, Japan

1TuPo.1.6

Development of New Production Technology for High-Purity SiH_4 Based on Hydrogen Plasma Etching of Metallurgical-Grade Si: Optimization of Surface Temperature and H_2 Flow Rate for Si Etch Rate

T. Yamada[1,2], K. Yamada[1], T. Hirano[1], H. Ohmi[1,2], H. Kakiuchi[1,2] and K. Yasutake[1,2]

[1]Department of Precision Science and Technology, Graduate School of Engineering, Japan, [2]Japan Science and Technology Agency, CREST, Japan

1TuPo.1.7

Optical Design of 4-terminal Solar Modules Combining $CuGaSe_2$ and IBC c-Si Cells

D. Zhang, W. Soppe and R. E. I. Schropp

ECN-Solliance, the Netherlands

1TuPo.1.8

Optical Design for the Performance Improvement of Heterojunction Silicon Nanowire Solar Cells

Y. Kurokawa[1,2], Y. Yamada[1], M. Yano[1] and A. Yamada[1,3]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]PRESTO, Japan Science and Technology Agency (JST), Japan, [3]Photovoltaics Research Center (PVREC), Tokyo Institute of

Technology, Japan

1TuPo.1.9

Optical Approach of Solar Cell Efficiency Enhancement Using Plasmonic Nanowires

Y. Feng, J. Yang, S. Lin, S. Huang, S. Shrestha and G. Conibeer

School of Photovoltaic and Renewable Energy Engineering, Australia

1TuPo.1.10

Geometry in Si-based Photonic Nanostructures Coupled with Ge Quantum Dot Multilayers and Its Impact on Optical Properties

O. Aonuma[1)], Y. Hoshi[1)],T. Tayagaki[2)], A. Novikov[3)], D. Yurasov[3,4)] and N. Usami[1)]

[1)]Graduate School of Engineering, Nagoya University, Japan, [2)]Institute for Chemical Research, Kyoto University, Japan, [3)]Institute for Physics of Microstructures, Russian Academy of Science, Russia, [4)]Nizhny Novgorod State University, Russia

1TuPo.1.11

Nanoparticles Seeded Single-crystal Si Nanowires Growth for Good Trapping Incident Light Within Solar Cells

Xiaomei Zhang[1,2)], Kairi Yamada[1)], Hiroshi. Akita[1)] and Manabu Ihara[1)]

[1)]Tokyo Institute of Technology, Department of Chemistry, Japan, [2)]Japan Science and Technology Agency, FUTURE-PV Innovation, Fukushima Renewable Energy Institute, Japan

1TuPo.1.12

Plasmonic Degradation and Its Effect on Solar Cell Properties

S. Pillai, Y. Yang, C. F. J. Lau, C. Disney, Y. Jiang and M. A. Green

Australian Centre for Advanced Photovoltaics, University of New South Wales, Australia

1TuPo.1.13

Application of Heterojunction to Si-based Solar Cells Using Photonic Nanostructures Coupled with Vertically Aligned Ge Quantum Dots

I. Takahashi[1)], Y. Hoshi[1)], T. Tayagaki[2)], T. Oikawa[3)], K. Ohdaira[3)] and N. Usami[1)]

[1)]Nagoya University, Japan, [2)]Kyoto university, Japan, [3)] Japan Advanced Institute of Science and Technology, Japan

1TuPo.1.14

Angular Response of Nano-sphere Lithography based Rear Reflectors for Thin Silicon Solar Cells

Claire Disney[1)], Supriya Pillai[1)], Qi Xu[1,2)], Craig Johnson[1)] and Martin Green[1)]

[1)]University of New South Wales, Australia, [2)]Tsinghua University, China

1TuPo.1.15

Solar Cell with Metal-Oxide-Semiconductor to Suppress the Carrier Recombination

Kohei Oki, Shota Wakamiya, Naoto Matsuo and Akira Heya

Department of Materials Science and Chemistry University of Hyogo, Japan

1TuPo.1.16

Fast Formation of Poly-Si Thin Films with 200um Grains by Aluminum-Induced Crystallization with a Temperature Profiling

Sergii Tutashkonko[1,2)], Van Hoang Nguyen[1,2)] and Noritaka Usami[1,2)]

[1)]MEXT, FUTURE-PV Innovation, Japan Science and Technology Agency (JST), Japan, [2)]Graduate School of Engineering, Nagoya University, Japan

1TuPo.1.17

Thin-Film GaAs Solar Cells Mechanically Stacked on Plasmonic Substrates

H. Mizuno[1)], K. Makita[2)], Y. Hozumi[2)], H. Sai[2)], K. Matsubara[2)] and H. Takato[1)]

[1)]Renewable Energy Research Center, Fukushima Renewable Energy Institute, National Institute of Advanced Industrial Science and Technology, Japan, [2)]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology, Japan

1TuPo.1.18

Withdrawn

1TuPo.1.19

Enhanced Light Harvesting of InN with Various Growth Temperature Using Indium-Tin Oxide Nanowhiskers

Lung-Hsing Hsu[1)], Chien-Chung Lin[2)], Peichen Yu[3)], Hau-Vei Han[3)], Da-Wei Lin[3)] and Hao-Chung Kuo[3)]

[1)]Institute of Lighting and Energy Photonics, National Chiao Tung University, Taiwan, [2)]Institute of Photonic System, National Chiao Tung University, Taiwan, [3)]Department of Photonic & Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan

1TuPo.1.20

Maskless Broadband Antireflection Technology on Glass for Flat and Concentrator PV

E. E. Tamayo R.[1,2)], K. Watanabe[1)], T. Hoshii[1,2)], R. Tamaki[1)], M. Sugiyama[2)], Y. Shoji[1)], Y. Okada[1,2)], and K. Miyano[1)]

[1)]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan, [2)]School of Engineering, The University of Tokyo, Japan

1TuPo.1.21

Relaxed Ge Film on Porous Si for Virtual Ge Substrate

S. Lee, X. Hao, A. Ho-Baillie and M. A. Green

School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

1TuPo.1.22

Harnessing Plasmonics for Flexible CIGS Thin-film Photovoltaics

Shih-Chen Chen[2)], Yi-Ju Chen[3)], Wei-Ting Chen[4)], Yu-Ting Yen[3)], Tsung-Sheng Kao[1)], Tung-Po Hsieh[5)], Yu-Lun Chueh[3)], Martin D. B. Charlton[6)], Din-Ping Tsai[4,7)] and Hao-Chung Kuo[1)]

[1)]Department of Photonics and Institute of Electro-Optical Engineering, National Chiao-Tung University, Taiwan, [2)]Department of Electrophysics, National Chiao-Tung University, Taiwan, [3)]Department of Materials Science and Engineering, National Tsing Hua University, Taiwan, [4)]Department of Physics and Graduate Institute of Applied Physics, National Taiwan University, Taiwan, [5)]Compound Semiconductor Solar Cell Department, Next Generation Solar Cell Division, Green Energy and Environment Research Laboratories, Industrial Technology Research Institute, Taiwan, [6)]School of Electronics and Computer Science, University of Southampton, United Kingdom, [7)]Research Center for Applied Sciences, Academia Sinica, Taiwan

1TuPo.1.23

A Rapid Thermal Process for Silicon Recycle and Refining from Cutting Kerf-loss Slurry

C. F. Yang, H. P. Hsu and C. W. Lan

Department of Chemical Engineering, National Taiwan University, Taiwan

1TuPo.1.24

Enhanced Light Absorption in Thin Film Solar Cells Using Al Nanoparticles Supporting Surface Plasmon Polaritons

Huiying Hao, Ming He, Jingjing Dong, Hua Gao and Jie Xing

School of Science, China University of Geosciences, China

1TuPo.1.25

Cylindrical and Square Fibre Luminescent Solar Concentrators Compared

J. J. H. Videira[1)], E. Bilotti[2,3)] and A. J. Chatten[1)]

[1)]Department of Physics, Imperial College London, UK, [2)]School of Engineering and Materials Science, Queen Mary University of London, UK, [3)]Nanoforce Technology Ltd., Queen Mary University of London, UK

1TuPo.1.26

The Formation of Thin Poly-si Films on Textured TCO by Flash Lamp Annealing

T. Watanabe and K. Ohdaira

Japan Advanced Institute of Science and Technology, Japan

1TuPo.1.27

Laser Nd:YAG Texturing for Lower Cost and High Efficiency c-Si Solar Cell

Nurul Huda Abdul Razak[1)] and Nowshad Amin[1,2)]

[1)]Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Malaysia, [2)]Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, Malaysia

1TuPo.1.28 LN

Transmittance and Fermi Level Modulation in Graphene and Its Study with Graphene/Silicon Solar Cell

S. Adhikari[1,2], Y. H. Lee[1,2]

[1]IBS Center for Integrated Nanostructure Physics (CINAP), Institute for Basic Science (IBS), Sungkyunkwan University, Korea [2]Department of Energy Science, Sungkyunkwan University, Korea

1TuPo.1.29 LN

Growth and Characterization of $Si_{1-x-y}Sn_xC_y$ Ternary Alloy Thin Films for Solar Cell Application

T. Yamaha[1], H. Oda[1], M. Kurosawa[1.2], W. Takeuchi[1], O. Nakatsuka[1], and S. Zaima[1]
[1]Grad. Schl of Eng., Nagoya Univ., Japan, [2]Research Fellow of JSPS, Japan

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Tuesday, November 25
13:00 - 14:25 Annex **Area 1**

1TuPo.2 New Materials and Emerging Technologies

Chairpersons:
Jean-François Guillemoles (NextPV, Joint CNRS and RCAST Laboratory, France/Japan)
Yasuaki Ishikawa (Nara Institute of Science and Technology, Japan)

1TuPo.2.1

Light Trapping for Emission from Photovoltaic Cells Used Under Monochromatic Illumination

Y. Takeda[1], H. Iizuka[1], T. Ito[1], S. Mizuno[1], K. Hasegawa[1], T. Ichikawa[1], H. Ito[1], T. Kajino[1], K. Higuchi[1,2], A. Ichiki[2] and T. Motohiro[2]

[1]Toyota Central Research and Development Laboratories, Inc., Japan, [2]Green Mobility Collaborative Research Center, Nagoya University, Japan

1TuPo.2.2

Interface Engineering for Efficient and Stable Chemical-Doping-Free Graphene-on-Silicon Solar Cell by Introducing a Graphene Oxide Interlayer

Lifei Yang, Xuegong Yu, Mingshen Xu, Hongzheng Chen and Deren Yang

State Key Lab of Silicon Materials Department of Materials Science and Engineering Zhejiang University, P. R. China

1TuPo.2.3

Effects of Nitrogen Content on the Photovoltaic Properties of Nitrogen Doped Amorphous Carbon/ Fullerene Junctions

T. Soga, A. Mimuro, N. Kishi and Y. Hayashi

Nagoya Institute of Technology, Japan

1TuPo.2.4

Predictive Modeling of Electronic and Absorption Properties of Novel $CuInS_2$ Wurtzite Phase: Implications To PV Applications

S. Tomić[1)], L. Bernasconi[2)], B. G. Searle[3)] and N. M. Harrison[4)]

[1)]University of Salford, UK, [2)]STFC Rutherford-Appleton Laboratories, UK, [3)]STFC Daresbury Laboratories, UK, [4)]Imperial College London, UK

1TuPo.2.5

High Temperature Photonics for Effective Solar-thermophotovoltaic Systems

M. Shimizu, A. Kohiyama, F. Iguchi and H. Yugami

Graduate School of Engineering, Tohoku University, Japan

1TuPo.2.6

A Thin Film Nc-Si:H/Silicon Wafer Heterojunction Tandem Solar Cell for Silicon-based Photoelectrochemical Water Splitting

R. Vasudevan, Z. Thanawala, L. Han, H. Tan, M. Zeman and A. H. M. Smets

Photovoltaic Materials and Devices (PVMD) Laboratory, Delft University of Technology, the Netherlands

1TuPo.2.7

Effect of Oxidation and Its Role in Carbon Nanotube Growth Via Quantum Confined Silicon Nanocrystals and Impact on Hybrid Silicon/Nano-carbon Devices

C. Rocks[1)], S. Mitra[1)], V. Svrcek[2)] and D. Mariotti[1)]

[1)]Nanotechnology & Integrated Bio-Engineering Centre (NIBEC), University of Ulster, UK , [2)]Research Center for Photovoltaics, National Institute of Advanced Industrial Science and Technology (AIST), Japan

1TuPo.2.8

$AgInTe_2$ Thin Films by Sputtering Deposition for Narrow Bandgap Thin Film Solar Cells

Abdullah Uzum, Naoya Takahashi and Seigo Ito

Department of Electrical Engineering and Computer Sciences University of Hyogo, Japan

1TuPo.2.9

Fabrication of Size-controlled Quantum Dots for Electron Energy Selective Contact for Thermionic Applications to Convert Solar Energy to Electricity

Y. Kusano, A. Ichiki and T. Motohiro

Green Mobility Collaborative Research Center, Nagoya University, Japan

1TuPo.2.10

Enhancement of Water Splitting Efficiency by Hydrogenation of TiO_2 Nanotubes with H_2, H_2O, HCOOH and CH_3OH under Moderate Temperature and Pressure Conditions

Tsai-Te Wang, Yung-Lin Chang, J. C. Li, P. Raghunath and M. C. Lin

Center for Interdisciplinary Molecular Science, Department of Applied Chemistry National Chiao Tung University, Taiwan

1TuPo.2.11

I-V Characteristics of $In_xGa_{1-x}As$ and Si Photocells Under the Illumination of a 1.06μm Laser Which is to Be the Output of Solar-pumped Lasers

D. Kanou[1)], H. Ito[2)], A. Ichiki[3)], K. Hasegawa[2)], S. Mizuno[2)], T. Ichikawa[2)], T. Ito[2)], T. Kajino[2)], Y. Takeda[2)], K. Higuchi[2,3)] and T. Motohiro[1,2,3)]

[1)]Department of Material Sciences and Engineering, Nagoya University, Japan, [2)]Toyota Central Research and Development Laboratories, Inc., Japan, [3)]Green Mobility Collaborative Research Center, Nagoya University, Japan

1TuPo.2.12

Carbon Based Solar Cells with Graphene

M. Umeno, S. Adhikari and D. C. Ghimire, H. Uchida

Department of Electronics and Information Engineering, Chubu University, Japan

1TuPo.2.13

The Photoelectrochemical Performances of Silver-Tin-Selenide Thin Films Using Selenization of Thermal Evaporated Metal Precursors

Kong-Wei Cheng and Yi Chiu and Wei-Tseng Tsai

Department of Chemical and Materials Engineering, Chang Gung University, Taiwan

1TuPo.2.14

MOVPE Growth of Thick (~1 μm) InGaN on AlN/Si Substrates for InGaN/Si Tandem Solar Cell

A. Yamamoto[1,2)], Md. Tanvir Hasan[1,2)], N. Shigekawa[3)] and M. Kuzuhara[1)]

[1)]University of Fukui, Japan, [2)]JST-CREST, Japan, [3)]Osaka City University, Japan

1TuPo.2.15

Effects of Surface Treatment on Type II Ge Clathrate Films

F. Ohashi, T. Sugiyama, I. Funato, R. Himeno, T. Kume, T. Ban and S. Nonomura

Faculty of Engineering, Gifu University, Japan

1TuPo.2.16

Demonstration of N-polar InGaN/GaN MQW Solar Cells with Possibility of Promoting Photocarrier Extraction

T. Tanikawa[1,2], J. H. Choi[1,2], K. Shojiki[1], R. Katayama[1,2] and T. Matsuoka[1, 2]

[1]Institute for Materials Research, Tohoku University, Japan, [2]CREST, Japan Science and Technology Agency, Japan

1TuPo.2.17

Application of Zonyl Fluorosurfactant on Silicon Nanowire/Organic Heterojunction Solar Cells

H.-J. Syu[1], T. Subramani[1], S.-C. Shiu[1] and C.-F. Lin[1,2,3,4]

[1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taiwan, [2]Graduate Institute of Electronic Engineering, National Taiwan University, Taiwan, [3]Department of Electrical Engineering, National Taiwan University, Taiwan, [4]Innovative Photonics Advanced Research Center, National Taiwan University, Taiwan

1TuPo.2.18

LO-Phonon Lifetime Calculations for Hot Carrier Solar Cell Materials

S. Laribi, H. Levard and J.-F. Guillemoles

IRDEP Institute of Research and Development on Photovoltaic Energy, France

1TuPo.2.19

Self-regeneration Mechanism and Self-organization of Nano-structures by Spinodal Nano-decomposition in Perovskite $CsSn(I_{1-x},Cl_x)_3$ and $CsSn(I_{1-x},Br_x)_3$ for the Low-Cost, Environment-Friendly and High-Efficiency Photovoltaic Solar Cells

T. Fukushima[1)], K. Sato[2,3)], H. Asahina[1)] and H. Katayama-Yoshida[1)]

[1)]Department of Materials Engineering Science, Graduate School of Engineering Science, Osaka University,Japan, [2)]PRESTO, Japan Science and Technology Agency (JST),Japan, [3)]Division of Materials and Manufacturing Science, Graduate School of Engineering, Osaka University, Japan

1TuPo.2.20

Evaluation of Optical Properties of Cu_2O Ceramics Prepared by Thermal Oxidation

H. Nakahara, J. Ueda and S. Tanabe

Kyoto University, Japan

1TuPo.2.21

New Concept of Photovoltaic Solar Cell Based on Spontaneous Electric Field in Polar Semiconductors

S. Emura[1)] and K. Sato[2)]

[1)]The Institute of Scientific and Industrial Research, Osaka University, Japan, [2)]Division of Materials and Manufacturing Science, Graduate School of Engineering, Osaka University, Japan

1TuPo.2.22

Optimized Methods for Increased Performance Photovoltaic Cells by Nanoparticles Integration

Dr. E.-L. Niederhäuser[1)], Dr. M. Wiatrowski[2)], Dr. J. Ulanski[2)], Dr. Alke Fink[3)] and Dr. Marc Jobin[4)]

[1)]Ecole d'ingénieurs et d'architectes de Fribourg (EIA-

FR), Switzerland, [2]Lodz University of Technology, Poland, [3]Adolphe Merkle Institute, University of Fribourg, Switzerland, [4]Haute école du paysage, d'ingénierie et d'architecture (HEPIA), Switzerland

1TuPo.2.23

$CuInS_2$/CdS Tetrapod Nanostructures for Efficient Photovoltaic Devices

Bomi Kim and Sungjee Kim

Department of Chemistry, Pohang University of Science and Technology, South Korea

1TuPo.2.24

Approach to Boost up V_{oc}: Transparent Double Junction Structure

Juhyung Yun[1], Seungmoo Lee[1], Jaihyung Won[1], Joondong Kim[2], Wayne A. Anderson[3]

[1]Thin Film Technology Team, Samsung Electronics, Korea, [2]Dept. of Electrical Engineering, Incheon National University, Korea, [3]Dept. of Electrical Engineering, University at Buffalo, USA

1TuPo.2.25

Can Thermodynamics Help Us to Improve the Operation of Solar Cells ?

T. Markvart

Solar Energy Laboratory, University of Southampton, UK

1TuPo.2.26

Electrochemical Formation of Calcium Silicide on Silicon Substratein $CaCl_2$-KCl Melt

S. Takashima[1], S. Ueda[1], T. Goto [1] and K. Hachiya[2]

[1]Department of Environmental System Science, Doshisha University, Japan, [2]Department of Fundamental Energy Science, Kyoto University, Japan

1TuPo.2.27

Formation of Titania Nanotube with Visible Light Activity by Electrochemical Reduction

M. Kinoshita[1)], T. Sasa[1)], T. Goto[1)] and K. Hachiya[2)]

[1)]Department of Environmental System Science, Doshisha University, Japan, [2)]Department of Fundamental Energy Science, Kyoto University, Japan

1TuPo.2.28LN

Synthesis and Characterization of CIBS Nanocrystals and Film with Addition of Sb by A Simple Solution Process for Photovoltaics Applications

Cheng Han Tsai, Tsai Li Sung and Chie Gau

Institute of Aeronautics and Astronautics/Research Center for Energy Technology and Strategy, National Cheng Kung University, Taiwan

1TuPo.2.29LN

Synthesis and Characterization of Oleylamine Capped $Cu_2ZnSn(S,Se)_4$ Nanoparticles Using 1-dodecanethiol as Sulphur Source

S. Ananthakumar[1)], J. Ramkumar[1)], S. Moorthy Babu[1)] and Y.Hayakawa[2)]

[1)]Crystal Growth Centre, Anna University, India, [2)]Research Institute of Electronics, Shizuoka University, Japan

1TuPo.2.30LN

Phase Selective Synthesis and Characterization of $Cu_{1.81}S$ Nanoparticles by Hot Injection Method

M. Senthilkumar[1)], J. Ramkumar[1)], S. Ananthakumar[1)], S. Moorthy Babu[1)] and Y.Hayakawa[2)]

[1)]Crystal growth centre, Anna University, India, [2)]Research Institute of Electronics, Shizuoka University, Japan

Tuesday, November 25
14:45 - 16:10 Annex **Area 2**

2TuPo.3 Thin Film Silicon Based Photovoltaics 1

Chairpersons:
Takuya Matsui (AIST, Japan)
Kimihiko Saito (Fukushima University, Japan)

2TuPo.3.1

Hydrogen Mediated Double Layer ZnO: Al Films for High Efficiency Triple-junction Solar Cells

Qian Huang, Dekun Zhang, Jian Ni, Lisha Bai, Bofei Liu, Changchun Wei, Ying Zhao and Xiaodan Zhang

Institute of photo electronics thin film devices and technique of Nankai university, Key laboratory of photo electronics thin film devices and technique of Tianjin, Key laboratory of optoelectronic information science and technology, Ministry of education, China

2TuPo.3.2

Improved Light Harvesting in The Tandem Structured Thin-Film Silicon-Based Solar Cell Using A Very Thin LiF Intermediate Layer

J. H. Yang[1)], Y. H. Hong[1)], Y. J. Lee[1,2)] and. K. S. Lim[1)]

[1)]Department of Electrical Engineering, Korea Advanced Institute of Science and Technology, Republic of Korea, [2)]R&D Center, TG Optoelectronics Technology, Republic of Korea

2TuPo.3.3

Thin film Poly-Si N-I-P Solar Cell Fabricated by Metal Induced Crystallization of Amorphous Si

He LI, Guijun LI, Man WONG and Hoi Sing KWOK

State Key Laboratory on Advanced Displays and Optoelectronics Technologies, Department of Electronic and Computer Engineering, the Hong Kong University of Science and Technology, China

2TuPo.3.4

Void-Hydrogen Structures in a-Si:H/c-Si Heterojunctions: Parameterization for Ellipsometry Analysis via Positron Annihilation Spectroscopy

N. Matsuki[1)] and A. Uedono[2)]

[1)]Center for Innovative Photovoltaic Systems (CIPS), Gifu University, Japan, [2)]Division of Applied Physics, Faculty of Pure and Applied Science, University of Tsukuba, Japan

2TuPo.3.5

LiF/Al as a Back Contact for Thin Film Solar Cells Based on Amorphous Silicon

A. S. Togonal[1,2,3)], D. Tondelier[3)], B. Geffroy[3,4)], J. C. Vanel[3)], Y. Bonnassieux[3)], Rusli[1)] and P. Roca i Cabarrocas[3)]

[1)]School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, [2)]CINTRA UMI CNRS/NTU/THALES, Singapore, [3)]LPICM-CNRS, Ecole Polytechnique, France, [4)]LICSEN, CEA Saclay IRAMIS/NIMBE, France

2TuPo.3.6

Electrodeposition of Crystalline Silicon Films in Molten KF-KCl-K_2SiF_6 at 923 K

K. Maeda[1)], K. Yasuda[1,2)], T. Nohira[1,3)], R. Hagiwara[1)] and T. Homma[3,4)]

[1)]Graduate School of Energy Science, Kyoto University, Japan, [2)]Environment, Safety, and Health Organization, Kyoto University, Japan, [3)]CREST, Japan Science and Technology Agency, Japan, [4)]Faculty of Science and Engineering, Waseda University, Japan

2TuPo.3.7

The Effect of I/N Buffer Layer On the Performance of PIN Type Hydrogenated Microcrystalline Silicon Solar Cells

Lisha Bai, Bofei Liu, Ze Chen, Qian Huang, Dekun Zhang, Jian Sun, Changchun Wei, Ying Zhao and

Xiaodan Zhang

Institute of Photo Electronics thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology, P. R. China

2TuPo.3.8

Fabrication of a-Si:H Layers with Very Low SiH_2 Contents by Reactive Magnetron Sputtering Using a New Process

T. Fujiseki, M. Sato and H. Fujiwara

Center of Innovative Photovoltaic Systems (CIPS), Gifu University, Japan

2TuPo.3.9

Simulation Study of Electrical Properties of Window Layers in a-Si:H Solar Cells

C. Ke[1,2], N. Sahraei[1,2], R. Stangl[1] and I. M. Peters[1]

[1]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore, [2]Department of Electrical and Computer Engineering, National University of Singapore, Singapore

2TuPo.3.10

Bilayer TCO Structure as Front Electrode for Thin-film Silicon Solar Cell Applications

X. Yan[1], S. Venkataraj[1], W. Li[1,2] and A. G. Aberle[1,2]

[1]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore, [2]Department of Electrical and Computer Engineering, National University of Singapore, Singapore

2TuPo.3.11

A New Formation Process of Crystalline Silicon Film by Molten Salt Electrolysis

T. Nohira[1,2], K. Maeda[1], K. Yasuda[1,3], R. Hagiwara[1] and T. Homma[2,4]

[1]Graduate School of Energy Science, Kyoto University,

Japan, [2]CREST, Japan Science and Technology Agency, Japan, [3]Environment, Safety, and Health Organization, Kyoto University, Japan, [4]Faculty of Science and Engineering, Waseda University, Japan

2TuPo.3.12

Textured $Zn_{1-x}Mg_xO$ as a Light Scattering Layer for Thin-film Silicon Solar Cells

H. Konishi, Y. Tsuda, T. Shinagawa, H. Tokioka and H. Fuchigami

Advanced Technology R&D Center, Mitsubishi Electric Corporation, Japan

2TuPo.3.13

Parasitic Absorption Loss by Surface Plasmon Polariton in Thin Film Solar Cells

Guijun. Li, He. Li and Hoi-Sing Kwok

State Key Lab on Advanced Displays and Optoelectronics Technologies, Hong Kong University of Science and Technology, Hong Kong

2TuPo.3.14

Low Temperature Processed a-SiO:H/a-Si:H Tandem Cells for Full Spectrum Solar Cells

D. W. Kang[1], P. Sichanugrist[1] and M. Konagai[1,2]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]Photovoltaic Research Center (PVREC), Tokyo Institute of Technology, Japan

2TuPo.3.15

Characterization of the Local Network Structures at a-SiC:H/a-Si:H Interface by Real-time Diagnostic Techniques

M. Sato and H. Fujiwara

Center of Innovative Photovoltaic Systems (CIPS), Gifu University, Japan

2TuPo.3.16

Photonic Crystal Microcrystalline Silicon Solar Cells

M. De Zoysa[1,2], K. Ishizaki[1], Y. Tanaka[1], T. Umeda[1], Y. Kawamoto[1], S. Fujita[1] and S. Noda[1]

[1]Department of Electronic Science and Engineering, Kyoto University, Japan, [2]Hakubi Center for Advanced Research, Kyoto University, Japan

2TuPo.3.17

Optimization of a-SiGeH Films for Using as the Bottom Cell of a-SiOHa-SiGeH Tandem Solar Cell Structure

S. Inthisang, T. Krajangsang, J. Sritharathikhun, A. Hongsingthong, A. Limmanee, S. Kittisontirak, S. Jaroensathainchok, A. Moollakorn and K. Sriprapha

Solar Energy Technology Laboratory (STL), National Electronics and Computer Technology Center (NECTEC), Thailand

2TuPo.3.18

Single-Crystalline pin-Si Thin-Film Solar Cells Grown on Si Substrate by Sputter-Epitaxy

Wenchang Yeh, Kyohei Tatebe and Keisuke Sugihara

Interdisciplinary Graduate School of Science and Engineering, Shimane University, Japan

2TuPo.3.19

Withdrawn

2TuPo.3.20

Self-Aligned Series Connection of Amorphous Silicon Based Thin-Film Solar Cells Fabricated on Micro-Imprinted Polymer Film Substrates

Y. J. Lee[1,2], Y. H. Hong[1], J. H. Yang[1], S. Kadokura[3], J. H. Lee[2] and K. S. Lim[1]

[1]Department of Electrical Engineering, Korea Advanced Institute of Science and Technology,

Republic of Korea, [2]R&D Center, TG Optoelectronics Technology, Republic of Korea, [3]FTS corporation, Japan

2TuPo.3.21

Enhanced Short-wavelength Response by Low-temperature P-type μc-SiO_x:H as Highly Transparent Window Layer in Microcrystalline Silicon Solar Cells

P. L. Chen, C. H. Hsu and C. C. Tsai

Department of Photonics, National Chiao Tung University, Taiwan

2TuPo.3.22

Electrical Characterization of Hydrogenated Amorphous Silicon Oxide Films

T. Itoh[1], R. Katayama[1], K. Yamakawa[1], K. Matsui[1], M. Saito[2], S. Sugiyama[2], P. Sichanugrist[3], S. Nonomura[1] and M. Konagai[3]

[1]Gifu University, Japan, [2]Sharp Corporation, Japan, [3]Tokyo Institute of Technology, Japan

2TuPo.3.23

Changed to 3TuPo.5.29

2TuPo.3.24

Graphene Transparent Electrode with Low Contact Barrier in Silicon Thin-Film Solar Cells

R. Ishikawa[1], Y. Kurokawa[2], S. Miyajima[2] and M. Konagai[2]

[1]Faculty of Engineering, Niigata University, Japan, [2]Department of Physical Electronics, Tokyo Institute of Technology, Japan

2TuPo.3.25

Sub-bandgap Defect Analysis of Amorphous Silicon by Fourier-transform Photocurrent Spectroscopy

A. Bidiville and T. Matsui

National Institute of Advanced Industrial Science and Technology (AIST), Japan

2TuPo.3.26

Modifying Plasmon Polaritons Resonant Absorption in Metal Back Reflector

Z. Chen, X. Zhang, J. Liang, X. Liang, J. Sun, D. Zhang, X. Chen, Q. Huang, C. Wei and Y. Zhao

Institute of Photoelectronic Thin Film Devices and Technology, Nankai University, China

2TuPo.3.27

Conversion Efficiency Improvement of SiGe:H Solar Cell by Changing RF Power and Using Si_2H_6 Gas

Yen-Chen Lai[1)], Fang-I Lai[1)], Ming-Hsuan Kao[2,3)], Jia-Min Shieh[2,3)] and Chang-Hong Shen[2)]

[1)]Department of Photonics Engineering, Yuan-Ze University, Taiwan, [2)]National Nano Device Laboratories, Taiwan, [3)]Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan

2TuPo.3.28

Effects of Gas Residence Time on Amount of Si Clusters Incorporated into a-Si:H Films

S. Toko, Y. Torigoe, Y. Kanemitu, H. Seo, N. Itagaki, K. Koga and M. Shiratani

Kyushu University, Japan

2TuPo.3.29

Fabrication of P-N Junction Diode Using Amorphous Mg_2Si-based Semiconductors as a Low Cost Solar Cell Material

S. Hara and H. Fujiwara

Center of Innovative Photovoltaic Systems (CIPS), Gifu University, Japan

2TuPo.3.30

Characterization of a-Si:H Photovoltaic Modules with Different B_2H_6 Doping Concentration

N. Silsirivanich[1)], D. Chenvidhya[1)], C. Jivacate[1)], K. Kirtikara[1)], K. Sriprapha[2)] and J. Sritharathikhun[2)]

[1)]CES Solar Cell Testing1CES Solar Cell Testing Center (CSSC), Thailand, Pilot Plant Development and Training Institute (PDTI), King Mongkut´s University of Technology Thonburi (KMUTT), [2)]National Electronics and Computer Technology Center (NECTEC), National Science and Technology Development Agency (NSTDA), Thailand

2TuPo.3.31

Ag/ZnO Back Reflectors on Stainless Steel for a-Si and a-Si/μc-Si Tandem Solar Cells

Cheng Liu

Shanghai University, China

2TuPo.3.32

Quantum Efficiency Simulation for Textured a-Si:H Solar Cells Based on Modified Optical Admittance Method

D. Murata[1)], T. Matsui[2)] and H. Fujiwara[1)]

[1)]Center of Innovative Photovoltaic Systems (CIPS), Gifu University, Japan, [2)]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan

2TuPo.3.33

Dependence of Electrical Properties of IWO Films on the Post-annealing Process

Leilei Shen[1,3)], Fanying Meng[1)], Jianhua Shi[1)], Zhongdan Lu[2)], Yucheng Liu[1)] and Zhengxin Liu[1)]

[1)]Research Center for New Energy Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, PR China, [2)]State Key Lab of PV Science and Technology, Trina Solar Limited, PR China, [3]University of Chinese Academy of Sciences, PR China

2TuPo.3.34

New Anode Materials for Electrochemical Si Production in Molten Salts

A. Tabushi[1)], Y. Sakanaka[1)], T. Goto[1)], F. Tsujii[1)], K. Hirota[2)] and M. Kato[2)]

[1)]Department of Environmental System Science, Doshisha University, Japan, [2)]Department of Molecular Chemistry and Biochemistry, Doshisha University, Japan

2TuPo.3.35

Effect of Surface Chemical Treatment of MOCVD-grown ZnO (TCO) Layers on The Microcrystalline Silicon Solar Cell Properties

S. Sugiyama[1)], H. Sai[2)] and T. Matsui[2)]

[1)]Sharp Corporation, Japan, [2)]National Institute of Advanced Industrial Science and Technology (AIST), Japan

2TuPo.3.36

Elimination of Light Elements from Soluble Silica via Solvent Extraction using Flow-Type Reactor toward High-Purity Source for Solar-Grade Silicon

N. Matsuo[1)], T. Ishihara[1)], T. Oyanagi[1)], K. Nakajima[1)], Y. Fukunaka[2,3)] and T. Homma[1,2,3)]

[1)]Department of Applied Chemistry, Waseda University, Japan, [2)]JST, CREST, Japan, [3)]Nanotechnology Research Center, Waseda University, Japan

2TuPo.3.37

Large-grained Ge Thin Films on Glass Formed by Al-induced Crystallization for Inexpensive Tandem Solar Cells

K. Toko[1)], K. Nakazawa[1)], N. Oya[1)], N. Usami[2)] and T. Suemasu[1)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2]Materials, Phys. and Energy Eng., Nagoya Univ., Japan

2TuPo.3.38

Periodically Textured Front Scattering and Back Reflective Electrodes Fabricated Using a Self-Assembled Polystyrene

Xiaodan Zhang, Xuejiao Liang, Bofei Liu, Lisha Bai, Haibo Gao, Qian Huang, Xinliang Chen, Changchun Wei and Ying Zhao

Institute of Photo Electronics thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology, P. R. China

2TuPo.3.39

High Open-circuit Voltage (>1.0 V) Approach by Hybrid Amorphous Silicon Carbide Intrinsic Material

J. Ma, J. Ni , J. Zhang, Q. Liu, X. Chen, X. Zhang and Y. Zhao

Institute of Photo-Electronic Thin Film Devices and Technology of Nankai University, Tianjin Key Laboratory of Photo-Electronic Thin Film Devices and Technology, Key Laboratory of Opto-Electronic Information Science and Technology, Nankai University, PR China

2TuPo.3.40

Withdrawn

2TuPo.3.41

Influence of Wide Bandgap p-nc-SiC:H Layers on Performance of Flexible Silicon Thin-film Solar Cells in n-i-p Configuration

E. S. Jang, D. Lim, S. K. Ahn, J. H. Park, K. S. Shin, K. H. Yoon and J. S. Cho

Photovoltaic Laboratory, Korea Institute of Energy Research, Korea

2TuPo.3.42

Thin-Film Silicon Triple-Junction Solar Cells for Hydrogen Production

D. Dominé[1)], L. Löfgren[1)], M. Modestino[2)], J.-H. Yum[1)], P. Kohler[1)], M. Benkhaira[1)], L. Sansonnens[1)], S. Nicolay[1)], J. Bailat[1)] and C. Ballif[1)]

[1)]CSEM SA, Switzerland, [2)]EPFL STI IMT LO, Ecole Polytechnique Fédérale de Lausanne, Switzerland

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Tuesday, November 25
16:30 - 17:55 Annex **Area 2**

2TuPo.4 Thin Film Silicon Based Photovoltaics 2

Chairpersons:
Kimihiko Saito (Fukushima University, Japan)
Akira Terakawa (Panasonic Corporation, Japan)

2TuPo.4.1

Nanostructured Dielectric Layer for Thin-film c-Si Light Trapping

Yusi Chen[1)], Yangsen Kang[1)], Yijie Huo[1)], Solène Coutant[3)], Pawan Kapur[3)], Jieyang Jia[1)], Li Zhao[2)], Huiyang Deng[1)] and James Harris[1,2)]

[1)]Department of Electrical Engineering, Stanford University, USA, [2)]Department of Material Science and Engineering, Stanford University, USA, [3)]Solexel INC., USA

2TuPo.4.2

Effect of Al Addition on the Electrical, Optical and Structural Properties of Sol-gel Derived $Zn_{1-x}Mg_xO$ Thin Film

L. Meng, S. Miyajima and M. Konagai

Department of Physical Electronics, Graduate School of Science and Engineering, Tokyo Institute of Technology, Japan

2TuPo.4.3

Process Induced Defect in Polycrystalline Silicon Thin-film Solar Cells on Glass by Liquid-phase Crystallisation

Jialiang Huang, Miga Jung, Sergey Varlamov and Martin A. Green

University of New South Wales, Australia

2TuPo.4.4

Periodic Textured Glass Surface Morphologies for High Transmittance, Haze Ratio and Low Sheet Resistance Of ITO:Zr Films in Thin Film Solar Cells

Shahzada Qamar Hussain[1)], Giduk Kwon[1)], Shihyun Ahn[2)], Sunbo Kim[1)], Hyeongsik Park[2)], Anh Huy Tuan Le[2)], Subramaniam Velumani[2,3)] and Junsin Yi[1,2)]

[1)]Department of Energy Science, Sungkyunkwan University, Korea, [2)]College of Information and Communication Engineering, Sungkyunkwan University, Korea, [3)]Department of Electrical Engineering-SEES, Mexico

2TuPo.4.5

Enhanced Infrared Spectral Response in Si-Based Thin-Film Solar Cells by Employing μc-$Si_{1-x}Ge_x$:H Absorbers with Optimized Film Quality

Y. T. Huang, C. H. Hsu and C. C. Tsai

Department of Photonics, National Chiao Tung University, Taiwan

2TuPo.4.6

Improved Polycrystalline-Silicon Crystallinity by Inserting a Thin Al_2O_3 Barrier Layer in Inverted Aluminum-induced Layer Exchange

Weiyuan Duan[1,2)], Jiantao Bian[1)], Liping Zhang[1)], Fanying Meng[1)] and Zhengxin Liu[1)]

[1)]Research Center for New Energy Technology, Shanghai Institute of Microsystem and Information Technology, PR China, [2)]University of Chinese

Academy of Sciences, PR China

2TuPo.4.7

Structural Engineering for Optical and Electronic Properties of a-Si:H/c-Si

J. Mitchell

The National Institute of Advanced Industrial Science and Technology, Japan

2TuPo.4.8

Development of p-type Nano Crystalline Silicon Oxide Film for Wide Band Gap and Highly Conducting Window Layer of Thin Film Solar Cell

Chonghoon Shin[1)], Sk Md Iftiquar[2)], Jinjoo Park[2)], Sangho Kim[1)], Junhee Jung[1)], Sungjae Bong[2)] and Junsin Yi[1,2)]

[1)]Department of Energy Science, Sungkyunkwan University, Republic of Korea, [2)]College of Information and Communication Engineering, Sungkyunkwan University, Republic of Korea

2TuPo.4.9

Application of Wide Band-gap Absorber and Doped Layers in High V_{oc} Amorphous Silicon Oxide Solar Cells

S. Wang[1,2)], V. Smirnov[2)], T. Chen[2)], X. Zhang[1)], S. Xiong[1)], Y. Zhao[1)] and F. Finger[2)]

[1)]Institute of Photo-electronic Thin Film Device and Technique, Nankai University, People's Republic of China , [2)]IEK5-Photovoltaik, Germany

2TuPo.4.10

Application Research of Polystyrenes Sphere Self-assemble Technology on Three-Dimension Thin Film Solar cells

H. Gao, X. Zhang and Y. Zhao

Institute of Photo Electronic Thin Films Devices and Technology, Nankai University, P. R. China

2TuPo.4.11

Improved Light Management in a-$Si_{1-x}Ge_x$:H-Based Multi-Junction Cells by Using N-type μc-SiO_x:H as Intermediate Reflecting Layer and Back Reflecting Layer

H. J. Hsu, C. C. Chien, C. H. Hsu and C. C. Tsai

Department of Photonics, National Chiao Tung University, Taiwan

2TuPo.4.12

Influence of Substrate Morphology on the Growth of Thin-film Microcrystalline Silicon Studied by In-situ Raman Spectroscopy

T. Fink, S. Muthmann, U. W. Paetzold, N. Sommer, A. Gordijn, A. Mück, R. Schmitz, M. Hülsbeck, R. Carius and M. Meier

IEK5-Photovoltaik, Germany

2TuPo.4.13

Light-trapping in Crystalline Silicon Thin-film Solar Cells Featuring Self-masking Plasma Texture

R. Pavlovic, T. Dannenberg, S. Lindekugel and S. Reber

Fraunhofer Institute for Solar Energy Systems (ISE), Germany

2TuPo.4.14

Highly Conductive μc-SiO_x:H with High Oxygen-Content Employed as Integrated Doped and Reflecting Layers for Improving Light Management in μc-Si:H Single-Junction and a-Si:H/μc-Si:H Tandem Solar Cells

S. W. Liang, Y. F. Tsai, C. H. Hsu and C. C. Tsai

Department of Photonics, National Chiao Tung University, Taiwan

2TuPo.4.15

Effects of Front and Rear Texturing on Absorption Enhancement in Laser-crystallised Silicon Thin-films on Glass

M. Z. Pakhuruddin[1,2], J. Dore[1,3], J. Huang[1] and S. Varlamov[1]

[1]School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia, [2]School of Physics, Malaysia, Universiti Sains Malaysia, [3]Suntech Research and Development Australia, Australia

2TuPo.4.16

Microcrystalline Silicon Alloys as Wide Gap Window Layer in Silicon Heterojunction Solar Cells

K. Ding[1], L. Zhao[1,2], A. Richter[1], M. Pomaska[1], T. Chen[1,3], V. Smirnov[1], F. Finger[1] and U. Rau[1]

[1]IEK5-Photovoltaik, Forschungszentrum Jülich, Germany , [2]Institute of Electrical Engineering, Chinese Academy of Sciences, China, [3]Now with: Jiangyin Sino-Germany Technology Transfer Center Co., Ltd, China

2TuPo.4.17

Investigation of the Correlation Between Chemical Bonding States and Fixed Charge States for Sr-silicate Passivation Films on Si(100) Substrates

S. Taniwaki[1], Y. Hotta[1,3], H. Yoshida[1,3], K. Arafune[1,3], A. Ogura[2,3] and S. Satoh[1,3]

[1]Univ. of Hyogo, Japan, [2]Meiji Univ., Japan, [3]JST-CREST, Japan

2TuPo.4.18

Improve The p/ITO Contact Properties of SHJ Solar Cells by Adopting Dual-layer Boron Doped Silicon Thin Films Emitter

F. Wang[1], X. Zhang[1], Y. Jiang[1], L. Wang[1,2] and Y. Zhao[1]

[1]Institute of Photo-electronics Thin Film Devices and

Technique of Nankai University, Key Laboratory of Photo-electronics Thin Film Devices and Technique of Tianjin, Key Laboratory of Photo-Electronic Information Science and Technology of Ministry of Education (Nankai University), China, [2]Institute of Semiconductor Materials, Hebei University of Technology, China

2TuPo.4.19

Development of High-quality a-SiO:H Film Using Triode Type PECVD and Low Temperature Deposition

Riku Yamamoto[1], Porponth Sichanugrist[1] and Makoto Konagai[1,2]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]Photovoltaic Research Center (PVREC), Tokyo Institute of Technology, Japan

2TuPo.4.20

Withdrawn

2TuPo.4.21

Photothermal Radiometry for Estimation of Spin Density in Si Thin Films

N. Yoshida[1,2], K. Ishii[1], S. Takahashi[1], Y. Matsuda[1], A. Yasui[1], H. Kondo[1] and S. Nonomura[1,2]

[1]Environmental and renewable Energy Division Systems, Graduate School of Engineering, Gifu University, Japan, [2]Center of Innovative Photovoltaic Systems, Gifu University, Japan

2TuPo.4.22

Development of High Open-circuit Voltage Hydrogenated Nanocrystalline Silicon Oxide Thin-film Solar Cell for Multi-junction Photovoltaics

P. W. Chen, C. H. Hsu and C. C. Tsai

Department of Photonics, National Chiao Tung University, Taiwan

2TuPo.4.23

Hydrogenated MGZO Thin Films for Solar Cells Under Different Deposition Ways

Jie-ming Liu, Xin-liang Chen, Cong-sheng Tian, De-kun Zhang, Ying Zhao and Xiao-dan Zhang

Institute of Photo-Electronic Thin Film Devices and Technology, Nankai University, People's Republic of China

2TuPo.4.24

Optical Simulations of Selective Nanostructured-substrates for Silicon Thin Film Solar Cells

B. Janthong[1)], S. Kato[1)] and M. Konagai[1,2)]

[1)]MEXT/FUTURE-PV Innovation Research, JST, Japan, [2)]Department of Physical Electronics, Tokyo Institute of Technology, Japan

2TuPo.4.25

Growth Process of Electrodeposited Si Thin Films in Ionic Liquid for Solar Cell Applications

Y. Tsuyuki[1)], A. Pham[1)], J. Komadina[2)], Y. Fukunaka[3,4)] and T. Homma[1,3,4)]

[1)]Department of Applied Chemistry, Waseda University, Japan, [2)]School of Engineering, UC Merced, Japan, [3)]JST, CREST, Japan, [4)]Nanotechnology Research Center, Waseda University, Japan

2TuPo.4.26

Triple-textured Electrode Architectures for Light Trapping in Triple Junction Solar Cells:A Numerical Study

Bofei Liu, Lisha Bai, Xiaodan Zhang and Ying Zhao

Institute of Photo Electronics thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology, P. R. China

2TuPo.4.27

Reduction of Light Reflectance of Thin Film Silicon Solar Cells by Insertion of Anti-Reflection Layer between Boron-Doped ZnO Films and Glass

K. Maejima[1)], T. Koida[2)], H. Sai[2)], T. Matsui[2)] and I. Yoshida[1)]

[1)]Thin Film Silicon Laboratory, Photovoltaic Power Generation Technology Research Association, JAPAN, [2)]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology, JAPAN

2TuPo.4.28

Investigation of Amorphous Silicon Oxide Thin Films Based on Surface Passivation of Crystalline Silicon

Liping Zhang[1)], Wanwu Guo[1)], Wenzhu Liu[1)], Jian Bao[2)], Jinning Liu[1)], Dongliang Wang[2)], Fanying Meng[1)] and Zhengxin Liu[1)]

[1)]Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China, [2)]State Key Laboratory of PV Science and Technology, Trina Solar, China

2TuPo.4.29

The Light-induced Degradation Behavior of Hydrogenated Amorphous Silicon Thin Film Solar Cells Prepared by Expanding Thermal Plasma Chemical Vapor Deposition

T. Nagai[1)], T. Matsui[1)], J. Melskens[2)], M. Fischer[2)], A. H. M. Smets[2)], M. Zeman[2)] and M. Kondo[3)]

[1)]Research Center for Photovoltaic technology, National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)]Photovoltaic Materials and Devices, Delft University of Technology, The Netherlands, [3)]Fukushima Renewable Energy Institute, National Institute of Advanced Industrial Science and Technology (AIST), Japan

2TuPo.4.30

One Step Electrochemical Process for Production of Si Film from SiO_2

Y. Sakanaka[1)] and T. Goto[1)], T. Ishikawa[2)] and Y. Fukunaka[2)]

[1)]Depart of Environmental System Science, Doshisha University, Japan, [2)]Japan Aerospace Exploration Agency, Japan

2TuPo.4.31

Crystalline Silicon Germanium Films Grown On Crystalline Silicon Substrates by Solid Phase Crystallization

Y. Kojima[1)] and M. Isomura[1, 2)]

[1)]Graduate school of Engineering, Tokai University, Japan, [2)]Department of Electrical and Electronic Engineering, Tokai University, Japan

2TuPo.4.32

Simulation Study of Effect of Heteroepitaxial Growth on Crystalline Germanium Heterojunction Solar Cell

S. Nakano and Y. Takeuchi

Mitsubishi Heavy Industries (MHI), Ltd., Japan

2TuPo.4.33

A Reliable Method for Etching Lines to Separate a-Si:H Solar Cells on Flexible Polyimide Substrates

Xiaoyu Jiao[1)] and Cheng Liu[2)]

[1)]Shanghai Institute of Space Power Sources, China, [2)]Shanghai University, China

2TuPo.4.34

Texturization of Al:ZnO Glass Substrate by Reactive Ion Etching and Its Application to Single Junction a-Si Solar Cells

Gourab Das, Sourav Mandal, Sukanta Dhar, Sukanta Bose, Arpita Jana, Sumita Mukhopadhyay, Chandan

Banerjee, A. K. Barua

Centre of Excellence for Green Energy and Sensor systems, Indian Institute of Engineering Science & Technology, India

2TuPo.4.35

Device Modeling and Simulation of High Efficiency n-type HIT Solar Cells

Wei-Cheng Kuo[1], Po-Wei,Cheng[4], Teng-Hsiang Changa,Yen-Ho Chu[4], Chien-Chieh Lee[2], Jenq-Yang Chang[4], Tomi Li[3] and I-Chen Chen[1]

[1]Institute of Materials Science and Engineering, National Central University, Taiwan, [2]Optical Science Center, National Central University, Taiwan, [3] Department of Mechanical Engineering, National Central University, Taiwan,[4]Department of Optics and Photonics, National Central University, Taiwan

2TuPo.4.36

A Study of Back Electrode Stacked With Low Cost Reflective Layers For Amorphous Si Thin-Film Silicon Solar Cell

Jun-Chin Liu[1,2], Chen-Cheng Lin[1], Yu-Hung Chen[1], Hsin-Wei Lu[1], Yung-Tsung Liu[1], Yu-Ming Wang[3] and Chung-Yuan Kung[2]

[1]Photovoltaic Technology Division, Green Energy and Environment Research Laboratories, Industrial Technology Research Institute (ITRI), Taiwan, [2]Department of Electrical Engineering, National Chung Hsing University, Taiwan, [3]Micro/Nano Manufacturing Technology Department, Mechanical and Systems Research Laboratories, Industrial Technology Research Institute (ITRI), Taiwan

2TuPo.4.37

Development of Large-size Double-textured ZnO:B Substrates and Their Applications to the Solar Cells

Y. Abe[1], P. Sichanugrist[1], C. R. Wronski[3] and M.

Konagai[1,2)]

[1)]Department of Physical Electronics, [2)]Photovoltaics Research Center (PVREC), Japan, [3)]The Pennsylvania State University, USA

2TuPo.4.38

Sensitivity Analysis Design of Photonic Crystals for Optical Absorption Enhancement of Thin Film Silicon Solar Cells

Y. Kawamoto[1)], Y. Tanaka[1)], K. Ishizaki[1)], M. De. Zoysa[1,2)] and S. Noda[1)]

[1)]Department of Electronic Science and Engineering, Kyoto University, Japan, [2)]Hakubi Center for Advanced Research, Kyoto University, Japan

2TuPo.4.39

Properties of Double Layered Silicon Emitter Films Epitaxially Deposited by Sputtering for Crystalline Silicon Solar Cells

Hyejeong Jeong, Inki Kim and Seongjae Boo

Applied Optics and Energy R&BD Group, Korea Institute of Industrial Technology, Republic of Korea

2TuPo.4.40

Multi-functional P-type Hydrogenated Microcrystalline Silicon Oxide Layers in Thin-film Silicon Solar Cells

J. Fang, X. Zhang, Z. Chen, G. Hou, J. Sun, C. Wei and Y. Zhao

Institute of Photo Electronics thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology, P. R. China

2TuPo.4.41

Control of Photo-induced Degradation in a-Si:H Prepared Under PADS Condition

Y. Sobajima[1,2)], D. Sugihara[1)], Y. Nishio[1)], C. Sada[1,2)], A. Matsuda[1,2)] and H. Okamoto[1,2)]

[1]Graduate school of engineering science, Osaka University, Japan, [2]JST-CREST, Japan

2TuPo.4.42LN

Enhancement of Light Trapping in C-Si Solar Cell for Different Periodicities Using Silver (Ag) as the Core of Plasmonic Nanowire

M. M. Alam, S. M. Saifuddin, A. Rahman and Z. U. Mozumder

North South University, Bangladesh

2TuPo.4.43LN

Ellipsometry Study for Inline Diagnosis for Thin Film Silicon Solar Cells

Xiaojing Liu[1], Wei Zi[1], Shengzhong Liu[1,2]

[1]Key Laboratory of Applied Surface and Colloid Chemistry, National Ministry of Education; School of Materials Science and Engineering, Shaanxi Normal University, China, [2]Dalian Institute of Chemical Physics, Dalian National Laboratory for Clean Energy, Chinese Academy of Sciences, China

Tuesday, November 25
14:45 - 16:10 Annex Area 3

3TuPo.5 Thin Film Compound Semiconductor Based PV 1

Chairpersons:
Takayuki Negami (Panasonic Corporation, Japan)
Takahiro Wada (Ryukoku University, Japan)

3TuPo.5.1

Novel Fabrication Route for Carbon-free and Dense $CuInSe_2$ (CIS) Thin Films via a Non-vacuum Process for Solar Cell Application

Young-Joo Eo[1], Wonha Lee[1], Kyunhwan Kim[1], SeJin Ahn[1], Ara Cho[1], Jihye Gwak[1], Kyunghoon Yoon[1], Keeshik Shin[1], Seung Kyu Ahn[1], Jun Sik Cho[1], Ju

Hyung Park[1)], Jin Su Yu[1)], Kihwan Kim[1)], Se Youn Moon[2)], Hyo Rim Jung[3)], Jin Hyeok Kim[3)] and Jae Ho Yun[1)]

[1)]Photovoltaic Laboratory, Korea Institute of Energy Research(KIER), Korea, [2)]High Enthalpy Plasma Research Center, Chonbuk National University, Korea, [3)]Department of Materials Science and Engineering, Chonnam National University, Korea

3TuPo.5.2

Effect of Deposition Pressure on the Properties of Magnetron Sputter Deposited Mo Back Contact for CIGS Solar Cells

W. Li[1,2)], S. Venkataraj[2)], X. Yan[1)] and A. Aberle[1,2)]

[1)]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore, [2)]Department of Electrical and Computer Engineering, National University of Singapore, Singapore

3TuPo.5.3

Study of CIGS Absorber Layer for Photovoltaic Cell Fabricated by CIG Ternary Target During Sputtering Process

Jeon Ryang Lee, Hak-Jun Chung* and Jin-Koog Shin

Korea printed Electronics center, Korea Electronic Technology Institute, Korea

3TuPo.5.4

Wide Band Gap Cu(In,Ga)S_2 Solar Cells with the Junction Prepared on the Rear Surface of the 3-stage Cu-deficiency Absorber Films

S. Nakano[1)], P. Gerhardt[2)], R. Klenk[2)] and R. Kaigawa[1)]

[1)]Department of Electronics and Informatics, Ryukoku University, Japan, [2)]Helmholtz-Zentrum für Materialien und Energie, Institute for Heterogeneous Material Systems, Germany

3TuPo.5.5

The Role of Metal-Alkanolamine Complexes in Hybrid Inks for CIS Thin Films

Ara Cho, SeJin Ahn, Jae Ho Yun, Jihye Gwak, Seung Kyu Ahn, Young-Joo Eo, Jun Sik Cho, Ju Hyung Park, Jin Su Yu, Kihwan Kim, Keeshik Shin and Kyunghoon Yoon

Photovoltaic Laboratory, Korea Institute of Energy Research (KIER), Korea

3TuPo.5.6

Properties of Deep-level Defect in Cu(In, Ga)Se_2 Thin Films Studied by Steady-state Photo-capacitance

X. B. Hu[1)], T. Sakurai[1)], A. Yamada[2)], S. Ishizuka[2)], S. Niki[2)] and K. Akimoto[1)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]National Institute of Advanced Industrial Science and Technology (AIST), Japan

3TuPo.5.7

Selenization of CIS and CIGS Layers Deposited by Spray Pyrolysis

B. J. Babu[1,2)], B. Egaas[3)], S. Velumani[1,4)] and R. Asomoza[1)]

[1)]Department of Electrical Engineering-SEES, CINVESTAV-IPN, Mexico, [2)]Institute of Molecules and Materials, France, [3)]National Renewable Energy Laboratory, USA, [4)]School of Information and Communication Engineering, Sungkyunkwan University, Korea

3TuPo.5.8

Photocarrier Dynamics of Cu(In,Ga)Se_2 Thin Films Revealed by Time-resolved Photoluminescence and Transient Absorption Measurements

M. Okano[1)], Y. Takabayashi[2)], T. Sakurai[2)], K. Akimoto[2)], H. Shibata[3)], S. Niki[3)] and Y. Kanemitsu[1,4)]

[1]Institute for Chemical Research, Kyoto University, Japan, [2]Institute of Applied Physics, University of Tsukuba, Japan, [3]National Institute of Advanced Industrial Science and Technology (AIST), [4]Japan Science and Technology, CREST, Japan

3TuPo.5.9

Photocatalytic Application of Cu_2ZnSnS_4 (CZTS) and Au/CZTS Core/Shell Nanostructures

L. Y. S. Lee, E. Ha, S. C. E. Tsang and K.-Y. Wong

Department of Applied Biology and Chemical Technology, The Hong Kong Polytechnic University, Hongkong SAR

3TuPo.5.10

Cu_2ZnSnS_4 Thin Films Grown by Multi-stage co-evaporation

T. Mise[1], S. Tajima[1], T. Fukano[1], K. Higuchi[1], T. Washio[2,3], K. Jimbo[2,3] and H. Katagiri[2,3]

[1]Toyota Central Research and Development Laboratories, Inc., Japan, [2]Department of Electrical and Electronic Engineering, Nagaoka National College of Technology, Japan, [3]CREST, Japan Science and Technology Agency, Japan

3TuPo.5.11

Influence of Capping During Annealing of $Cu_2ZnSn(S,Se)_4$ Thin Films

Bhagyashree Pani[1] and Udai P Singh[2]

[1]School of Applied Sciences, [2]School of Electronics Engineering, KIIT University, India

3TuPo.5.12

Direct Preparation of $Cu_2ZnSnSe_4$ Films Using Microwave Irradiation and Its Dependence on the Sn/(Sn+Zn) Ratio

S. Hashimoto[1], R. Klenk[2] and R. Kaigawa[1]

[1]Department of Electronics and Informatics, Ryukoku University, Japan, [2]Helmholtz-Zentrum Berlin für

Materialien und Energie, Institute for Heterogeneous Material Systems, Germany

3TuPo.5.13

Characterization of $Cu_2ZnSn(S,Se)_4$ Solar Cells Annealed under Different Atmospheres

Y. Zhang[1)], N. Suyama[2)], M. Goto[2)], J. Kuwana[2)], K. Sugimoto[2)], T. Satake[1)], Y. Kurokawa[2)], M. Yin[1)] and A. Yamada[2)]

[1)]Technical Research Institute, Toppan Printing Co., Ltd., Japan, [2)]Department of Physical Electronics, Tokyo Institute of Technology, Japan

3TuPo.5.14

$Cu_2ZnSnSe_4$ Films Directly Synthesized by the Reaction for One Second from Elemental Metal Precursor Using a Spot Welding Machine

S. Shibata[1)], R. Klenk[2)] and R. Kaigawa[1)]

[1)]Department of Electronics and Informatics, Ryukoku University, Japan, [2)]Helmholtz-Zentrum für Materialien und Energie, Institute for Heterogeneous Material Systems, Germany

3TuPo.5.15

Effects of Sodium on Electrical Properties in CZTS Single Crystal

A. Nagaoka[1)], K. Yoshino[2)] and Y. Nose[1)]

[1)]Department of Materials Science and Engineering, Kyoto University, Japan, [2)]Department of Applied Physics and Electronic Engineering, University of Miyazaki, Japan

3TuPo.5.16

Photoluminescence of CdTe Doped with a Novel Cu Doping for CdTe/CdS Solar Cells

S. Seto[1)], Y. Ogawa[2)], A. Hosono[2)] and T. Okamoto[2)]

[1)]Department of Electrical Engineering, Ishikawa National College of Technology, Japan, [2)]Department of Electrical and Electronic Engineering, Kisarazu

National College of Technology, Japan

3TuPo.5.17

Withdrawn

3TuPo.5.18

Pulsewidth Dependence of 532 nm Laser Scribing of Thin Film CdTe Photovoltaic Devices in the Picosecond Regime

B. Baird[1)] and T. Gerke[2)]

[1)]Summit Photonics LLC, USA, [2)]Fianium Ltd., USA

3TuPo.5.19

Low Temperature Solution Process for the Deposition of $CuCdS_2$ Thin Films as a Novel Absorber for the Fabrication of Thin Film Solar Cells

V. Nirmal Kumar[1,2)], R. Gopalakrishnan[1)], R. Suriakarthick[1)], Y. Hayakawa[2)], H. Shamima[3)], S. Chakravarty[3)] and G. M. Bhalerao[3)]

[1)]Anna University, INDIA, [2)]Research Institute of Electronics, GSST, Shizuoka University, JAPAN, [3)]UGC-DAE Consortium for Scientific Research, INDIA

3TuPo.5.20

Evaluation of Surface Potential Distributions Around Grain Boundaries and Minority-carrier Diffusion Lengths in Impurity Doped n- and p- type $BaSi_2$ Epitaxial Films

D. Tsukahara[1)], M. Baba[1)], K. Toko[1)], K. O. Hara[2)], N. Usami[2,3)], K. Watanabe[1)], T. Sekiguchi[4)] and T. Suemasu[1,3)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]Graduate School of Engineering, Nagoya University, Japan, [3)]Japan Science and Technology Agency, CREST, Japan, [4)]National Institute for Materials Science, Japan

3TuPo.5.21

Evaluation of Diffusion Coefficients of n-type and p-type Impurities in $BaSi_2$ Epitaxial Films Grown by Molecular Beam Epitaxy

N. Zhang[1)], K. Nakamura[1)], M. Baba[1)], K. Toko[1)] and T. Suemasu[1, 2)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]CREST-JST, Japan

3TuPo.5.22

Properties of Bismuth Selenide and Copper Doped Bismuth Selenide Films Deposited by Solution Route

Fatima Subait Al Wahshi, Shifaa Mohsen Al Baity, Saeed Ali Abdulla Yalyali, Abeer Ali Al Yafeai, Muntaser Al Mansoori and Sovannary Phok

National Energy and Water Research Center, Abu Dhabi Water and Electricity Authority, United Arab Emirates

3TuPo.5.23

Effects of Surface Conditions and Grain Boundaries on Minority-carrier Lifetime in Undoped *n*-$BaSi_2$ on Si(111)

R. Takabe[1)], K. O. Hara[2)], M. Baba[1)], W. Du[1)], K. Toko[1)], N. Usami[2,3)] and T. Suemasu[1,3)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]Graduate School of Engineering, Nagoya University, Japan, [3)]Japan Science and Technology Agency, CREST, Japan

3TuPo.5.24

Transparent p-type NiO Films by Reactive-sputtering Method Using the Facing Target System

Y. Furuya, T. Nomoto and N. Tsuboi

Niigata University, Japan

3TuPo.5.25

Sulfur Annealing of Electrochemically Deposited Iron Sulfide Films and Its Impact on Properties of pn Heterojunction with ZnO

T. Kajima[1)], S. Kawai[2)] and M. Ichimura[1)]

[1)]Dept. Eng. Phys., Electron., Mech., Nagoya Institute of Technology, Japan, [2)]DENSO CORP. Research Laboratories, Japan

3TuPo.5.26

Theoretical and Experimental Studies on Wide Band Gap p-type Conductive BaCuSeF and Related Compounds

Hiroshi. Sakakima[1)], Koichi. Yamamoto[1)], Mikihiko Nishitani[2)] and Takahiro. Wada[1)]

[1)]Ryukoku University, Japan, [2)]Osaka University, Japan

3TuPo.5.27

Nano-dipole Thin Film Solar Cell with Conversion Efficiency of 9.36%

B. Yang[1)], F. Huang[1)], X. Liu[1)], H. Li[1)], J. Han[2)], M. Besland[2)]

[1)]The Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Engineering, China, [2)]Institut des Matériaux Jean Rouxel (IMN), Universit de Nantes, France

3TuPo.5.28LN

Kinetically Metallized Carbon-free $CuInGaSe_2$ Solar Cell by Supersonic Spraying Dry Nanoparticles

J. J. Park, J. G. Lee, D. Y. Kim, M. Liou, and S. S. Yoon

Korea University, Republic of Korea

3TuPo.5.29

Polarized Raman spectroscopy of single crystal $Cu_2ZnSnSe_4$

D. Nam[1)], J. Kim[1)], J.-U. Lee[1)], A. Nagaoka[2)], K. Yoshino[2)], W. Cha[1)], H. Kim[1)], I. C. Hwang[3)], K. B. Yoon[3)] and H. Cheong[1)]

[1)]Department of Physics, Sogang University, Korea, [2)]Department of Electrical and Electronic Engineering, University of Miyazaki, Japan, [3)]Korea Center for Artificial Photosynthesis, Center for Microcrystal Assembly, Department of Chemistry, Sogang University, Korea

Tuesday, November 25
16:30 - 17:55 Annex — Area 3

3TuPo.6 Thin Film Compound Semiconductor Based PV 2

Chairpersons:
Katsumi Kushiya (Solar Frontier, Japan)
Akira Yamada (Tokyo Institute of Technology, Japan)

3TuPo.6.1

$Cu(In,Ga)Se_2$ Polycrystalline Thin Films Deposition by Hybrid Process

P. Reyes[1,2)], T. Painchaud[2)], L. Arzel[2)] and N. Barreau[2)] and S. Velumani[1,3)]

[1)]Department of Electrical Engineering (SEES), Mexico, [2)]Institut des Matéraux Jean Rouxel (IMN), Universit de Nantes, France, [3)]School of Information and Communication Engineering, Sungkyunkwan University, Korea

3TuPo.6.2

Structural And Morphological Studies of CIGS Thin Film Deposited by Spin Coating Using Nanoparticle- Based Ink

M. Rohini[1)], P. Reyes[1)], S. Velumani[1,2)] and I. G. Becerril-Juárez[1)]

[1)]Department of Electrical Engineering (SEES), Mexico, [2)]School of Information and Communication Engineering, Sungkyunkwan University, Korea

3TuPo.6.3

Study on the DC Sputtered Mo On Soda-lime Glass for CIGS Solar Cells

Heejin Ahn and Youngho Um

Physics of Ulsan, Republic of Korea

3TuPo.6.4

$Cu_2ZnSn(S,Se)_4$ Thin Films Prepared by Annealing in Sulfur, Selenium and Tin Mixing Atmosphere for Photovoltaic Applications

Mitsuki Nakashima[1)], Toshiyuki Yamaguchi[1)], Yuichi Mizui[1)], Junji Sasano[2)] and Masanobu Izaki[2)]

[1)]Wakayama National College of Technology, Japan, [2)] Toyohashi University of Technology, Japan

3TuPo.6.5

The Photoelectrochemical Performances of AgInSSe Thin Films Created Using Selenization of Chemical Bath Deposition Ag-In-S precursors

Kong-Wei Cheng, Yun-Ju Chang and Shan-Gche Hsieh

Department of Chemical and Materials Engineering, Chang Gung University, Taiwan

3TuPo.6.6

The Effect of 2nd Time Dependence of $Cu(In,Ga)Se_2$ Films Deposited by Three Stage Methods

Ho-Jung Jeong[1)], Dae-Seon Kim[2)], Guk-Jin Jeon[2)], Ye-chan Kim[2)] and Jae-Hyung Jang[1,2,3)]

[1)]WCU Department of Nanobio Materials and Electronics, Gwangju Institute of Science and Technology, Korea, [2)]School of Information and Communications, Gwangju Institute of Science and Technology, Korea, [3)]Research Institute of Solar and Sustainable Energies, Gwangju Institute of Science and Technology, Korea

3TuPo.6.7

Characterization of $CuInS_2$ Thin Films Prepared from Materials Grown by Mechanochemical Method and Their Photovoltaic Applications

Y. Akaki[1], K. Sugimoto[1], S. Nakamura[2], T. Yamaguchi[3] and K. Yoshino[4]

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3TuPo.6.8

Fabrication of $CuIn_{1-x}Ga_xSe_2$ Thin Film Solar Cells from $CuInSe_2$/$CuGaSe_2$ Bilayers

S. Chatraphorn[1,2], B. Noikaew[1,2], B. Namnuan[1,2], S. Sukaiem[1,2] and K. Yoodee[1,2]

[1]Department of Physics, Faculty of Science, Chulalongkorn University, Thailand, [2]Research Center in Thin Film Physics, Thailand Center of Excellence in Physics, Thailand

3TuPo.6.9

Study of $Cu_2ZnSnSe_4$ Thin Film Deposited by co-evaporation

Bhagyashree Pani[1] and Udai P Singh[2]

[1]School of Applied Sciences, [2]School of Electronics Engineering KIIT University, India

3TuPo.6.10

Thin-Film Solar Cells with Cu_2ZnSnS_4 / Cu_2SnS_3 Double Heterojunctions

T. Toyama and R. Tsuji

Kaneka Fundamental Technology Alliance Research Laboratories, Graduate School of Engineering, Osaka University, Japan

3TuPo.6.11

Study of Kesterite Phase Formation by Selenization of Electrodeposited Cu-Sn-Zn Thin Films

A. Crossay[1], D. Colombara[1], L. Vauche[2], S. Jaime[2], M. Guennou[3], N. Valle[3], P.-P. Grand[2] and P. J. Dale[1]

[1]Laboratory for Energy Materials - Universit du Luxembourg, Luxembourg, [2]NEXCIS, France, [3] Département Science et Analyse des Matériaux Centre de Recherche Public-Gabriel Lippmann, Luxembourg

3TuPo.6.12

Fabrication and Evaluation of $Cu_2ZnSnSe_4$ Solar Cells by Co-sputtering Followed by Short Duration RTP Selenization for Large Area Application

T. Prem kumar[1], Yon-kil Jeong[1], Hojung Jeong[1,2], N. L. Tarwal[1], Kwanwoo Nam[1], Guk-Jin Jeon[1,2], Kim Ye-Chan[1,2] and Jae-Hyung Jang[1,2]

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3TuPo.6.13

Influence of Cu Content on Properties of CZTSe Thin Films Fabricated by Co-evaporation

Ding Sun, Yang Ge, Li Zhang, Sheng-zhi Xu, Chang-chun Wei, Ying Zhao and Xiao-dan Zhang

Institute of Photo Electronics thin Film Devices and Technology of Nankai University, Key Laboratory of Photoelectronic Thin Film Devices and Technology, P.R. China

3TuPo.6.14

Study of Sulfurization Condition for Controlling the Morphology of CZTS Thin Films

T. Washio[1,2], K. Jimbo[1] and H. Katagiri[1,2]

[1]Nagaoka National College of Technology, Japan, [2] JST-CREST, Japan

3TuPo.6.15

Optical Properties of $Cu_2ZnSnSe_4$ and Cu_2SnSe_3 Thin Films Studied by Spectroscopic Ellipsometry

S. Minoura[1], H. Tampo[2], Y. Hirate[1], K. Kim[2], H. Shibata[2], S. Niki[2] and H. Fujiwara[1]

[1]Center of Innovative Photovoltaic Systems (CIPS), Japan, Gifu University, Japan, [2]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan

3TuPo.6.16

Fabrication of CdS/CdTe Solar Cells with Transparent p-type Conductive BaCuSeF Back Contact

K. Yamamoto[1], H. Sakakima[1], Y. Ogawa[2], A. Hosono[2], T. Okamoto[2] and T. Wada[1]

[1]Department of Materials Chemistry, Ryukoku University, Japan, [2]Kisarazu National College of Technology, Japan

3TuPo.6.17

Study on Laser Annealed CdTe Thin Films Deposited by Thermal Evaporation Technique

N. A. Khan[1], M. A. Islam[1], K. S. Rahman[1], F. Haque[1], P. Chelvanathan[1], M. M. Alam[3], K. Sopian[1] and N. Amin[1,2,3]

[1]Solar Energy Research Institute, The National University of Malaysia, Malaysia, [2]Department of Electrical, Electronic and System Engineering, Faculty of Engineering and Built Environment, The National University of Malaysia, Malaysia, [3]Advanced Materials Research Chair, Chemistry Department, College of Sciences, King Saud University, Saudi Arabia

3TuPo.6.18

Epitaxial Growth of $BaSi_2$ Films on Ge(111) Substrates by Molecular Beam Epitaxy

R. Takabe[1)], M. Baba[1)], W. Du[1)], K. Toko[1)], K. O. Hara[2)], N. Usami[2,3)] and T. Suemasu[1,3)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]Graduate School of Engineering, Nagoya University, Japan, [3)]Japan Science and Technology Agency, CREST, Japan

3TuPo.6.19

Intrinsic Point-Defect Engineering to Improve the Electronic Properties of Cuprous Oxide for Photovoltaics

S. C. Siah[1)], M. A. Lloyd[1)], S. Johnston[2)], R. E. Brandt[1)], Y. S. Lee[1)] and T. Buonassisi[1)]

[1)]Massachusetts Institute of Technology, United States, [2)]National Renewable Energy Laboratory, United States

3TuPo.6.20

Numerical Simulation of New Earth-abundant SnS/ $BaSi_2$ Thin-film Solar Cells with High Efficiencies Exceeding 20 %

K. O. Hara[1,2)] and N. Usami[1,2)]

[1)]Graduate School of Engineering, Nagoya University, Japan, [2)]JST-CREST, Japan

3TuPo.6.21

Not Conventional Synthesis of Lead Telluride Applied to a Solar Cell

K. J. Mendoza Peña[1)], J. A. Heredia Cancino[1)], R. Ochoa Landín[2)], S. J. Castillo[1)]

[1)]Departamento de Investigación en Física, Universidad de Sonora, México, [2)]Departamento de Física, Universidad de Sonora, México

3TuPo.6.22

Growth and Photoresponse Properties of Polycrystalline Ge Films Formed on Al-induced Crystallization Seed Layer

K. Nakazawa, K. Toko and T. Suemasu

University of Tsukuba, Institute of Applied Physics, Japan

3TuPo.6.23

Study on Optical Properties and Resistivity of RF Magnetron Sputtered AZO: H Film Used in CdTe Solar Cells

Z. Du, H. Li and X. Liu

The Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Engineering, CAS, Canada

3TuPo.6.24

Two-Step Heat-Treatment Effects on Properties of In_2O_3 Based Transparent Conducting Thin Films Epitaxially Grown on Sapphire Substrate

T. Aoshima, Y. Muraki and Y. Sato

Akita University, Japan

3TuPo.6.25

Thin Films of Single Wall Carbon Nanotube and Reduced Graphene Oxide Back Electrodes for CdTe Solar Cell

L. Bao[1.2)], B. Yang[1)], H. Li[1)], H. Zhou[2)] and X. Liu[1)]

[1)]The Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Engineering, CAS, China [2)]The School of Electronic and Computer Engineering, Peking University Shenzhen Graduate School, Peking University, China

3TuPo.6.26

Improvement of Electrical and Optical Characterization on Sprayed Ga-doped ZnO Films Grown by Hydrogen Annealing

Kenta Hamachi[1)], Akiko Ide[1)], Akiko Mochihara[1)], Kenji Yoshino[1)], Minoru Oshima[2)], Yujin Takemoto[2)], Kouji Toyota[2)], Koichiro Inaba[2)], Ken-ichi Haga[2)] and Toshio Naka[2)]

[1)]Department of Electrical and Electronic Engineering, University of Miyazaki, Japan, [2)]Tosoh Finechem Corporation, Japan

3TuPo.6.27

Computational Nano-Materials Design and General Rule of Self-regeneration, Self-organization, and Self-Survival of the Low-Cost, Environment-Friendly and High-Efficiency Photovoltaic Solar Cells

H. Katayama-Yoshida[1)], K. Sato[2,3)], H. Asahina1 and T. Fukushima[1)]

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3TuPo.6.28LN

Synthesis, Characterization of CZTSSe Thin Film Materials and Related Solar Cells

Xiaodong Ren[1)], Shengzhong Liu[1,2)]

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Tuesday, November 25
10:15 - 11:30 Annex Area 4

4TuPo.7 Wafer-Based Crystalline Silicon 1

Chairperson:
Kentaro Kutsukake (Tohoku University, Japan)

4TuPo.7.1

Comparative Study of Indium Tin Oxide Prepared by Pulsed-DC and RF Magnetron Sputtering at Low Temperature and Low Power Conditions

M. Huang[1)], Z. Hameiri[1,2)], A. G. Aberle[1)] and T. Mueller[1)]

[1)]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore, [2)]Now with: School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

4TuPo.7.2

Suppression of Carrier Tunneling Effect in Interdigitated Back-Contacted Back-Junction Silicon Solar Cell by Lateral Diffusion

C. M. Wei, H. L. Chen, Y. K. Tsao, S. Y. Liu, K. C. Lai and Y. P. Pai

Motech Industries, Inc., Science Park Branch, Taiwan

4TuPo.7.3

Comparative Study of Laser Doping and Laser Transfer Doping of Boron from a Spin-on Source into Crystalline Silicon

M. Ernst, A. Fell and K. Weber

Centre for Sustainable Energy Systems, Australian National University, Australia

4TuPo.7.4

Realization of Excellent Passivation with Wide Bandgap a-SiOx:H Thin Film for the Application to Silicon Heterojunction Solar Cells

He Zhang[1)], Kazuyoshi Nakada[2)], Shinsuke Miyajima[2)] and Makoto Konagai[1,2)]

[1)]MEXT/FUTURE-PV Innovation Research, JST, Japan, [2)]Department of Physical Electronics, Tokyo Institute of Technology, Japan

4TuPo.7.5

Solar Cells Based in ITO and ITON Thin Films

M. Sparvoli[1)], R. K. Onmori[2)] and J. F. D. Chubaci[2)]

[1)]Universidade Federal do ABC, Brasil, [2)]Universidade de São Paulo, Brasil

4TuPo.7.6

Numerical Simulation of Emitter Fraction on Interdigitated Back Contact Solar Cells

Kuang-Chieh Lai, Chih-Ming Wei, Yu-Pan Pai, Yun-Kuo Tsao and Shu-Yen Liu

Back Contact Cell Technology Development Project, Motech Industries, Inc, Taiwan

4TuPo.7.7

Analysis of Small Area Interdigtiated Back Contact Silicon Solar Cells: The Influence of Boron Diffusion Process on Cell Performances

S. Y. Liu, Y. K. Tsao, Z. L. Yao, B. S. Lee, K. C. Lai and Y. P. Pai

Motech Industries, Inc., Taiwan

4TuPo.7.8

Control of Passivation Properties by Plasma Diagnostics in a-Si:H/c-Si Heterojunction Solar Cells

G. H. Wang, R. D. Hu, L. Zhao, H. W. Diao and W. J. Wang

Key Laboratory of Solar Thermal Energy and Photovoltaic System of Chinese Academy of Sciences, Institute of Electrical Engineering, the Chinese Academy of Sciences, China

4TuPo.7.9

Approaching 20% Conversion Efficiency in Silicon IBC Solar Cells with Modulated Surface Textures Based on Nanotexturing of Micro-scale Pyramids

A. Ingenito, O. Isabella and M. Zeman

Delft University of Technology, PVMD/Dimes, The Netherlands

4TuPo.7.10

Influence of Texture Roughness on Contact Finger Geometry of Stencil Printed Silicon Solar Cells

A. Lorenz, T. Strauch, M. Demant, T. Barnes Hofmeister, J. Seiffe, M. Linse, F. Clement and D. Biro

Fraunhofer Institute for Solar Energy Systems ISE, Germany

4TuPo.7.11

Withdrawn

4TuPo.7.12

Spectrally-resolved Photoluminescence of Light Trapping Structures for Silicon Solar Cells

C. Barugkin, T. P. White, T. K. Chong, T. Allen, K. J. Weber and K. R. Catchpole

Centre for Sustainable Energy Systems, The Australia National University, Australia

4TuPo.7.13

Silicon Heterojunction Solar Cells with Novel Fluorinated n-type Nanocrystalline Silicon Oxide Emitters on p-type c-Si

Sukanta Dhar, Sourav Mandal, Gourab Das, Chandan Banerjee, Sumita Mukhopadhyay and A. K. Barua

Centre of Excellence for Green Energy and Sensor Systems, Indian Institute of Engineering Science & Technology, India

4TuPo.7.14

The Influence of Metal Contact Ratio on IBC Solar Cell

Z. L. Yao, Y. P. Pai, K. C. Lai, S. Y. Liu, Y. K. Tsao and B. S. Lee

Motech Industries, Inc., Science Park Branch, Taiwan

4TuPo.7.15

Investigation of Fine Line Screen-printed and Stencil-printed Ag Metal Contacts for Silicon Wafer Solar Cells

Naomi Nandakumar[2)], Vinodh Shanmugam[1,2)], Johnson Wong[1)], Jessen Cunnusamy[3)], Michael Zahn[3)] Andrew Zhou[3)], Rado Yang[3)], Xiao Chen[3)], Thomas Mueller[1)] and Armin G. Aberle[1,2)]

[1)]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore, [2)]Electrical and Computer Engineering Department, National University of Singapore, Singapore, [3)]DEK Solar, U.K.

4TuPo.7.16

Spin-Coating Alumina Thin Films For Back Side Passivated Silicon Solar Cell

Takuma Noguchi, Abdullah Uzum, Hiroyuki Kanda and Seigo Ito

University of Hyogo, Japan

4TuPo.7.17

Spatial Atomic Layer Deposition of Intrinsic Zinc Oxide Films for Application in the Photovoltaic Industry

Naomi Nandakumar[1,2)], Bas Dielissen[3)], Diana Garcia-Alonso[4)], W. M. M. Kessels[4)], Roger Gortzen[3)], Armin G. Aberle[1,2)] and Bram Hoex[1)]

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SoLayTec B. V., Netherlands, [4]Department of Applied Physics, Eindhoven University of Technology, Netherlands

4TuPo.7.18

Thermal Stability of Single Al_2O_3 Film and Al_2O_3/SiN_x Film Stack for c-Si Surface Passivation

Chunlan Zhou, Yan Zhao, yehua Tang, Su Zhou and Wenjing Wang

Key Laboratory of Solar Thermal Energy and Photovoltaic System, Institute of Electrical Engineering, Chinese Academy of Sciences, China

4TuPo.7.19

Withdrawn

4TuPo.7.20

Structure of AlOx Passivation Films Deposited by Mist CVD Method for Solar Cell Applications

K. Iguchi[1,3], S. Kitano[1], S. Miki[1,3], A. Ogura[2,3], H. Yoshida[1,3], S. Satoh[1,3] and K. Arafune[1,3]

[1]University of Hyogo, Japan, [2]Meiji University, Japan, [3]JST-CREST, Japan

4TuPo.7.21

Characterization of Laser Transferred Contact through Aluminum Oxide Passivation Layer

Shunsuke Urabe[1], Junpei Irikawa[1], Makoto Konagai[1,2] and Shinsuke Miyajima[1]

[1]Graduation School of Science and Engineering, Japan, [2]PVREC, Japan

4TuPo.7.22

Impact of the Firing Step on the Al_2O_3 Passivation on p-type Cz Si Wafers

M. Pawlik[1,2], J-P. Vilcot[1], M. Halbwax[1], M. Gauthier[3] and N. Le Quang[3]

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Lille, France, [3]EDF ENR PWT (PHOTOWATT), France

4TuPo.7.23

Mercury: Record Efficiency of Industrial 6" IBC with Front Floating Emitter

A. A. Mewe, I. Cesar, N. Guillevin, A. R. Burgers, E. E. Bende, L. J. Geerligs and A. W. Weeber

ECN Solar Energy, The Netherlands

4TuPo.7.24

Impact of Sputtering Ion Bombardment on the Heterointerfaces of a-Si:H/c-Si Solar Cells with Double-layered In_2O_3:Sn Structures

M. Tamakoshi and N. Matsuki

Center for Innovative Photovoltaic Systems (CIPS), Gifu University, Japan

4TuPo.7.25

Loss Analysis of Laser-doping PERL Solar Cells with Various Substrate Thicknesses

Dianlei Wang[1)], Shuquan Chen[1)], Zongcun Liang[1,2)], Qinglin Zheng[1)] and Hui Shen[1,2)]

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4TuPo.7.26

Ultra-fast, Single-side Alkaline Etching Process of Crystalline Silicon

S. M. Yu[1)], W. C. Sun[2)], W. Y. Chou[2)], S. Y. Wei[2)], H. C. Chen[3)], L. T. Huang[3)] and L. S. Huang[3)]

[1)]Department of Engineering and System Science, National Tsing Hua University, Taiwan, [2)]Material & Chemical Research Laboratories, Industrial Technology Research Institute, Taiwan, [3)]Infina Technology Co.,Ltd., Taiwan

4TuPo.7.27

Automated Methods for Determining Bulk Doping Density from Simultaneous Photoconductance and Photoluminescence Measurements

M. K. Juhl, Z. Hameiri and T. Trupke

The School of Photovoltaic and Renewable Energy Engineering, The University of New South Wales, Australia

4TuPo.7.28

TiO_2 Nanoparticle/Liquid Source SiO_2 Back Reflector for Solar Cells

T. Murooka and H. Nagayoshi

Tokyo National College of Technology, Japan

4TuPo.7.29

Quantifying the Recombination Strength of Grain Boundaries in Multicrystalline Silicon Wafers Through Photoluminescence Imaging

H. C. Sio[1)], T. Trupke[2)] and D. Macdonald[1)]

[1)]Research School of Engineering, The Australian National University (ANU), Australia, [2)]BT Imaging Pty Ltd, Australia

4TuPo.7.30

Crystallographic and Electronic Quality of Si Single Crystals Grown by the Noncontact Crucible Method

K. Nakajima[1)], R. Murai[1)], S. Ono[1)], K. Morishita[2)], D. M. Powell[3)], M. Kivambe[3)] and T. Buonassisi[3)]

[1)]FUTURE-PV Innovation, Japan, [2)]Graduate School of Engineering, Kyoto University, Japan, [3)]Massachusetts Institute of Technology, USA

4TuPo.7.31

Interconnection Process by Using Conductive Film for Crystalline Silicon Photovoltaic Modules

Keiko Kizawa[1)], Shigenori Shimizu[1)], Naotaka Tanaka[1)], Takeshi Horiuchi[2], Yuka Ito[2] and Atsushi Masuda[3]

[1]Hitachi Chemical Co., Ltd., Japan, [2]Hitachi Chemical Co., Ltd., Japan, [3]National Institute of Advanced Industrial Science and Technology, Japan

4TuPo.7.32

Laser Doping of Boron-Doped Si Paste for High Efficiency Si Solar Cells

Yuka Tomizawa[1], Tetsuya Imamura[1], Masaya Soeda[1,2], Yoshinori Ikeda[1] and Takashi Shiro[1,2]

[1]Electronics Materials Development Project, New Business Development Business Unit, Teijin Limited, Japan, [2]NanoGram Corporation, USA

4TuPo.7.33

The Influence of Blistering Defect on Aluminum Oxide Passivation on Interdigitated Back Contact Solar Cell

Yun-Kuo Tsao, Kuang-Chieh Lai and Richard Pai

Motech Industries, Inc., Taiwan

4TuPo.7.34

Rapid Optimal Process Development Coupled with Optical Emission Spectroscopy on Intrinsic Hydrogenated Amorphous Silicon as a Passivation Layer Prepared by PECVD for Solar Cell

Yu-Lin Hsieh[1], Chien-Chieh Lee[2], Tomi T. Li[1], Chia-Cheng Lu[1], Jenq-Yang Chang[3], I-Chen Chen[4] and Ju-Yi Lee[1]

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4TuPo.7.35

Co-Diffusion of Locally Patterned N$^+$ and P$^+$ Doped Layers for Interdigitated Back Contact Solar Cells by Ultrasonic Spray Technique

S. Y. Wei[1)], W. C. Sun[1)], J. W. Liao[2)], T. I. Lin[1)], C. Y. Kuo[2)], S. M. Yu[1)], C. H. Wu[3)], K. B. Chen[3)], H. H. Wu[3)], H. C. Lin[3)], N. T. Ou[3)], K. W. Huang[3)], K. Y. Wu[4)], C. H. Yu[5)], C. C. Cho[5)], J. C. Lee[5)] and J. H. Tsai[5)]

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4TuPo.7.36

Formation and Evaluation of N-type Emitter by Phosphorus Thermal Diffusion For Crystalline Silicon Solar Cells

H. Imaeda[1,3)], K. Urushibata[1,3)], Y. Miki[1)], I. Nakagoshi[1)], S. Miki[1)], A. Ogura[2,3)], H. Yoshida[1,3)], S. Sata[1,3)] and K. Arafune[1,3)]

[1)]University of Hyogo, Japan, [2)]University of Meiji, Japan, [3)]JST-CREST, Japan

4TuPo.7.37

Impact of Growth Rate on Multicrystalline Silicon Grown from Small Randomly Oriented Seeds

R. R. Prakash[1,2)], K. Jiptner[1)], Y. Miyamura[1)], J. Chen[1)], H. Harada[1)] and T. Sekiguchi[1,2)]

[1)]National Institute for Materials Science, Japan, [2)]Graduate School of Pure and Applied Science, University of Tsukuba, Japan

4TuPo.7.38

High-sensitivity Infrared Imaging Polariscope for Prompt Characterization of Residual Strain in Large Cast-grown Silicon

K. Fuchuya, M. Yamada and M. Fukuzawa

Graduate School of Science and Technology, Kyoto Institute of Technology, Japan

4TuPo.7.39

Polysilazane Based Solution-derived Diffusion Barrier Layer for Back Contact Crystalline Si Solar Cell

Y. Jiang, Y. Ishikawa, S. Yoshinaga, T. Honda, M. Horita and Y. Uraoka

NARA INSTITUTE of SCIENCE and TECHNOLOGY, JAPAN

4TuPo.7.40

Impact of N_2O Plasma Pretreatment Prior to Silicon Nitride Deposition on Silicon Solar Cells with Ni-Cu Based Front Metallization

M. Raval[1,2], S. Saseendran[1,3], S. Saravanan[1], B. Arunachalam[1], S. Mallikarjunchary[1], H. Singh[1,2], K. Murukesan[1,3], S. Kumbhar[1], A. Kottantharayil[1,3] and C. Solanki[1,2]

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4TuPo.7.41

Enhancement of PN Si Solar Cells by Graphene Oxide

Guan-Yu Chen, Liang-Jun Chen and Chu-Hsuan Lin

Department of Opto-electronic Engineering, National Dong Hwa University, Taiwan

4TuPo.7.42

Passivation Quality of Cat-CVD SiN_x and SiN_x/P Cat- doped Layers on Textured C-si Wafers

Trinh Cham Thi[1,2], Koichi Koyama[1,2], Keisuke Ohdaira[1,2] and Hideki Matsumura[1,2]

[1]Japan Advanced Institute of Science and Technology (JAIST), Japan, [2]CREST, Japan Science and

Technology Agency (JST), Japan

4TuPo.7.43

High Growth-Rate Sputter-Epitaxy of Low Thread-Dislocation-Density Ge Film on Si (100) Substrate for Solar-Cell Application

Wenchang Yeh, Akihiro Matsumoto, Keisuke Sugihara and Hisataka Hayase

Interdisciplinary Graduate School of Science and Engineering, Shimane University, Japan

4TuPo.7.44

Antireflective Effect of Wide-gap Heterojunction Emitter for Crystalline Silicon Heterojunction Solar Cell

E. O. Ateto[1)], Kazuki Shimizu[1)], Makoto Konagai[1,2)] and Shinsuke Miyajima[1)]

[1)]Graduate School of Science and Engineering, Tokyo Tech, Japan, [2)]PVREC, Tokyo Tech, Japan

4TuPo.7.45

Application of c-Si Surface Oxidation to a-Si/c-Si Heterojunction Solar Cells

T. Oikawa[1)], K. Ohdaira[1,2)] and H. Matsumura[1,2)]

[1)]Japan Advanced Institute of Science and Technology, Japan, [2)]CREST, Japan Science and Technology Agency

4TuPo.7.46

Correlation Between PL Intensity and Dislocation Density in Silicon Crystal Using High Spatial Resolution PL Measurement

S. Ninomiya[1)], K. Kutsukake[1,2)], M. Deura[1)], Y. Ohno[1)], N. Usami[3)] and I. Yonenaga[1)]

[1)]Tohoku University, Japan, [2)]JST PRESTO, Japan, [3)]Nagoya University, Japan

4TuPo.7.47

R&D Activities of C-Si Solar Cells and Modules in AIST(FREA)

K. Shirasawa, Y. Kida, T. Fukuda and H. Takato

National Institute of Advanced Industrial Science Technology, Japan

4TuPo.7.48

Studies of Diamond Wire Sawn Wafers among Different Tension Setting in Processe

Cheng-Fung Yeh, Yen-Chun Chou, Shang-wei Yang, Yu-Chung Chen and Jian-Jiun Wang

Motech Industries, Inc., Taiwan

4TuPo.7.49

Emission-Free Fabrication of mono-Crystalline Si Solar Cells with 16.7% Efficiency

Wenchang Yeh and Takuya Wasa

Interdisciplinary Graduate School of Science and Engineering, Shimane University, Japan

4TuPo.7.50

Void Analysis Using Ultrasonic Mapping Technique for PERC Solar Cell Evaluation

M. Dhamrin, S. Suzuki, M. Matsubara, Y. Nishio and H. Tada

Toyo Aluminium K.K., Japan

4TuPo.7.51

Withdrawn

4TuPo.7.52

A Novel Process for Solar-grade Silicon Production via Electrolysis of SiO_2 Granules in Molten Salt

X. Yang[1,2], K. Yasuda[1,3], T. Nohira[1,2], R. Hagiwara[1], K. Ichitsubo[4], K. Masuda[4] and T. Homma[2,5]

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4TuPo.7.53

Investigation on Rear Surface Passivation of Floating Junction Bifacial Solar Cell

Suhaila Sepeai[1], M. K. M. Khairunaz[1], A. W. Azhari[1,2], N. A. Ludin[1], K. Sopian[1] and Saleem H. Zaidi[1]

[1]Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, Malaysia, [2]School of Environmental Engineering, Universiti Malaysia Perlis, Malaysia

4TuPo.7.54

Influence of Spin-on Doping Process on Surface Passivation Properties of Bulk Si

K. B. Lin[1], J. W. Hu[1], K. Y. Fong[1], T. M. Kuan[2], C. W. Kuo[2], C. Y. Yu[2], C. C. Lee[3], J. Y. Chang[3], T. Li[4] and I. C. Chen[1]

[1]Institute of Materials Science and Engineering, National Central University, Taiwan, [2]TSEC Corporation, Taiwan, [3]Optical Sciences Center, National Central University, Taiwan, [4]Department of Mechanical Engineering, National Central University, Taiwan

4TuPo.7.55

Surface Passivation by Sol-Gel Processed MgO for c-Si Solar Cell Applications

N. Balaji[1], C. Park[1], J. Raja[2], M. Ju[2], S. Lee[2], S. Chung[1] and J. Yi.[1,2]

[1]Department of Energy Science, Sungkyunkwan University, Korea [2]College of Information and Communication Engineering, Sungkyunkwan University, Korea

4TuPo.7.56

Relationship Between Passivation Property and Band Alignment on O3-Based ALD AlOx Surface Passivated Crystalline Si for Photovoltaic Applications

N. Ikeno[1)], Y. Yamashita[1)], H. Oji[2)], T. Katsumata[1,5)], S. Miki[3)], Y. Miki[3)], S. Kitano[3)], K. Arafune[3,5)], H. Yoshida[3,5)], S. Satoh[3,5)], T. Chikyow[4)], I. Hirosawa[2)] and A. Ogura[1,5)]

[1)]Meiji Univ., Japan, [2)]JASRI, Japan, [3)]Univ. of Hyogo, Japan, [4)]NIMS, Japan, [5)]JST-CREST, Japan

4TuPo.7.57

Annealing Behavior of Electrically Active Nitrogen-Oxygen Complexes in Cast-grown Silicon Crystal

K. Sato[1,2)], A. Ogura[1)] and H. Ono[1,2)]

[1)]Meiji University, Japan, [2)]Kanagawa Industrial Technology Center, Japan

4TuPo.7.58

Study of Carrier Recombination at Crystalline Defects Induced by SiN_x Plasma CVD

T. Tachibana[1)], D. Takai[1)], T. Kojima[1)], A. Ogura[2)] and Y. Ohshita[1)]

[1)]Toyota Tech. Inst., Japan, [2)]Meiji Univ. Japan

4TuPo.7.59

Decrease of Effective Lifetime in Si(100) and Si(111) Crystal with SiN_x:H Layer by Light Irradiation

D. Takai, T. Kojima, T. Tachibana, N. Kojima, Y. Ohshita and M. Yamaguchi

Toyota Technological Institute, Japan

4TuPo.7.60

A Modified Metallurgical Refining Process for Multicrystalline Silicon Ingot using a Seed in Directional Solidification

J. K. Lee[1, 3)], J. S. Lee[1)], B. Y. Jang[1)], J. S. Kim[1)], Y. S. Ahn[1)], G. H. Kang[2)] and C. H. Cho[3)]

[1]Advanced Materials and Devices Laboratory, Korea Institute of Energy Research, Republic of Korea, [2]Photovoltaic Laboratory, Korea Institute of Energy Research, Republic of Korea, [3]Graduate School of Energy Science and Technology, Chungnam National University, Republic of Korea

4TuPo.7.61

Understanding the Uniqueness of the Inkjet Metallization of Multicrystalline Silicon Solar Cell

Nian Chen, A. Ebong

Energy Production and Infrastructure Center (EPIC), Department of Electrical and Computer Engineering, University of North Carolina, Charlotte

4TuPo.7.62

HF-free Texturing of Si Wafer for Photo Voltaic Cells

Seung Hyun Ha, Ji Hyeon Kim, In Sang Yoo and Sang Joon Park

Department of Chemical and Biological Engineering, Gachon University, Korea

4TuPo.7.63

Generalized Analysis of the Impact of Emitter Sheet Resistance on Silicon Solar Cell Performance

Nian Chen[1], Keith Tate[2], Ahrar Ahmed Chowdhury[1] and Abasifreke Ebong[1]

[1]Department of Electrical and Computer Engineering, University of North Carolina at Charlotte, United States, [2]School of Electrical and Computer Engineering, Georgia Institute of Technology, United States

4TuPo.7.64

Surface Damage Removal Techniques on Laser Texturization of c-Si Wafers to Achieved High Efficiency

Nurul Huda Abdul Razak[1] and Nowshad Amin[1,2]

[1]Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Malaysia, [2]Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, Malaysia

4TuPo.7.65

Recycling Technology of Precious Metals

T. Yanagisawa

Tanaka Holdings Co., Ltd., Japan

4TuPo.7.66LN

Dual-Junction Perovskite/Silicon Tandem Solar Cell

I. Al Mansouri, A. Ho-Baillie and M. A. Green

University of New South Wales, Australia

4TuPo.7.67LN

High Efficiency Large Area IBC Solar Cells: Processing and Characterization

B.J. O'Sullivan[1], S. Singh[1], K. Manabu[2], M Debucquoy[1] and J. Szlufcik[1]

[1]imec, Belgium, [2]Kyocera Corporation, Japan

4TuPo.7.68LN

Efficient Light Management for Crystalline Silicon Solar Cells

Yahui Liu[1], Shell He[2], Shengzhong Liu[1,3]

[1]Key Laboratory of Applied Surface and Colloid Chemistry, National Ministry of Education, School of Materials Science and Engineering, Shaanxi Normal University, China, [2]Huanghe Hydropower Solar Industry Technology Co.,Ltd, China, [3]Dalian Institute of Chemical Physics, Dalian National Laboratory for Clean Energy, Chinese Academy of Sciences, China

4TuPo.7.69LN

Room Temperature Boron Doping Using UV Pulse Laser with Boron-doped Silicon Nano Ink

M. Manabe[1)], H. Nishimura[1)], T. Fuyuki[1)], Y. Tomizawa[2)] and Y. Ikeda[2)]

[1)]Graduate School of Materials Science, Nara Institute of Science and Technology (NAIST), Japan, [2)]Teijin Co., Ltd., Japan

4TuPo.7.70LN

Relation Between Misorientation Angle and Recombination Activity of Small Angle Grain Boundaries Induced by Multi-seed Casting

T. Kojima[1)], T. Tachibana[1)], Y. Ohshita[1)], R. R. Prakash[2,3)], T. Sekiguchi[2,3)] and M. Yamaguchi[1)]

[1)]Toyota Technological Institute, Japan, [2)]National Institute for Materials Science, Japan, [3)]Tsukuba University, Japan

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Tuesday, November 25
14:45 - 16:10 Annex Area 5

5TuPo.8 III-V Cell & CPV 1

Chairpersons:
Takeyoshi Sugaya (AIST, Japan)
Taishi Sumita (Japan Aerospace Exploration Agency, Japan)

5TuPo.8.1

Evaluation of Conversion Efficiency for Multi-junction Solar Cell with Luminescent Coupling Considering Series and Shunt Resistance Effects

A. Ogura, T. Sogabe and Y. Okada

Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

5TuPo.8.2

Silicon Heterojunction Solar Cells with Plated Contacts for Low Concentration Photovoltaics

M. Despeisse, C. Allebé , J. Champliaud, J. Levrat, A. Descoeudres, A. Faes, L. Barraud, F. Debrot, A.

Lachowicz, N. Badel and C. Ballif

CSEM SA, PV-center, Switzerland

5TuPo.8.3

Characteristics of *InGaP/Ga(In)As/Ge* Solar Cells Fabricated with Wet Chemical Etching Final Process

V. S. Kalinovsky, E. A. Grebenshchikova, P. A. Dmitriev, N. D. Il`inskaya, E. B. Kontrosh, N. M. Lebedeva and A. B. Malevskaya

Ioffe Physical-Technical Institute, Russia

5TuPo.8.4

I-V Curves of Superlattice Solar Cells at High Temperatures

J. Nishinaga[1)], A. Kawaharazuka[2,3)] and Y. Horikoshi[2,3)]

[1)]Research Center for Photovoltaic Technology, AIST, Japan, [2)]Faculty of Science and Engineering, Waseda University, Japan, [3)]CREST, JST, Japan

5TuPo.8.5

Withdrawn

5TuPo.8.6

Growth and Advanced Characterization of InGaP/InGaAs/Ge Triple-Junction Solar Cells

I. A. Alhomoudi[1)], Z. Pulwin[2)], J. A. Ott[3)], M. Hopstaken[3)] and C. Ebert[2)]

[1)]King Abdulaziz City for Science and Technology (KACST), Saudi Arabia, [2)]Veeco Instruments Corporation, USA, [3)]IBM Thomas J. Watson Research Center, USA

5TuPo.8.7

Demonstration of the Mini-band Investigation in Strain-Balanced InGaAs/GaAsP Quantum Well Solar Cells by Combination of a Piezoelectric Photothermal and Photoreflectance Spectroscopies

T. Aihara[1)], T. Murakami[1)], H. Kuradome[1)], T. Sugimoto[1)], H. Suzuki[1)], A. Fukuyama[1)], T. Ikari[1)], K. Toprasertpong[2)], M. Sugiyama[2)] and Y. Nakano[2)]

[1)]Faculty of Engineering, University of Miyazaki, Japan, [2)]Faculty of Engineering, The University of Tokyo, Japan

5TuPo.8.8

Minimized Reduction in Open-circuit Voltage for Quantum Well Solar Cell with Bandgap-Engineered Graded Quantum Well Depths

Xiaohan Li, Vaishno Dasika, Ping-Chun Li, Li Ji, Seth R. Bank and Edward T. Yu

Microelectronics Research Center, The University of Texas at Austin, USA

5TuPo.8.9

Investigation on the Origin of N-H Complex in GaAsN Grown by Chemical Beam Epitaxy Using Deuterated Trisdimethylaminoarsenic

K. Demizu[1)], K. Ikeda[1)], N. Kojima[1)], Y. Ohshita[1)], E. Omar[1)], H. Machida[2)], M. Ishikawa[2)], H. Sudoh[2)] and M. Yamaguchi[1)]

[1)]Toyota Technological Institute, Japan, [2)]Gas-phase Growth Ltd., Japan

5TuPo.8.10

Structural and Optical Characterization of MBE Grown $(In_xGa_{1-x})_2Se_3$ on GaAs(111)

H. Nakamura, N. Kojima, Y. Ohshita and M. Yamaguchi

Toyota Technological Institute, Japan

5TuPo.8.11

***In situ* X-ray Diffraction Study of Strain Relaxation Process of Lattice-mismatched InGaAs / GaAs**

Daisuke Kodera[1)], Toshiaki Nishi[1)], Kazuma Ikeda[1)], Takuo Sasaki[2)], Masamitu Takahasi[2)], Hidetoshi Suzuki[3)], Hiroya Nakamura[1)], Yoshio Ohshita[1)], Nobuaki Kojima, Itaru Kamiya[1)] and Masafumi Yamaguchi[1)]

[1)]Toyota Technological Institute, Japan, [2)]Japan Atomic Energy Agency, Japan, [3)]University of Miyazaki, Japan

5TuPo.8.12

Numerical Study of InGaN-based Solar Cell with Direction of Piezoelectric Field

S. Lee, Y. Honda and H. Amano

Department of Electrical Engineering and Computer Science, Graduate School of Engineering, Nagoya University, Japan

5TuPo.8.13

GaN-based Solar Cell as Grown by the MOCVD and MBE - techniques

J. A. Espinoza-Figueroa[1)], V. H. Mendez-Garcia[1)], M. Lopez-Lopez[2)], Y. Casallas-Moreno[2)], S. Gallardo-Hernandez[2)], VÍctor Sanchez-Resendiz[2)], G. Contreras-Puente[3)], M. Ramirez-Lopez[4)] and F. de Moure-Flores[5)]

[1)]Universidad Autónoma de San Luis Potos , Mexico, [2)]Centro de Investigación y de Estudios Avanzados del I.P.N., Mexico, [3)]Escuela Superior de Fisica y Matematicas del I.P.N., Mexico, [4)]Unidad Profesional Interdisciplinaria en Ingeniería y TecnologÍas Avanzadas del I.P.N., Mexico, [5)]Facultad de Química de la Universidad Autónoma de Querétaro, Mexico

5TuPo.8.14

Evaluation of Misalignments within a CPV Module by the Module Optical Analyzer (MOA): A Case of Study Concerning Temperature Effects on the Module Performance

R. Herrero, S. Askins, I. Antón and G. Sala

Instituto de Energía Solar IES-UPM, Spain

5TuPo.8.15

A Consideration of Cooperative Solar Tracking of An Array of Compact Solar-pumped Lasers Combined with PV Cells for Electricity Generation

T. Motohiro[1,2,3)], A. Ichiki[3)], T. Ichikawa[2)], H. Ito[2)], K.

Hasegawa[2)], S. Mizuno[2)], T. Ito[2)], T. Kajino[2)], Y. Takeda[2)] and K. Higuchi[2,3)]

[1)]Department of Material Sciences and Engineering, Nagoya University, [2)]Toyota Central Research and Development Laboratories, Inc., Japan, [3)]Green Mobility Collaborative Research Center, Nagoya University, Japan

5TuPo.8.16

Influence of Aerosol on Performance of Concentrator Photovoltaics

K. Nomura[1)], K. Imai[1)], Y. Ota[1)], T. Minemoto[2)] and K. Nishioka[1)]

[1)]University of Miyazaki, Japan, [2)]College of Science and Engineering, Ritsumeikan University

5TuPo.8.17

Solar Cell Size Influence on Actual Concentrator Photovoltaic Module Operation Estimated Using Finite Element Method

Y. Ota and K. Nishioka

University of Miyazaki, Japan

5TuPo.8.18

The Effects of Circumsolar and Diffuse Solar Radiation on Cell-in-Cell-Structured CPV Module

D. Hirai, K. Okamoto and N. Yamada

Department of Mechanical Engineering, Nagaoka University of Technology

5TuPo.8.19

Design of Shaped Fresnel Lens by Integration of Pentagon Prisms

K. Araki and H. Nagai

Daido Steel, Japan

5TuPo.8.20

Heat Transfer Analysis of Hybrid Photovoltaic Module for the Conversion of Sunlight into Microwave in Solar Power Satellite

D. Sato[1)], N. Yamada[1)] and K. Tanaka[2)]

[1)]Department of Mechanical Engineering, Nagaoka University of Technology, Japan, [2)]Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency (JAXA), Japan

5TuPo.8.21LN

Structural and PL Investigations of MBE-grown InGaAs and GaAsSb Compounds with Low Lattice-Mismatch to GaAs

A. Maros, N. Faleev and C. Honsberg

Arizona State University, USA

5TuPo.8.22LN

Anti-soiling Coating Based on Silica for Fresnel Lens of Concentrator Photovoltaic

T. Hirohata, Y. Ota and K. Nishioka

Faculty of Engineering, University of Miyazaki, Japan

5TuPo.8.23LN

Characterization and Solar Cell Application of GaSb/AlGaAs Quantum Dots

Martin Elborg[1)], Takeshi Noda[1)], Arthur Bowman III[1)], Takuya Kawazu[1)], Takaaki Mano[1)], Liyuan Han[1)] and Hiroyuki Sakaki[1,2)]

[1)]National Institute for Materials Science, Japan, [2)]Toyota Technological Institute, Japan

5TuPo.8.24LN

High^LIGHT^ SAT (Solar Array Tester): Development of New Generation Large Area Tester for Space Application

Corinne Droz[1)], Nicolas Bassi[1)], Jonas Hiller[1)], Yanik Pelet[1)] and Emilio Fernandez Lisbona[2)]

[1]Pasan SA (Meyer Burger Group), Switzerland, [2]ESA - ESTEC, The Netherlands

Tuesday, November 25
16:30 - 17:55 Annex **Area 5**

5TuPo.9 III-V Cell & CPV 2

Chairpersons:
Kenji Araki (Daido Steel, Japan)
Tatsuya Takamoto (Sharp Corporation, Japan)

5TuPo.9.1

Broadband, Omnidirectional, Flexible Integrated Antireflection Nanostructures for Epitaxial Lift-Off GaAs Solar Cells

Xiaohan Li[1], Ping-Chun Li[1], Li Ji[1], Christopher Stender[2], Rao Tatavarti[2], Kimberly Sablon[3] and Edward T. Yu[1]

[1]Microelectronics Research Center, The University of Texas at Austin, USA, [2]Microlink Devices, Inc., USA, [3]U. S. Army Research Laboratory, USA

5TuPo.9.2

Towards III-V Multi-junction Solar Cells on Si Substrate: Epitaxial GaAs-on-Si Characterization & Performance Modeling

N. Jain, Y. Zhu, P. Goley and M. K. Hudait

Virginia Tech, USA

5TuPo.9.3

MBE-grown 1.0 eV Bandgap InGaAsP Solar Cells on InP(001) Substrates for Application to Multi-junction Solar Cells

Ryuji Oshima[1], Kikuo Makita[1], Hidenori Mizuno[2], Hidetaka Takato[2], Koji Matsubara[1] and Takeyoshi Sugaya[1]

[1]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science

and Technology (AIST), Japan, [2]Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Japan

5TuPo.9.4

Evaluation of Concentrator Photovoltaic Properties of GaInNAsSb Solar Cells

N. Miyashita, N. Ahsan and Y. Okada

Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

5TuPo.9.5

Numerical Analysis and Evaluation of Triple Junction Photovoltaic Cells Bonded with Expanded Area of Bottom Cell

Jonggon Heo[1], Jung Woo Leem[2], Jongmin Kim[1], Jae Su Yu[2] and Won-Kyu Park[1]

[1]Korea Advanced Nano Fab Center, South Korea, [2]Department of Electronics and Radio Engineering, Kyung Hee University, South Korea

5TuPo.9.6

Toward GaAs/Si Tandem Solar Cell on Si Substrate

T. Molière[1,2], C. Renard[1], N. Cherkashin[3], A. Jaffré [2], L. Vincent[1], D. Bouchier[1], J. Alvarez[2], J. P. Kleider[2], D. Mencaraglia[2], A. Michel[3], A. Claverie[3] and J. Connolly[4]

[1]IEF, France, [2]LGEP, [3]CEMES-CNRS, France, [4]Universidad Politecnica de Valencia, Spain

5TuPo.9.7

Calculation and Optimisation of the Absorption Coefficients of Highly Strained, Arbitrary Profile Quantum Wells to Enable 50% Efficient CPV Solar Cells

M. Führer[1], D. Alonso-Álvarez[1], N. J. Ekins-Daukes[1], D. Farrell[2], H. Fujii[2], K. Toprasertpong[2] and M. Sugiyama[2]

[1]Department of Physics, Imperial College London, U.K., [2]Research Center for Advanced Science and Technology, University of Tokyo, Japan

5TuPo.9.8

Hole Trap Acting as Acceptor in P-type GaAsN Grown by Chemical Beam Epitaxy

O. Elleuch, L. Wang, K. Demizu, K. Ikeda, N. Kojima, Y. Ohshita and M. Yamaguchi

Toyota Technological Institute, Japan

5TuPo.9.9

Si Doping in Atomic Layer Epitaxy of GaAsN Thin Films For Multi-Junction Solar Cells

H. Suzuki, T. Yamauchi, T. Haraguchi, A. Fukuyama and T. Ikari

Faculty of Engineering, University of Miyazaki, Japan

5TuPo.9.10

Non-Destructive Investigation of Photovoltaic Performance of GaAs p-n Junction Grown on Si Substrate Using Surface Photo-voltage Spectroscopy

W. Ding[1)], K. Kawano[1)], Y. Li[1)], H. Suzuki[1)], A. Fukuyama[1)], T. Ikari[1)], O. Morohara[2)], H. Geka[2)], Y. Moriyasu[2)], K. Ikeda[3)], N. Kojima[3)] and M. Yamaguchi[3)]

[1)]Faculty of Engineering, University of Miyazaki, Japan, [2)]AsahiKASEI Co. Ltd, Japan, [3)]Toyota Technological Institute, Japan

5TuPo.9.11

GaP/Si Selective Contact Heterojunction Solar Cells: Analytical and Experimental Approaches Towards Improved Efficiency

R. Saive, C. T. Chen, H. S. Emmer and H. A. Atwater

Thomas J. Watson Laboratory of Applied Physics California Institute of Technology, USA

5TuPo.9.12

Simulated Study of GaAsN Solar Cells as Functions of the Doping Level in Front Surface Field (FSF) And Back Surface Field (BSF) Layers

L. Wang, O. Elleuch, N. Kojima, Y. Ohshita and M. Yamaguchi

Toyota Technological Institute, Jap

5TuPo.9.13

Estimating of Cell Temperature in Concentrator Photovoltaic Module Using Direct Normal Irradiance and Ambient Temperature

K. Imai, K. Nomura, Y. Ota and K. Nishioka

Faculty of Engineering, University of Miyazaki, Japan

5TuPo.9.14

Design and Test of Cell-in-cell-structured CPV Modules for Better Solar Energy Conversion

K. Okamoto, D. Hirai and N. Yamada

Department of Mechanical Engineering, Nagaoka University of Technology

5TuPo.9.15

Optical Design and Testing of a Multi-focus Solar Dish CPV System Based on Elliptical Pneumatic Membrane Facets

M. Schmitz[1)], G. Ambrosetti[2)] and A. Steinfeld[1,3)]

[1)]ETH Zurich, Dept. of Mechanical and Process Engineering, Switzerland, [2)]Airlight Energy Manufacuring SA, Switzerland, [3)]Solar Technology Laboratory, Paul Scherrer Institute, Switzerland

5TuPo.9.16

Field Test Analysis of Concentrator Photovoltaic System Focusing on Average Photon Energy and Temperature

Husyira Al Husna[1)], Yasuyuki Ota[1)], Takashi Minemoto[2)] and Kensuke Nishioka[1)]

[1)]Faculty of Engineering, University of Miyazaki, Japan, [2)]Faculty of Science and Engineering, Ritsumeikan University, Japan

5TuPo.9.17

Consideration of Current Mismatch in Multi-junction Solar Cells for Concentrator Photovoltaic Using Field Test Results of Lens Transmittance

K. Nomura, T. Hirohata, Y. Ota and K. Nishioka

University of Miyazaki, Japan

5TuPo.9.18

A 3D Photovoltaic Simulation Tool for Low Concentration and Sun Tracking

I. D. S. Miranda[1)], R. N. Guimarães[2)] and A. P. D. Lima[2)]

[1)]Universidade Federal do Reconcavo da Bahia, Brazil,
[2)]União Metropolitana de Educação e Cultura, Brazil

5TuPo.9.19

Nature Inspired Solar PV Panel Tracking Using Sunflower Based Heliotropism for Higher Efficiency of Solar PV Power System

D. K. Sharma and G. Purohit

School of Engineering, Sir Padampat Singhania University, India

5TuPo.9.20

Step Stress Accelerated Life Tests: An Useful Tool for The Evaluation of Reliability of Advanced Concentrator Multijunction Solar Cells

Vincenzo Orlando, Pilar Espinet, Neftali Nuñez, Luis Cifuentes, Jesús Bautista, Manuel Vázquez and Carlos Algora

Instituto de Energía Solar, Universidad Politécnica de Madrid, Spain

5TuPo.9.21

Temperatures Dependence of Solar Performance in Poly-silicon and GaAs Solar Cells

Zih-Yang Chen, Ming-Jer Jeng and Liann-Be Chang

Department of Electronic Engineering, Chang Gung University, Taiwan

5TuPo.9.22LN

Polarization of N-H Bond in Growth Process of GaAsN by Chemical Beam Epitaxy

K. Ikeda, K. Demizu, N. Kojima, Y. Ohshita and M. Yamaguchi

Toyota Technological Institute, Japan

5TuPo.9.23LN

Costs of III-nitride Solar Cells

W.A Doolittle[1], F. Ponce[2], S.M. Goodnick[2] and C.B. Honsberg[2]

[1]Georgia Institute of Technology, Atlanta GA, USA, [2]Arizona State University, Tempe, AZ, USA

5TuPo.9.24LN

Design and Analysis of a Novel CPV-T Receiver Concept

Robert Höller[1], Manfred Hangweirer[1] and Hartmut Schneider[2]

[1]University of Applied Sciences Upper Austria, Austria, [2]Fresnex GmbH, Austria

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Tuesday, November 25
14:45 - 16:10 Annex **Area 7**

7TuPo.10 Characterization and Modules Reliability 1

Chairperson:
Yoshihito Eguchi (MITSUI CHEMICALS, Inc., Japan)

7TuPo.10.1

Accelerated Degradation in Commercial PV Modules by Using Extension and Repetition of Damp Heat and Thermal Cycling

Shinji Kawai[1], Yutaka Fukumoto[1], Fujio Tamai[1], Koji Masuda[2], Yasunori Uchida[2], Hiroshi Kato[2], Tadashi Obayashi[2], Eiji Yamada[2], Takuya Doi[3], Atsushi

Masuda[3] and Michio Kondo[3]

[1]Industrial Technology Center of SAGA (SAGA-ITC), Japan, [2]Japan Electrical Safety & Environment Technology Laboratories (JET), Japan, [3]National Institute of Advanced Industrial Science and Technology (AIST), Japan

7TuPo.10.2

Optical Characterization of Different Module Technologies

Rita Ebner, Bernhard Kubicek, Gusztav Ujvari and Karl Berger

AIT Austrian Institute of Technology, Energy Department, Austria

7TuPo.10.3

Study on the Weathering Degradation Rate of PET Film

M. Tanaka, T. Amioka and M. Terada

Toray Industries, Inc. Environment & Energy Development Center, Japan

7TuPo.10.4

Correlative Evaluation of Current-induced Magnetic Flux Distribution and Electroluminescence Image in Crystalline Silicon Photovoltaic Modules

S. Kawamoto[1], K. Tada[1], N. Yamada[1], T. Tadaumi[2] and K. Kato[3]

[1]Department of Mechanical Engineering, Nagaoka University of Technology, Japan, [2]ATOX Co., Ltd, Japan, [3]Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan

7TuPo.10.5

Withdrawn

7TuPo.10.6

Solder Joint Failure Modes in Crystalline Si PV Modules Operated in Tsukuba, Japan for 10 Years - Voids and Cracks

Uichi Itoh, Tetsuro Nishimura2, Takuro Fukami[2)], Kenji Takamura[2)], Akira Kita[2)], Ryosuke Miyabayashi[3)], Hideo Ohkuma[4)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan, [2)]Nihon Superior Co. LTD., Suita, Osaka, Japan, [3)]NPC Incorporated, Japan, [4)]HTO Inc., Japan

7TuPo.10.7

Accurate and Rapid Measurement of High-Capacitance PV Cells and Modules Using Dark and Light I-V Characteristics

Hisashi Kojima[1)], Kazutaka Iwamoto[1)], Akio Shimono[1)], Junichiro Abe[1)] and Yoshihiro Hishikawa[2)]

[1)]Kyoshin Electric Co., Ltd. (KOPEL), Japan, [2)] National Institute of Advanced Industrial Science and Technology (AIST), Research Center for Photovoltaic Technologies, Japan

7TuPo.10.8

Results of the Fourth International Spectral Measurement Intercomparison of a Steady-state AM0 Solar Simulator and a FEL-type Standard Lamp

M. Pravettoni[1)], R. Galleano[2)], G. Jungst[3)], S. Bartocci[4)], J. A. Bogeat Sánchez-Piqueras[5)], J. F. Fabero[6)], R. Fucci[7)], J. Gadermaier[8)], K. Hoogendijk[9)], C. Lanconelli[10)], A. Minuto[11)] and A. Serrano Perez[12)]

[1)]University of Applied Sciences and Arts of Southern Switzerland, Switzerland, [2)]European Commission, Joint Research Centre, Institute of Energy and Transport, Italy, [3)]Instituto Nacional de Técnica Aeroespacial (INTA), Spain, [4)]University of Rome "Tor Vergata", Department of Enterprise Engineering, Italy, [5)]Instituto Nacional de Técnica Aeroespacial (INTA), Dpto. de Observación de la Tierra, Mazagón, Huelva, Spain, [6]CIEMAT, Departamento de Energía, Madrid, Spain, [7]ENEA, UTTP FOTO, Portici, Italy, [8]Austrian Institute of Technology, Photovoltaic Systems, Vienna, Austria; [9]EKO Instruments Europe, Den Haag, Netherlands, [10]National Research Council, Institute of Atmospheric Science and Climate (ISAC), Bologna, Italy, [11]RSE Spa, Milan, Italy, [12]University of Extremadura, Departament of Physics, Badajoz, Spain

7TuPo.10.9

Innovative System for High Precision Measurements of PV Module Temperature Coefficients and Energy Rating

A. Metz, S. Schenk, M. Meixner, K. Ramspeck, S. Dauwe and A. Laux

h.a.l.m. elektronik GmbH, Germany

7TuPo.10.10

Experimentally Measured Light Distribution from Metal Nanoparticles

Y. Yang, N. Kao, S. Pillai and M. Green

Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

7TuPo.10.11

Influence of Cross-Linking Conditions of EVA on Long-Term Stability for Crystalline Silicon Photovoltaic Modules

S. Jonai[1], K. Hara[1], Y. Tsutsui[2], H. Nakahama[2] and A. Masuda[1]

[1]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2]Nisshinbo Holdings Inc., Japan

7TuPo.10.12

Fault Diagnostic Method of PV Module Using An Induction Coil

T. Yamaguchi[1), T. Ikegami[1), R. Hayashida[1), F. Mitsugi[1) and A. Tanaka[2)

[1)Graduate School of Science and Technology, CSEE, Kumamoto University, [2)Graduate School of Science and Technology, GelK, Kumamoto University, JAPAN

7TuPo.10.13

Modeling and Testing the Effect of Soiling on PV Modules

Jan Herrmann, Timo Lorenz, Karolina Slamova, Elisabeth Klimm, Karl-Anders Weiss and Michael Koehl

Fraunhofer-Institut für Solare Energiesysteme (ISE), Germany

7TuPo.10.14

Measurement of the Magnetic Flux Density Distribution in PV Cells for Fault Detection

R. Hayashida[1), T. Ikegami[1), T. Yamaguchi[1), F. Mitsugi[1) and A. Tanaka[2)

[1)Graduate School of Science and Technology, CSEE, Kumamoto University, JAPAN, [2)Graduate School of Science and Technology, GelK, Kumamoto University, JAPAN

7TuPo.10.15

Development of Cost-competitive Solutions for Back-contact Modules

M. J. A. A. Goris, I. J. Bennett and V. Rosca

ECN Solar Energy, The Netherlands

7TuPo.10.16

Accurate Performance Evaluation of Conventional and Bifacial Crystalline Silicon Solar Cells

Y. Hishikawa, A. Sasaki and H. Shimura

National Institute of Advanced Industrial Science and Technology (AIST), RCPVT

7TuPo.10.17

New Process Monitoring Methodologies Based on Multiwavelength Excitation Raman Scattering and Photoluminescence Techniques: Advanced Characterization of $CuIn_{1-x}Ga_xSe_2$ Based Solar Cells and Large Area Modules

V. Izquierdo-Roca[1)], C. Insignares[1)], Y. Sanchez[1)], X. Fontané[1)], E. Saucedo[1)], T. Goislard de Monsabert[2)], V. Bermúdez[2)] and Al. Pérez-Rodríguez[1,3)]

[1)]IREC: Institut de Recerca en Energia de Catalunya, Spain, [2)]NEXCIS Photovoltaic Technology, France, [3)]IN[2]UB i Departament d´Electrònica, Universitat de Barcelona, Spain

7TuPo.10.18

Durability of Adhesion of Polymeric Encapsulation Materials within PV Modules in Dependence of Lamination Conditions

D. Wu, J. Zhu, D. Montiel-Chicharro, J. Frese, T. R. Betts and R. Gottschalg

Centre for Renewable Energy Systems Technology (CREST), UK

7TuPo.10.19

Field Measurements of PV Power Generation from Thin Film Solar Cells Installed on Walls in a Snowy Cold Region

Y. Abe[1)], T. Tsukidate[1)], T. Tsutsumi[1)], Y. Inoue[2)], K. Iwaki[2)], K. Hayashi[3)], Y. Yokoyama[3)] and Y. Tsukahara[3)]

[1)]Hokkaido Research Organization, Northern Regional Building Research Institute, Japan, [2)]Yodogawa Steel Works, Ltd., Japan, [3)]Fuji Electric Co., Ltd., Japan

7TuPo.10.20

Development of Mathematical Equation for Photovoltaic Array Internal Resistance Analysis Under Operating Condition

N. Ketjoy, N. Khaosaad, C. Sirisamphanwong, K. Mansiri and M. Konyu

School of Renewable Energy Technology (SERT), Naresuan University, Thailand

7TuPo.10.21

Comparison of PV Systems Yield with Poly Crystalline and Amorphous/Microcrystalline and Solar Spectral Effect

Y. Sangpongsanont, C. Limsakul, M. Seapan, D. Chenvidhya, B. Muenpinij, T. Chenvidhya and K. Kirtikara

CES Solar Cell Testing Center (CSSC), Pilot Plant Development and Training Institute (PDTI), King Mongkut´s University of Technology Thonburi (KMUTT), Thailand

7TuPo.10.22

Study on Connection Poor Detection Technology of PV Module Connector

C. Nagao, N. Yamanaka and S. Nishikawa

Nihon University, Japan

7TuPo.10.23

Measurement of Photovoltaic Devices at JET and Intercomparison with AIST

Hiromi Tobita[1)], Ryo Urabe[1)], Takamitsu Inoue[1)], Eiji Yamada[1)] and Yoshihiro Hishikawa[2)]

[1)]Japan Electrical Safety & Environment Technology Laboratories (JET), Japan, [2)]National Institute of Advanced Industrial Science and Technology (AIST), Research Center for Photovoltaic Technologies (RCPVT), Japan

7TuPo.10.24LN

The Study of Dynamic Mechanical Loads on Novel Heat Cap and Traditional PV Modules

Chen-Wei Chen[1)], Hung-Sen Wu[1)], Wen-Yao Chou[2)], Chien-Chun Hsieh[2)] and Chen-Lieh Wang[2)]

[1)]Industrial Technology Research Institute, Photovoltaic Metrology Laboratory, Taiwan, [2)]Win Win Precision

Technology Co.,Ltd(WINAICO) , Taiwan

Tuesday, November 25
16:30 - 17:55 Annex **Area 7**

7TuPo.11 Characterization and Modules Reliability 2

Chairperson:
Atsushi Masuda (AIST, Japan)

7TuPo.11.1

Identification and Elimination of Potential Induced Degradation (PID) at Photovoltaic Power Plants

S. Krauter

University of Paderborn, Department of Electrical Energy Technology - Sustainable Energy Concepts, Germany

7TuPo.11.2

Development of PV Measurement Cooperative Research Consortium of PV Industries and AIST

Y. Hishikawa[1], A. Sasaki[1], K. Yamagoe[1], H. Shimura[1], A. Nakajima[2], S. Sugawara[3], T. Sato[4], M. Taguchi[5], T. Asano[6], E. Takeuchi[7], H. Kojima[8], H. Muraoka[9], A. Ura[10] and N. Watanabe[11]

[1]National Institute of Advanced Industrial Science and Technology (AIST), RCPVT, [2]Kaneka corporation, [3]Kyocera Corporation, Solar Energy R&D Div., [4]Mitsubishi Electric Corp., Advanced Technology R & D Center, [5]Panasonic Corporation, Eco Solutions company, [6]Bunkoukeiki Co., Ltd., [7]EKO Instruments Co., Ltd., [8]Kyoshin Electric Corporation, [9]Opto Research Corporation, [10]Soma Optics, Ltd., [11]Wacom Electric Co.,Ltd.

7TuPo.11.3

Infrared Camera Based Verification of Hottest PV Cells Arising from Hot Spot Phenomena and the IEC 61215 Standards

S. Munggonrit, P. Parinya, T. Srisaksomboon, N. Jirarungsatian, T. Chenvidhya, M. Seapan, B. Muenpinij, Y. Sangpongsanon, D. Chenvidhya and K. Kirtikara

CES Solar Cells Testing Center, King Mongkut´s University of Technology Thonburi, Thailand

7TuPo.11.4

Challenges and Solutions for Performance Measurement of High Efficiency PV Cells and Modules in Production Environment

Corinne Droz, Vahid Fakhfouri, Yanik Pelet, Nicolas Bassi and Jonas Hiller

Pasan SA (Meyer Burger Group), Switzerland

7TuPo.11.5

Actual Performance and Degradation Rate of Different Types of Photovoltaic Modules: A Case Study in Thailand

A. Limmanee[1)], K. Chumpolrat[1)], N. Udomdachanut[1)], S. Keawniyompanit[2)], Y. Sato[3)], M. Nakaishi[3)], S. Kittisontirak[1)], K. Sriprapha[1)] and Y. Sakamoto[3)]

[1)]Solar Energy Technology Laboratory, National Electronics and Computer Technology Center, Thailand, [2)]Thai Tabuchi Electric Co., Ltd., Thailand, [3)] Tabuchi Electric Co., Ltd, Japan

7TuPo.11.6

A Correction Method for Outdoor Thermography Performed from Slanted Angles

Bernhard Kubicek[1)], Horst Sonnleitner[2)], Peter Steirer[1)], Rita Ebner[1)] and Karl A. Berger[1)]

[1)]AIT Austrian Institute of Technology, Austria, [2)] Encome, Austria

7TuPo.11.7

Characterization of Shadowing on c-Si PV-modules and Irradiation Sensors by the Serial Resistance Using Artificial Neural Networks

J. A. Weicht, J. Zielinski, A. Domnik, F. U. Hamelmann and G. Behrens

University of Applied Sciences Bielefeld, Germany

7TuPo.11.8

Low-temperature Conductive Film Bonded Crystalline Silicon PV Modules

Su-Wung Baek, Kwang-Il Choi, Suk-Ho Lee and Cheol-Hyun Lim

Green Energy Institute, Korea

7TuPo.11.9

Accurate Performance Measurement of High Capacitance Modules

H. Song, M. Wang, H. Chen and D. Hu

National Center of Supervision and Inspection on Solar Photovoltaic Product Quality (CPVT), P.R.China

7TuPo.11.10

Diagnosis Method for Detriorated PV Modules String

Youichi Hirata

Tokyo University of Science, Japan

7TuPo.11.11

Performance Improvement by Reducing NOCT and the Temperature Coefficient of Crystalline Si PV Modules

Indeok Chung, Nari Yoon, Hoon Oh, Hyun-Young Son, Un-il Baek, Won-jae Lee, Eun-Chel Cho and In-Sik Moon

PV Research Dep´t, Green Energy Business Division, Hyundai Heavy Industries, Co., Ltd., Korea

7TuPo.11.12

Effects of Lamination Temperature on Durability of EVA Encapsulated PV Modules

J. Zhu, D. Wu, D. Montiel-Chicharro, T. R. Betts and R. Gottschalg

Centre for Renewable Energy Systems Technology, Loughborough University, UK

7TuPo.11.13

On Determination of Parameters Dynamic Resistances of Photovoltaic Panels under the Shading Effects

J. Thongpron[1)], C. naracha[1)], W. Muangjai[2)] and S. Teerasak[2)]

[1)]Department of Electrical Engineering, Faculty of Engineering, Rajamangala University of Technology Lanna, Thailand, [2)]College of Integrated Science and Technology Rajamangala University of Technology Lanna, Thailand

7TuPo.11.14

Optimal Diode Ideality Factors and Resistances Size in the Photovoltaic Cell by Shuffled Frog Leaping Algorithm

W. Prommee and U. Wongtragoon

Faculty of Engineering, Rajamangala University of Technology Lanna, Thailand

7TuPo.11.15

Outdoor Testing of Field-aged Bp Saturn Modules with Nickel-copper Plated Contacts

N. Nampalli[1)], D. Jordan[1)], A. Lennon[1)], R. Evans[1,2)], S. Wenham[1)] and M. Edwards[1)]

[1)]School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia, [2)]Suntech R&D Australia Pty Ltd, Australia

7TuPo.11.16

Improvement of PV Module Temperature Estimation Using Derivative Ambient Temperature and Irradiation

N. Jirarungsatian[1,2], P. Parinya[2], T. Chenvidhya[2], K. Kirtikara[2], T. Srisaksomboon[2] and D. Chenvidhya[2]

[1]Division of Energy Technology, School of Energy, Environment and Materials, [2]CES Solar Cells Testing Center, Pilot Plant Development and Training Institute, King Mongkut´s University of Technology Thonburi, Thailand

7TuPo.11.17

Outdoor Performance Analysis of Multi-crystalline Solar Cell and Its Module

S. Parthasarathy, P. Kasirajan and Periyasamy Thilakan

Photon Energy Technology Laboratory, Centre for Green Energy Technology, Madanjeet School of Green Energy Technologies, Pondicherry University, SASTRA University, India

7TuPo.11.18

Preparation of Solar Spectral Database in Japan

A. Itagaki[1], K. Utsunomiya[1], T. Aoshima[2] and I. Harada[3]

[1]Japan Weather Association, Japan, [2]EKO INSTRUMENTS CO., LTD, Japan, [3]new planning co., ltd., Japan

7TuPo.11.19

Study of Multiple Effects on Solar Irradiance Measurement by Wavelet Transform

N. Silsirivanich, C. Limsakul, Y. Sangpongsanont, T. Srisaksomboon, W. Ketren, M. Seapan, D. Chenvidhya, C. Jivacate and K. Kirtikara

CES Solar Cell Testing Center (CSSC), Pilot Plant Development and Training Institute (PDTI) King Mongkut´s University of Technology Thonburi (KMUTT), Thailand

7TuPo.11.20

Leakage Current Analysis of Components in Photovoltaic Modules Under Potential Induced Degradation Conditions

S. Bae[1)], W. Oh[1)], S. M. Kim[1)], S. Park[1)], Y. Kang[2)], H. Lee[1)] and D. Kim[1)]

[1)]Department of Materials Science and Engineering, Solar Energy Research Center of Korea University, Korea, [2)]KU KIST Green School Graduate School of Energy and Environment, Korea

7TuPo.11.21

NICE Bifacial Module Technology

F. Madon[1)], O. Nichiporuk[1)], R. Einhaus[1)], T. Klaus[2)], L. Popescu[2)], C. Comparotto[2)], G. Galbiati[2)] and A. Edler[2)]

[1)]Apollon Solar, France, [2)]ISC Konstanz, Germany

7TuPo.11.22

Investigations on Temporal Output Power Fluctuations in Solar Photovoltaic Power System

P. Kasirajan, S. Parthasarathy and Periyasamy Thilakan

Photon Energy Technology Laboratory, Centre for Green Energy Technology, Madanjeet School of Green Energy Technologies, Pondicherry University, SASTRA University, India

7TuPo.11.23

Environment Friendly Design of Backsheets

M. Wielpuetz[1)], D. Demicoli[2)] and W. Du[3)]

[1)]Director Business Management Solar, EVONIK Industries AG, Germany, [2)]Manager Business Management Resource Efficiency, EVONIK Industries AG, Germany, [3)]Business Manager, EVONIK Degussa (China) Co. Ltd., China

7TuPo.11.24

Finding Degraded PV Modules in a PV Power Plant with Non-parametric Monitoring Data Analysis

K. Shibahara[1)], K. Fujimoto[1)], Y. Inatomi[2)] and T. Shioda[2)]

[1)]Tensor consulting, Japan, [2)]Mitsui Chemicals, Inc., Japan

7TuPo.11.25LN

A Simple On-line Method of Characterizing PV Cells/Modules Using Supercapacitor

S. Basu Pal[1)], T.Belel[2)], K.Das (Bhattacharya)[1)] and D. Mukherjee[2)]

[1)]Department of Electrical Engineering, IIEST, Shibpur, West Bengal, India, [2)]Department of Electronics Engineering, IIEST, Shibpur, West Bengal, India

7TuPo.11.26LN

Study of Highly Accurate Outdoor Characterization Technique for PV Modules

A. Fukabori[1)], T. Takenouchi[1)], Y. Matsuda[1)], Y. Tsuno[1,2)] and Y. Hishikawa[1)]

[1)]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2)](present address) TÜV Rheinland, Japan

7TuPo.11.27LN

A Method for Measuring Spectral Responsivity for Slow Response Solar Cells

T. Okura[1)], Y. Matsumoto[1)] and Y. Hishikawa[2)]

[1)]Soma Optics, LTD., Japan, [2)]National Institute of Advanced Industrial Science and technology, Japan

7TuPo.11.28LN

Accelerated Degradation by Light Illumination or Current Injection during Heat Tests on Flexible Thin Film Modules

Keiichiro Sakurai[1,2)], Akihiro Takano[2)], Hironori Yanase[2)], Toshiaki Sakai[2)], Hironori Nishihara[2)], Tetsuro

Nakamura[2], Shinji Fujikake[2], Masayoshi Takani[2]

[1]National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2]Photovoltaic Power Generation Technology Research Association (PVTEC), Japan

Wednesday, November 26
16:30 - 17:55 Annex

Area 1

1WePo.1 Quantum Structured Solar Cells

Chairpersons:
Dirk König (University of New South Wales, Australia)
Shuhei Yagi (Saitama University, Japan)

1WePo.1.1

Intermediate-Band Formation of Ultrahigh-Density InAs/GaAsSb Quantum Dots

S. Uchida, K. Uchida, K. Sakamoto and K. Yamaguchi

Department of Engineering Science, University of Electro-Communications, Japan

1WePo.1.2

Withdrawn

1WePo.1.3

Efficient Two-step Photon Absorption in InAs/GaAs Quantum Dot Solar Cells

T. Kada[1)], S. Asahi[1)], T. Kaizu[1)], T. Kita[1)], R. Tamaki[2)], Y. Okada[2)] and K. Miyano[2)]

[1)]Department of Electrical and Electronic Engineering, Graduate School of Engineering, Kobe University, Japan, [2)]RCAST, The University of Tokyo, Japan

1WePo.1.4

Changed to 1TuO.8.5

1WePo.1.5

Theory Of Quantum Coupling And Efficiency In QD Array Based Intermediate Band Solar Cells

S. Tomić[1)], T. Sogabe[2)] and Y. Okada[2)]

[1)]University of Salford, UK, [2)]University of Tokyo, Japan

1WePo.1.6

Withdrawn

1WePo.1.7

Hot Carrier Intermediate Band Solar Cell Using Low-dimensioned Quantum Structures

D. Watanabe, N. Kasamatsu, T. Kada, S. Asahi, Y. Harada and T. Kita

Department of Electrical and Electronic Engineering, Graduate School of Engineering, Kobe University, Japan

1WePo.1.8

Slowed Cooling of Hot Carriers in Silicon Nanocrystals

Xiaoming Wen[1], Penfei Zhang[1], Yu Feng[1], Santosh Shrestha[1], Gavin Conibeer[1], Shujuan Huang[1], Rebecca J. Anthony[2] and Uwe R. Kortshagen[2]

[1]Australian Centre for Advanced Photovoltaics, University of New South Wales, Australia, [2]Department of Mechanical Engineering, University of Minnesota, United States

1WePo.1.9

Control of Intermediate Band Configuration in GaAs:N δ-doped Superlattice

K. Osada[1], T, Suzuki1 S. Yagi[1], S. Naito[2], Y. Shoji[2], Y. Okada[2], Y. Hijikata[1] and H. Yaguchi[1]

[1]Graduate School of Science and Engineering, Saitama University, Japan, [2]Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

1WePo.1.10

GeN_x/Ge/GeN_x Resonant Tunnelling Structure as Energy Selective Contacts for Hot Carrier Solar Cells

X. Dai, Y. Liao, S. Huang, S. Shrestha and G. Conibeer

Australian Centre for Advanced Photovoltaics, School of Photovoltaic and Renewable Energy Engineering, Australia

1WePo.1.11

Effect of Field Damping Layer on Two Step Absorption of Quantum Dots Solar Cells

Y. Shoji[1)], R. Tamaki[1)], A. Datas[2)], A. Mart [2)], A. Luque[2)] and Y. Okada[1)]

[1)]Research Center for Advanced Science and Technology (RCAST), Japan, The University of Tokyo, [2)]Instituto de Energía Solar - Universidad Politécnica de Madrid ETSI Telecomunicación, Ciudad Universitaria sn, Spain-EU

1WePo.1.12

Formation of Single Crystalline Silicon Nanowires Using Indium Nano-droplets

I. Kita[1)], K. Fukunaga[1)], H. Yano[1)], A. Tani[1)], Y. Ishikawa[1)], N. Okamoto[1)], M. Ajmal Khan[2)] and T. Fuyuki[1)]

[1)]Nara Institute of Science and Technology, Japan, [2)] Japan Science and Technology Agency, Japan

1WePo.1.13

Influence of Trapping Processes on Photocurrent Generation Efficiencies in Quantum-dot Intermediate-band Solar Cells

D. M. Tex[1,2)], T. Ihara[1)], I. Kamiya[3)] and Y. Kanemitsu[1,2)]

[1)]Institute for Chemical Research, Kyoto University, Japan, [2)]Japan Science and Technology Agency, CREST, Japan, [3)]Toyota Technological Institute, Japan

1WePo.1.14

Effect of Sequential Tunneling in Quantum Dot Intermediate Band Solar Cells

K. Yoshida[1)], Y. Okada[2)] and N. Sano[1)]

[1)]Institute of Applied Physics, University of Tsukuba, JAPAN, [2)]Research Center for Advanced Science and Technology, The University of Tokyo, JAPAN

1WePo.1.15

Withdrawn

1WePo.1.16

Band Edge Alignment at the Back Electrode of a ZnO/PbS Depleted Heterojunction Quantum Dot Photovoltaic Cell

M. Philip[1)] and N. Cowern[2)]

[1)]Ngee Ann Polytechnic, Singapore, [2)]Newcastle University, UK

1WePo.1.17

GaNAs/GaAs Quantum Well Intermediate Band Solar Cell with Zero Valance Band Offset

Martin Elborg[1)], Takeshi Noda[1)], Takaaki Mano[2)], Kazuaki Sakoda[2,3)] and Liyuan Han[1)]

[1)]Photovoltaic Materials Unit, National Institute for Materials Science Tsukuba, Japan, [2)]Applied Photonic Materials Unit, National Institute for Materials Science Tsukuba, Japan, [3)]Graduate School of Pure and Applied Sciences, University of Tsukuba, Japan

1WePo.1.18

InGaP-based Multiple-quantum-well Solar Cell Fabricated Using Metal-organic-vapor -phase-epitaxy

Yunpeng Wang[1)], Hassanet Sodabanlu[1)], Hiromasa Fujii[2)], Kasidit Toprasertpong[2)], Kentaroh Watanabe[1)], Masakazu Sugiyama[2)] and Yoshiaki Nakano[1,2)]

[1)]Research Center for Advanced Science and Technology, the University of Tokyo, Japan, [2)]Department of Electrical Engineering & Information System, School of Engineering, the University of Tokyo, Japan

1WePo.1.19

Device Simulations of Si/SiO2 Superlattice Solar Cells Using Bohm Quantum Potential Method

S. Yamada[1)], R. Ishikawa[2)], T. Higa[3)], M. Konagai[1,3)] and S. Miyajima[3)]

[1)]Japan Science and Technology Agency, Japan,

[2]Faculty of Engineering, Niigata University, Japan, [3]Department of Physical Electronics, Tokyo Institute of Technology, Japan

1WePo.1.20

Two-Color Spectroscopy of PbS Quantum Dot Coupled $NaYF_4:Er^{3+}$ Layers for Up-Conversion Solar Cells

Sanghun Woo[1], Craig M. Johnson[1], John A. Stride[2], Peter J. Reece[3], Shujuan Huang[1], Richard P. Corkish[1] and Gavin J. Conibeer[1]

[1]School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia, [2]School of Chemistry, University of New South Wales, Australia, [3]School of Physics, University of New South Wales, Australia

1WePo.1.21

Size-Dependent Effect of Boron-Doped Si Quantum Dot Thin Films Utilizing a Gradient Si-Rich Oxide Multilayer Structure

P. R. Huang, Y. J. Chen, K. Y. Kuo and P. T. Lee

Department of Photonics & Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan

1WePo.1.22

Improved Efficiency of Hybrid PEDOT:PSS/Silicon-Nanowire Heterojunction Solar Cell via Back Surface Treatment

Yi-Chun Lai[1], Yu-Fan Chang[1], Shu-Cheng Yu[1], Wei-Sheng Weng[1], Hsin-Fei Meng[2], Gou-Chung Chi[1] and Peichen Yu[1]

[1]Department of Photonics and Institute of Electro-Optical Engineering, National Chiao-Tung University, Taiwan, [2]Institute of Physics, National Chiao-Tung University, Taiwan

1WePo.1.23

Fabrication of Wire-structure Crystalline Silicon Solar Cells Using Doping Paste as a Doping Source

Y. Yashiki[1)], S. Hiza[1)], Y. Shirayanagi[1)], T. Hakamata[1)] and M. Konagai[2)]

[1)]Japan Science and Technology Agency, Japan,
[2)]Tokyo Institute of technology, Japan

1WePo.1.24

Fabrication of Hybrid ErAs:InAs Quantum Dots for Solar Cell Application

ChaoYu Hung, Tomah Sogabe, Naoya Miyashita, Shunya Naitoh and Yoshitaka Okada

Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

1WePo.1.25

Assembled Quantum Dots for Photovoltaic Applications

Sungjee Kim

Department of Chemistry, Pohang University of Science and Technology, South Korea

1WePo.1.26

PLD of Cu_2O for Intermediate Band Solar Cells

S. Polyakov and T. W. Reenaas

Norwegian University of Science and Technology (NTNU), Department of Physics, Norway

1WePo.1.27LN

Withdrawn

1WePo.1.28LN

Synthesize of ZnO-based Semiconductor with Tunable Band Gap and Its Application in Multi-Quantum-Well Solar Cells

N. Itagaki[1,2)], K. Matsushima[1)], T. Ide[1)], D. Yamashita[1)], H. Seo[1)], K. Koga[1)] and M. Shiratani[1)]

[1)]Kyushu University, Japan, [2)]JST PRESTO, Japan

1WePo.1.29LN

Optical Properties of Si Nano-Walls for Solar Cell Application

S. Yoshiba[1)], M. Hirai[1)], H. Tomizawa[1)], Y. Ichikawa[1)] and M. Konagai[1,2)]

[1)]Japan Science and Technology Agency, Japan,
[2)]Tokyo Institute of Technology, Japan

1WePo.1.30LN

Advanced Concept of Hybrid Solar Cells for Third Generation Photovoltaic Devices

Jongwon Lee and Christiana B. Honsberg

School of Electrical, Computer and Energy Engineering, Arizona State University, USA

1WePo.1.31LN

Generalized Detailed Balance Solver for Solar Energy Conversion

Elizabeth LeBeau, Matthias Karow and Christiana Honsberg

Arizona State University, Solar Power Laboratory, Tempe, AZ, USA

Wednesday, November 26
10:15 - 11:30 Annex **Area 3**

3WePo.5 Thin Film Compound Semiconductor Based PV 3

Chairpersons:
Takashi Minemoto (Ritsumeikan University, Japan)
Shigeru Niki (AIST, Japan)

3WePo.5.1

The Correlation of the Efficiency of CIGS Solar Cells to Its Defect Activation Energy

Ming-Jer Jeng[1)], Konstantin Bocharov[2)], Gennady Novikov[2)], Liann-Be Chang[1)], Jian-Ping Ao[3)] and Yun

Sun[3)]

[1)]Department of Electronic Engineering, Chang Gung University, Taiwan, [2)]Institute of Problems of Chemical Physics, RAS, Russia, [3)]Institute of Photoelectronic Thin Film Device and Technology, Nankai University, PR China

3WePo.5.2

Study on Synthesized Temperature for Cu-In-Ga-Se Nano-powders of CIGS Film Formations

Dong-seob Jeong, Hyungmin Lee, Hyosang Lee and Chinho Park

School of Chemical Engineering, Yeungnam University, Korea

3WePo.5.3

P3 Laser Scribing of CIGSe Solar Cells with Different Gallium Gradients

C. Schultz[1)], M. Schüle[1)], K. Stelmaszczyk[2)], M. Weizman[1)], C. Wolf[2)], S. Merdes[2)], F. Ziem[2)], C. A. Kaufmann[2)], B. Rau[2)], R. Schlatmann[1,2)], V. Quaschning[1)], B. Stegemann[1)] and F. Fink[1)]

[1)]PVcomB / HTW Berlin - University of Applied Sciences, Germany, [2)]PVcomB / Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

3WePo.5.4

Changed to 3WeO.15.2

3WePo.5.5

Excitonic Photoluminescence of CuInS2 Films by Pulse Laser Deposition

Ryo Yoshida[1)], Tseng Po-Han[1)], Yong-Gu Shim[2)] and Kazuki Wakita[1)]

[1)]Chiba Institute of Technology, Japan, [2)]Osaka Prefecture University, Japan

3WePo.5.6

Optical and Electrical Properties of Electrospun

CIS Nanofibers of 3D Network

H. Yoon, S. An, M. W. Kim, H. Y. Kim, and S. S. Yoon

Korea University, Republic of Korea

3WePo.5.7

Fabrication of CIGS Solar Cell by Non-Toxic Solution Used Spray Deposition

Jae Hyun Kim, Firoz Khan, Hyun-Jung Lee and Misol Oh

Energy Research Division, Daegu Gyeongbuk Institute of Science & Technology (DGIST), Republic of Korea

3WePo.5.8

$Cu_2ZnSnSe_4$ Thin Films Prepared by Annealing from Precursor Using $Cu_2ZnSnSe_4$ Compound in Selenium and Tin Mixing Atmosphere

Mitsuki Nakashima[1)], Toshiyuki Yamaguchi[1)], Kengo Kusumoto[1)], Shohei Yukawa[1)], Junji Sasano[2)] and Masanobu Izaki [2)]

[1)]Wakayama National College of Technology, Japan, [2)]Toyohashi University of Technology, Japan

3WePo.5.9

Influence of Zinc/Tin Composition Ratio on the performance of CZTSe Solar Cells

Guk-jin Jeon[1)], Hojung Jeong[2)], Ye-chan Kim[1)] and Jaehyung Jang[1,2,3)]

[1)]Scool of Information and Communications, GIST, Republic of Korea, [2)]WCU Department of Nanobio Materials and Electronics, GIST, Republic of Korea, [3)]Research Institute for Solar and Sustainable Energies(RISE), GIST, Republic of Korea

3WePo.5.10

Optoelectronic Properties of Undoped and Na-doped Cu_2ZnSnS_4 Single Crystals

Le Quang Phuong[1,2)], Makoto Okano[1)], Yasuhiro Yamada[1)], Akira Nagaoka[3)], Kenji Yoshino[3)] and

Yoshihiko Kanemitsu[1,2)]

[1)]Institute for Chemical Research, Kyoto University, Japan, [2)]Japan Science and Technology Agency, CREST, Japan, [3)]Department of Applied Physics and Electronic Engineering, University of Miyazaki, Japan

3WePo.5.11

Characteristics of Cu_2ZnSnS_4 Thin Films Fabricated through the Sulfurization of Two Types of Metal Precursors

S. Hong[1)] and C. Kim[2)]

[1)]Division of Science Education, Daegu University, Korea, [2)]Department of Physics, Kyungpook National University, Korea

3WePo.5.12

Effects of Sulfur Contents on Sulfurization Using Single-layered Cu-Zn-Sn Metal Precursors Deposited by Co-sputtering Method

C. Kim[1)] and S. Hong[2)]

[1)]Department of Physics, Kyungpook National University, Korea, [2)]Division of Science Education, Daegu University, Korea

3WePo.5.13

Effect of Cu/Sn Ratio on Defect Properties of $Cu_2ZnSn(S,Se)_4$ Thin Film

X. Luo[1)], M. Halim[1)], T. Sakurai[1)], N. Sakai[2)], T. Kato[2)], H. Sugimoto[2)], H. Tampo[3)], H. Shibata[3)], S. Niki[3)] and K. Akimoto[1)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]Energy Solution Business Center, Showa Shell Sekiyu K.K., Japan, [3)]National Institute of Advanced Industrial Science and Technology (AIST), Japan

3WePo.5.14

The Effects of Surface Oxygen on Cu_2ZnSnS_4 Thin Films

Hisashi Miyazaki[1)], Masami Aono[1)], Hiroaki Kishimura[1)] and Hironori Katagiri[2)]

[1)]National Defense Academy, Japan, [2)]Nagaoka National College of Technology, Japan

3WePo.5.15

Surface Treatment of CZTS Thin Films by Ammonia Solution

Hisashi Miyazaki[1)], Masami Aono[1)], Hiroaki Kishimura[1)] and Hironori Katagiri[2)]

[1)]National Defense Academy, Japan, [2)]Nagaoka National College of Technology, Japan

3WePo.5.16

Properties of $Cu_2Sn_{1-x}Ge_xS_3$ Based Thin-film Photovoltaic Absorber

Myo Than Htay[1)], T. Mandokoro[1)], H. Seki[1)], N. Momose[2)], T. Taishi[1)], Y. Hashimoto[1)] and K. Ito[1)]

[1)]Department of Electrical and Electronic Engineering, Faculty of Engineering, Shinshu University, Japan, [2)] Department of Electrical and Electronic Engineering, Nagano National College of Technology, Japan

3WePo.5.17

Growth and Characterization of Tin Sulphide (SnS) Thin Films for Potential Photovoltaic Absorber Layer Application

P. Chelvanathan[1)], Z. Zakaria[1)], N. Asim[1)], M. M. Alam[3)], K. Sopian[1)] and N. Amin[1,2,3)]

[1)]Solar Energy Research Institute, The National University of Malaysia, Malaysia, [2)]Department of Electrical, Electronic and System Engineering, Faculty of Engineering and Built Environment, The National University of Malaysia, Malaysia, [3)]Advanced Materials Research Chair, Chemistry Department, College of Sciences, King Saud University, Saudi Arabia

3WePo.5.18

Pulsed Laser Deposition of Cu-Sn-S Thin Films for Solar Cell Absorber Layers

R. B. Ettlinger[1)], A. Crovetto[2)], A. Cazzaniga[1)], Stela Canulescu[1)], O. Hansen[2)] and J. Schou[1)]

[1)]DTU Fotonik, Technical University of Denmark, Denmark, [2)]DTU Nanotech, Technical University of Denmark, Denmark

3WePo.5.19

Infrared Solar Cell by: PbSe Film as An Absorption Layer

J. A. Heredia Cancino[1)], K. J. Mendoza Peña[1)], R. Ochoa Landín[2)] and S. J. Castillo[1)]

[1)]Departamento de Investigación en Física, Universidad de Sonora, México, [2)]Departamento de Física, Universidad de Sonora, México

3WePo.5.20

Defect Levels in N-basi2 Epitaxial Films Measured on Metal/n-BaSi$_2$ Schottky-junction and n-BaSi$_2$/p-Si Heterojunction Diodes by Deep Level Transient Spectroscopy

H. Takeuchi[1)], W. Du[1)], M. Baba[1)], R. Takabe[1)], K. Toko[1)] and T. Suemasu[1,2)]

[1)]University of Tsukuba, Institute of Applied Physics, Japan, [2)]JST-CREST, Japan

3WePo.5.21

Fabrication of Single-phase BaSi$_2$ Thin Films on Silicon Substrates by Vacuum Evaporation for Solar Cell Applications

Y. Nakagawa[1)], K. O. Hara[1,2)], T. Suemasu[2,3)] and N. Usami[1,2)]

[1)]Graduate School of Engineering, Nagoya University, Japan, [2)]JST-CREST, Japan, [3)]Institute of Applied Physics, University of Tsukuba, Japan

3WePo.5.22

Si-based New Material for High Efficiency Thin Film Solar Cell Applications

W. Du[1)], K. Toko[1)], M. Baba[1)], R. Takabe[1)], N. Usami[2,3)] and T. Suemasu[1,3)]

[1)]Institute of Applied Physics, University of Tsukuba, Japan, [2)]Graduate School of Engineering, Nagoya University, Japan, [3)]Core Research for Evolutional Science and Technology, Japan Science and Technology agency, Japan

3WePo.5.23

Thermodynamic Analysis on $ZnSnP_2$ Fabrication Process Using Chemical Potential Diagrams

S. Nakatsuka, Y. Nose, T. Uda and Y. Shirai

Department of Materials Science and Engineering, Japan

3WePo.5.24

Growth of Low Resistivity Sprayed Ga-doped ZnO Films for $CuInGaSe_2$ Solar Cells

Kenta Hamachi[1)], Akiko Mochihara[1)], Kenji Yoshino[1)], Shigeru Ikeda[2)] and Takashi Minemoto[3)]

[1)]Department of Electronics and Applied Physics, University of Miyazaki, Japan, [2)]Research Center for Solar Energy Chemistry, Osaka University, Japan, [3)] Department of Electrical and Electronic Engineering, Ritsumeikan University, Japan

3WePo.5.25

Growth of Zn(O,S) Films Deposited by CBD on the Different Substrates

Takeshi Maki, Chie Honda, Tetsuhito Okamoto and Masanobu Izaki

Toyohashi University of Technology, Graduate School of Engineering, Japan

3WePo.5.26

Low-Cost Growth of Aluminum Doped Zinc Oxide Films for Photovoltaic Applications

Donguk Kim[1)], Sooho Lee[1)], Minha Kim[1)], Dohyun Baek[1)], Yongseob Park[2)] and Jaehyeong Lee[1)]

[1]School of Electronic and Electrical Engineering, Sungkyunkwan University, Republic of Korea, [2] Department of Photoelectronics Information, Chosun College of Science and Technology, Republic of Korea

3WePo.5.27

Ag-embedded Wide-band Gap ZnMgO for Transparent Conductive Oxide

Kwanwoo Nam[1], Hojung Jung[2], T. Prem kumar[1] and Jaehyung Jang[1,2]

[1]Research Institute of Solar and Sustainable Energy, Gwangju Institute of Science and Technology, Korea Republic, [2]WCU Department of Nanobio Materials and Electronics, Gwangju Institute of Science and Technology, Korea Republic

3WePo.5.28LN

Optical, Structural and Morphological Properties of $CuInSe_2$ Nanoparticles Synthesized by Wet Chemical and Hydrothermal Processes

J. Ramkumar[1], S. Ananthakumar[1], S. Moorthy Babu[1] and Y.Hayakawa[2]

[1]Crystal Growth Centre, Anna University, India, [2]Research Institute of Electronics, Shizuoka University, Japan

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Wednesday, November 26
13:00 - 14:25 Annex | **Area 3**

3WePo.6 Thin Film Compound Semiconductor Based PV 4

Chairpersons:
Hironori Katagiri (Nagaoka National College of Technology, Japan)
Takahiro Wada (Ryukoku University, Japan)

3WePo.6.1

Self-organization of Nano-structures in Solar Cell Materials and Its Effects on the Conversion

Efficiency

K. Sato[1,2], H. Tanaka[3], T. Fukushima[3] and H. Katayama-Yoshida[3]

[1]Division of Materials and Manufacturing Science, Graduate School of Engineering, Osaka University, Japan, [2]PRESTO, Japan Science and Technology Agency (JST), Japan, [3]Department of Materials Engineering Science, Graduate School of Engineering Science, Osaka University, Japan

3WePo.6.2

Withdrawn

3WePo.6.3

Influence of Cd-Free Buffer Layer and Window Layer on the High Efficiency $Cu(In,Ga)Se_2$ Thin Film Solar Cells

Minha Kim[1], Wonkyu Chae[1], Donguk Kim[1], Dohyun Baek[1], Yongseob Park[2], Junsin Yi[1], Jaehyeong Lee[1]

[1]School of Electronic and Electrical Engineering, Sungkyunkwan University, South Korea, [2]Department of Photoelectronics Information, Chosun College of Sci. & Tech, South Korea

3WePo.6.4

Using Photoluminescence to Investigating Optical Properties of Different Cu/In Ratio of $CuInSe_2$ Film

Siang-Yi Hu[1], Fang-I Lai1 , Pei-Jhe Liou[1], Jui-Fu Yang[1,2] and Shou-Yi Kuo[2]

[1]Department of Photonics Engineering, Yuan-Ze University Taiwan [2]Department of Electronic Engineering, Chang Gung University, Taiwan

3WePo.6.5

Precise Control of Se Flux for High Quality $Cu(In,Ga)Se_2$ Absorber Layer Deposition at Low Substrate Temperature by UV Light Absorption in Vapor Phase

S. Nihiwaki[1)], F. Pianezzi[1)], B. Bissig[1)], P. Reinhard[1)], S. Buecheler[1)], C. Eisele[2)] and A. N. Tiwari[1)]

[1)]Laboratory for Thin Films and Photovoltaics, Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland, [2)]Dr. Eberl MBE-Komponenten GmbH, Germany

3WePo.6.6

Performance Dependence of Graded CIGS Solar Cells on Effects of Defect Density and Carrier Density Distribution Studied by Device Simulation

Chia-Hua Huang and Wen-Jie Chuang

Department of Electrical Engineering, National Dong Hwa University, Taiwan

3WePo.6.7

Comparative Study of CBD ZnS-based Buffers Prepared in Acid or Alkaline Solutions for CIGS Solar Cells

Chia-Hua Huang and Yueh-Lin Jan

Department of Electrical Engineering, National Dong Hwa University, Taiwan

3WePo.6.8

Spray Pyrolyzed Copper Indium Sulfide Thin Film Solar Cells Using Sandwich Structured TCO Layer

Erkan Aydin, Esma Ugur, Mehmet Sankir and Nurdan Demirci Sankir

Department of Materials Science and Nanotechnology Engineering, TOBB University of Economics and Technology, Turkey

3WePo.6.9

Cu_2ZnSnS_4 Thin Film Deposited by the PLD Method

Hiroki Miura[1)], Yusuke Watanabe[1)], Yong-Gu Shim[2)] and Kazuki Wakita[1)]

[1)]Chiba Institute of Technology, Japan, [2)]Osaka Prefecture University, Japan

3WePo.6.10

Fabrication of a New CdZnS buffer Layer for CZTS Solar Cells by a Chemical Bath Deposition Method

XF. Zhang, S. Takahashi and M. Kobayashi

Waseda University, Japan

3WePo.6.11

Characterization of $Cu_2ZnSn(S,Se)_4$ Solar Cells Fabricated by Coating and Sintering Process

M. Morihama, K. Nakamura, T. Maeda and T. Wada

Department of Materials Chemistry, Ryukoku University, Japan

3WePo.6.12

First-principles Study on Interface Between $Cu_2ZnSn(S,Se)_4$ and Back Electrode, Mo and Other Metals

A. Shigemi and T. Wada

Department of Materials Chemistry, Ryukoku University, Japan

3WePo.6.13

High Short-circuit Current Density of $Cu_2ZnSnSe_4$ Solar Cells Prepared by Se Vapour Selenization of Sputtered Metallic Precursors

Shou-Yi Kuo[1)], Jui-Fu Yang[2)] and Fang-I Lai[2)]

[1)]Department of Electronic Engineering, Chang Gung University, Taiwan, [2)]Department of Photonics Engineering, Yuan-Ze University, Taiwan

3WePo.6.14

Secondary Phases Formation and Its Influence on Cu-poor Zn-rich $Cu_2ZnSn(S_{1-y}Se_y)_4$ Based Solar Cells

H. Xie[1)], M. Dimitrievska[1)], Y. Sánchez[1)], X. Fontané[1)], S. López-Marino[1)], V. Izquierdo-Roca[1)], A. Pérez-Rodríguez[1,2)] and E. Saucedo[1)]

[1)]Catalonia Institute for Energy Research, IREC., Spain, [2)]IN2UB, Departament d'Electrònica, Universitat de Barcelona, Spain

3WePo.6.15

$Cu_2ZnSn(S,Se)_4$ Thin-Film Solar Cells Prepared by Two-step Annealing

M. Goto[1)], J. Kuwana[1)], N. Suyama[1)], Y. Zhang[2)], Y. Kurokawa[1)] and A. Yamada[1,3)]

[1)]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2)]Technical Research Institute, Toppan Printing Co. Ltd., Japan, [3)]Photovoltaics Research Center, Tokyo Institute of Technology, Japan

3WePo.6.16

Effect of Sulphurization on Cu_2ZnSnS_4 Thin Films Deposited by Single Source Thermal Evaporation Method

Z. Zakaria[1,2)], P. Chelvanathan[1)], M. J. Rashid[1)], M. Akhtaruzzaman[1)], M. M. Alam[3)], K. Sopian[1)] and N. Amin[1,3)]

[1)]Solar Energy Research Institute (SERI), The National University of Malaysia, Malaysia, [2)]Faculty of Electrical Engineering, Universiti Teknikal Malaysia Melaka, Malaysia, [3)]Advanced Materials Research Chair, Chemistry Department, College of Sciences, King Saud University, Saudi Arabia

3WePo.6.17

Preparation of Copper Tin Sulfide Thin Films for Solar Cell Application

T. Korechika[1)], Y. Mizui[2)], S. Yukawa[2)], T. Yamaguchi[2)], S.

Kunitsugu[3] and S. Nakamura[1]

[1]Tsuyama National College of Technology, Japan, [2] Wakayama National College of Technology, Japan, [3] Industrial Technology Center of Okayama Prefecture, Japan

3WePo.6.18

Preparation of Cu_2SnS_3 Thin Films Using Chemical Bath Deposition for Photovoltaic Application

Lin-Ya Yeh and Kong-Wei Cheng

Department of Chemical and Materials Engineering, Chang Gung University, Taiwan

3WePo.6.19

Reaction Paths for Formation of Cu_2SnSe_3 Films by Selenization of Cu-Sn Precursors

Z. Tang[1], J. Chantana[2], Y. Nukui[2], K. Kosaka[2], H. Uegaki[2] and T. Minemoto[2]

[1]Ritsumeikan Global Innovation Research Organization, Ritsumeikan University, Japan, [2]College of Science and Engineering, Ritsumeikan University, Japan

3WePo.6.20

Performance of Zn_3P_2 Solar Cells Using Bulk Crystals Grown by Solution Growth

R. Katsube[1], A. Nagaoka[1], Y. Nose[1], K. Yoshino[2] and Y. Shirai[1]

[1]Kyoto University, Japan, [2]University of Miyazaki, Japan

3WePo.6.21

Conversion Efficiency of Sustainable Photovoltaic Materials Calculated with *ab initio* Optical Absorption Coefficient

D. Deguchi[1], K. Sato[1,2], T. Kotani[3], H. Katayama-Yoshida[4] and T. Kakeshita[1]

[1]Division of Materials and Manufacturing Science, Graduate School of Engineering, Osaka University,

Japan, [2]PRESTO, Japan Science and Technology Agency (JST), Japan, [3]Department of Applied Mathematics and Physics, Tottori University, Japan, [4]Department of Materials Engineering Science, Graduate School of Engineering Science, Osaka University, Japan

3WePo.6.22

Study of Nano-crystals in CdS:O Thin Films by Kelvin Probe Force Microscopy

Masahiro Nakajima[1], Ryo Asaba[1], Akinori Suzuki[1], Nobuo Sato[1], Yong-Gu Shim[2], Kazuki Wakita[1], Kh. Khalilova[3], Nazim Mamedov[3], Ayaz Bayramov[3] and Emil Huseynov[3]

[1]Chiba Institute of Technology, Japan, [2]Osaka Prefecture University, Japan, [3]Institute of Physics, Azerbaijan

3WePo.6.23

Control of Conductivity Type in Co-evaporated $CuFeS_2$ Thin Films

K. M. Kim, H. Tampo, H. Shibata and S. Niki

Research Center for Photovoltaic Technologies, National Institute of Advanced Industrial Science and Technology (AIST), Japan

3WePo.6.24

Characteristics of p-type Cu_2O Absorber Layer for Heterojunction Solar Cell

Y. S. Jung[1], S. J. Park[2] and K. H. Kim[1]

[1]Department of Electrical Engineering, Gachon University, Republic of Korea, [2]Department of Chemical Engineering, Gachon University, Republic of Korea

3WePo.6.25

Efficient Light Harvesting Using ZnO Nanorod as an Anti-reflection Layer on Cu(In,Ga)Se_2 Solar Cells

Fang-I Lai[1], Ming-Yang Hsieh[2] and Shou-Yi Kuo[2]

[1]Department of Photonics Engineering, Yuan-Ze University, Taiwan, [2]Department of Electronic Engineering, Chang Gung University, Taiwan

3WePo.6.26

Thickness Dependent Properties of Molybdenum Thin Films Induced by Growth Parameters in Magnetron Sputtering

P. Chelvanathan[1], F. Arith[2], M. M. Alam[3], Z. A. AlOthman[3], K. Sopian[1] and N. Amin[1,2,3]

[1]Solar Energy Research Institute, The National University of Malaysia, Malaysia, [2]Department of Electrical, Electronic and System Engineering, Faculty of Engineering and Built Environment, The National University of Malaysia, Malaysia, [3]Advanced Materials Research Chair, Chemistry Department, College of Sciences, King Saud University, Saudi Arabia

3WePo.6.27

Properties of Sn-S Thin Films Prepared by Sulfulization

K. Iwasaki[1], S. Nakamura[2] and Y. Akaki[1]

[1]Miyakonojo Coll. Tech., Japan , [2]Tsuyama Coll. Tech., Japan

3WePo.6.28LN

Disorder Induced Phase Change in Cu_2ZnSnS_4

Sunil Kumar Samji, Brajesh Tiwari, M. Krishna Surendra, and M.S. Ramachandra Rao

Department of Physics and Nano Functional Materials Technology Centre, Indian Institute of Technology Madras, India

3WePo6.29

Fabrication and Properties of $CuGaSe_2$/CdS Solar Cell

Seung-Hee Yu, Gye-Choon Park

Dept. of Electrical Engineering, Mokpo National University, Korea

Wednesday, November 26
10:15 - 11:30 Annex Area 4
4WePo.7 Wafer-Based Crystalline Silicon 2

Chairperson:
Atsushi Ogura (Meiji University, Japan)

4WePo.7.1

High Electron Mobility Indium Tin Oxide Films for Heterojunction Silicon Wafer Solar Cell Applications

M. Huang[1)], Z. Hameiri[1,2)], A. G. Aberle[1)] and T. Mueller[1)]

[1)]Solar Energy Research Institute of Singapore, National University of Singapore, Singapore, [2)]Now with: School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

4WePo.7.2

Withdrawn

4WePo.7.3

Impact of Rear Internal Reflectance on Photocurrent in Silicon Wafer Solar Cells

Z. Liu[1,2)], C. Ke[1,2)], R. Stangl[1)], B. Hoex[1)] and I. M. Peters[1)]

[1)]Solar Energy Research Institute of Singapore, Singapore, [2)]Department of Electrical and Computer Engineering, National University of Singapore, Singapore

4WePo.7.4

Ultra-shallow Hydrogen-like Donors Formed in Carbon- and Hydrogen-doped Oxygen-rich Silicon Crystals

A. Hara and T. Awano

Tohoku Gakuin University, Japan

4WePo.7.5

Silicon Photovoltaic Cells Designed for Intense Monochromatic Illumination

Y. Takeda[1)], H. Iizuka[1)], T. Ito[1)], S. Mizuno[1)], K. Hasegawa[1)], T. Ichikawa[1)], H. Ito[1)], T. Kajino[1)], K. Higuchi[1,2)], A. Ichiki[2)] and T. Motohiro[2)]

[1)]Toyota Central Research and Development Laboratories, Inc., Japan, [2)]Green Mobility Collaborative Research Center, Nagoya University, Japan

4WePo.7.6

PC2D Simulation of the Effects of Gridline and Heavily Doped Region Parameters on the Performance of Crystalline Silicon Selective Emitter Solar Cells

B. Ai, X. Jia, Y. Deng and H. Shen

Guangdong Provincial Key Laboratory of Photovoltaic Technologies, State Key Laboratory of Optoelectronic Materials and Technologies, Sun Yat-sen University, China

4WePo.7.7

A Novel Low Temperature Doping Technology, Cat-Doping, and Its Application to Solar Cells

Hideki Matsumura, Shogo Tsuzaki, Trinh Thi Cham, Koichi Koyama and Keisuke Ohdaira

JAIST (Japan Advanced Inst. Sci. & Tech.), JAPAN

4WePo.7.8

Optical Anisotropy of Conductive Polymer PEDOT:PSS -Its Effect on the Photovoltaic Performance of Crystalline-Si/PEDOT:PSS Heterojunction Solar Cells-

H. Shirai, K. Ueno and R. Ishikawa

Graduate School of Science and Engineering, Saitama University, Japan

4WePo.7.9

High Efficiency Rear Emitter Si Heterojunction Solar Cell With Cu Plating

T. Watahiki, T. Furuhata, T. Matsuura, T. Shinagawa, Y. Shirayanagi, T. Morioka, T. Hayashida, Y. Yuda, Y. Sakai, H. Tokioka and H. Fuchigami

Advanced Technology R&D Center, Mitsubishi Electric Corporation, Japan

4WePo.7.10

Competition of Emitter Recombination and Surface Passivation Effects in the Oxidation of $POCl_3$ Emitters of Silicon Solar Cells

Yoonseok Choi, Jongchul Lee, Jong-Keun Lim, Kyumin Lee, Won-jae Lee and Eun-Chel Cho

Hyundai Heavy Industries, Co., Ltd, South Korea

4WePo.7.11

Low Temperature Fabrication Technologies of Si Solar Cell with Sputter Epitaxy Method

S. Fujimura, S. Yoshiba, T. Tsukamoto, K. Kamisako and Y. Suda

Graduate School of Engineering, Tokyo University of Agriculture and Technology, Japan

4WePo.7.12

Numerical Analysis of N-type Crystalline Silicon Heterojunction Solar Cells with P-type Hydrogenated Nanocrystalline Cubic Silicon Carbide Emitter

D. Hamashita[1)], S. Miyajima[1)] and M. Konagai[1,2)]

[1)]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2)]Photovoltaic Research Center (PVSEC), Tokyo Institute of Technology, Japan

4WePo.7.13

Interdigitated Back Contact Heterojunction Solar Cells Fabricated by Inkjet-Printing Patterning

K. Saito[1], H. Noge[1], A. Sato[1], T. Kaneko[2] and M. Kondo[1,3]

[1]Fukushima University, Japan, [2]Tokai University, Japan, [3]National Institute of Advanced Industrial Science and Technology, Fukushima Renewable Energy Institute, Japan

4WePo.7.14

Spin Coating ZrO_2 Based Anti-Reflection Film For Crystalline Silicon Solar Cells

Masashi Kuriyama[1], Norihisa Harano[1], Abdullah Uzum[1], Yutaka Kimura[2], Kenji Tanimoto[2], Hidehito Fukui[3], Taichiro Izumi[3], Tomitaro Harada[3] and Seigo Ito[1]

[1]University of Hyogo, Japan, [2]Nissan Chemical Industries Ltd., Japan, [3]Daiwa Sangyo, Japan

4WePo.7.15

Impedance Carrier-Lifetime Analysis for Crystalline Silicon Solar Cells with μ-PCD Measurements

Hiroyuki Kanda, Abdullah Uzum and Seigo Ito

Department of Electrical Engineering and Computer Sciences University of Hyogo, Japan

4WePo.7.16

Comparison of P-type PERT and PERL Solar Cells

H. C. Lin[1], K. B. Chen[1], H. H. Wu[1], N. T. Ou[1], K. W. Huang[1], C. H. Wu[1], S. Y. Wei[2], S. M. Yu[2], W. C. Sun[2], K. Y. Wu[3], C. C. Cho[4], J. C. Lee[4], J. H. Tsai[4] and C. H. Yu[4]

[1]Gintech Energy Corporation, Taiwan, [2]Material and Chemical Research Laboratories, Industrial Technology Research Institute, Taiwan, [3]China Steel Corporation, Taiwan, [4]Thintech Materials Technology Corporation, Taiwan

4WePo.7.17

A Novel Spin Coating Phosphorus Diffusion Source for High Efficiency Crystalline Silicon Solar Cells

Shuhei Mochizuki[1)], Hiroyuki Kanda[1)], Abdullah Uzum[1)], Hidehito Fukui[2)], Taichiro Izumi[2)], Tomitaro Harada[2)], Ken Fukatsu[1)] and Seigo Ito[1)]

[1)]Department of Electrical Engineering and Computer Sciences University of Hyogo, Japan, [2)]Daiwa Sangyo, Japan

4WePo.7.18

The Influence of Aluminum Oxide Passivation on Back Contact Back Junction Solar Cell

Yun-Kuo Tsao, Kuang-Chieh Lai and Richard Pai

Motech Industries, Inc., Taiwan

4WePo.7.19

Fabrication of Rear-Emitter Heterojunction Solar Cells with a-SiO:H Passivation Layer

K. Nakada[1)], J. Irikawa[1)], S. Miyajima[1)] and M. Konagai[1,2)]

[1)]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2)]MEXT/FUTURE-PV Innovation Research, JST, Japan

4WePo.7.20

Boron Laser Doping Using Spin-on Dopant for Textured Crystalline Silicon

H. Nishimura, M. Manabe, Y. Kudamatsu and T. Fuyuki

Nara Institute of Science and Technology (NAIST), Japan

4WePo.7.21

Impact of Back Surface Morphology on Ag-Si Contact and Back-contact Back-junction Solar Cells Performance

Chenming Jiang[1)], Dianlei Wang[1)] and Hui Shen[1,2)]

[1)]Institute for Solar Energy Systems, Sun Yat-sen University, China, [2)]Shunde SYSU Institute for Solar Energy, China

4WePo.7.22

Spin-Coatable Passivation Films Prepared by Using ZrO_2-SiO_2 Composite Solution

S. Yoshiba[1)], K. Tanitsu[2)], Y. Suda[1)] and K. Kamisako[1)]

[1)]Tokyo University of Agriculture and Technology, Japan, [2)]TOKYO OHKA KOGYO CO., LTD., Japan

4WePo.7.23

Simulation of Interdigitated Back Contact Silicon Heterojunction Solar Cells Having Overlapped p/i and n/i a-Si:H Layers

H. Noge[1)], K. Saito[1)], A. Sato[1)], T. Kaneko[2)] and M. Kondo[1,3)]

[1)]Fukushima University, Japan, [2)]Tokai University, Japan, [3)]National Institute of Advanced Industrial Science and Technology, Fukushima Renewable Energy Institute, Japan

4WePo.7.24

Optical Properties of Encapsulated Silicon Solar Cells with Silicon Nitride Film of Varying Refractive Indices

Jieun Lee, Indeok Chung, Kyumin Lee, Hae-Na-Ra Shin, In-Sik Moon, Won-jae Lee and Eun-Chel Cho

Hyundai Heavy Industries Co. Ltd., South Korea

4WePo.7.25

Spatially Resolved Lifetime Spectroscopy from Temperature-Dependent Photoluminescence Imaging

Z. Hameiri, M. K. Juhl and T. Trupke

The School of Photovoltaic and Renewable Energy Engineering, The University of New South Wales, Australia

4WePo.7.26

CO_2 Laser Doping to Fabricate Crystalline Silicon Solar Cell

T. Honda[1], Y. Ishikawa[1], H. Ikenoue[2], Y. Watanabe[2], S. Yoshinaga[1], Y. Jiang[1] and Y. Uraoka[1]

[1]Graduate School of Material Science, Nara Institute of Science and Technology (NAIST), Japan, [2] Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan

4WePo.7.27

Effective Low Cost SiO_2 Passivation Using Perhydropolysilazane

C. Hagiwara and H. Nagayoshi

Tokyo National College of Technology, Japan

4WePo.7.28

How Can We Control Adjacent Dendrite Crystals in Parallel Direction to Realize High-quality Multicrystalline Si Ingot for Solar Cells?

T. Hiramatsu, I. Takahashi and N. Usami

Nagoya University, Japan

4WePo.7.29

Novel Carbon Based Screen-Printing Front Contact Paste for Crystalline Silicon Solar Cells

Taiki Ashikaga, Abdullah Uzum and Seigo Ito

Department Of Electrical Engineering and Computer Sciences, University of Hyogo

4WePo.7.30

Photonic Nanostructures for Light-management in IBC Solar Cells:Device Integration and Performance Benchmarking

F. Lenzmann[1], L. Duval[1], P. Spinelli[1,2], M. Koppes[1], A. Polman[2] and A. Weeber[1]

[1]ECN, Solar Energy, The Netherlands, [2]Center for Nanophotonics, FOM Institute AMOLF, The Netherlands

4WePo.7.31

Oxygen Precipitation around Grain Boundaries in Multicrystalline Silicon for Solar Cells

T. Uno[1,2], K. Sato[1,2], A. Ogura[1] and H. Ono[1,2]

[1]Meiji University, Japan, [2]Kanagawa Industrial Technology Center, Japan

4WePo.7.32

Surface Reflectance of Nanoimprinted-Texture on Crystalline Silicon Solar Cells

S. Yoshinaga, Y. Ishikawa, S. Araki, T. Honda, Y. Jiang, M. Horita and Y. Uraoka

Nara Institute of Science and Technology, Japan

4WePo.7.33

Experimental and First-principles Study of the Suppression of Boron-oxygen Defects in C-doped CZ-Si

Deren Yang, Yichao Wu and Xuegong Yu

State Key Laboratory of Silicon Materials and Department of Materials Science and Engineering, Zhejiang University, China

4WePo.7.34

Influence of Coating on the Quality of Si Ingots Grown by Directional Solidification

K. Jiptner, J. Li, H. Harada, T. Kimura, Y. Miyamura and T. Sekiguchi

National Institute for Materials Science, Japan

4WePo.7.35

Re-solidification and Evaluation of Retrieved Silicon Swarf from Waste Coolant of Fixed-Abrasive Multi-Wire-Sawing

S. Miki, T. Tokuzawa, H. Satone, K. Maeda and K. Arafune

University of Hyogo, Japan

4WePo.7.36

Mössbauer Spectroscopic Investigation of a ^{57}Fe Doped Si Wafer Containing Voids and Interstitial Defects Clusters

Y. Ino, K. Tanaka and Y. Yoshida

Shizuoka Institute of Science and Technology, Japan

4WePo.7.37

Effects of Mirror Position with Tilted Condition on the Solid-liquid Interface Shape of Silicon Molten Zone by Floating Zone Method Under Infrared Convergent Heating

Md. Mukter Hossain[1)], S. Watauchi[1,2)], M. Nagao[1)] and I. Tanaka[1)]

[1)]Center for crystal science and technology, University of Yamanashi, Japan, [2)]Precursory Research for Embryonic Science and Technology (PRESTO), Japan Science and Technology Agency (JST), Japan

4WePo.7.38

Optimization of Boron Spin on Dopant (BSOD) Diffusion for Emitter Formation In *n*- type c-Si Solar Cells

Bandana Singha and Chetan Singh Solanki

Department of Energy Science nd Engineering, Indian Institute of Technology Bombay, India

4WePo.7.39

Improvement of 50cm Square Mono Cast Si Ingot for Solar Cell Application

Y. Miyamura[1)], H. Harada[1)], K. Jiptner[1)], T. Sekiguchi[1)], S. Nakano[2)] and K. Kakimoto[2)]

[1)]National Institute for Materials Science, Japan, [2)]Kyushu University, Japan

4WePo.7.40

Direct Observation of FeB Pairs in B-Highly Doped Si Wafers by Mössbauer Spectroscopy

K. Tanaka[1)], T. Watanabe[2)], Y. Ino[1)] and Y. Yoshida[2)]

[1)]Center for Advanced Technology, Shizuoka Institute of Science and Technology (SIST), Japan, [2)]Faculty of Science and Technology, SIST, Japan

4WePo.7.41

A Study on the Emitter Diffusion Process Using the Oxide Barrier for Crystalline Silicon Solar Cells

Si-Cheol Roh, Jeong-Ho Choi and Hwa-Il Seo

Korea University of Technology and Education (KOREATECH), Republic of Korea

4WePo.7.42

Microcrystalline Silicon (-oxide) Emitters for Hit Solar Cells

L. Mazzarella, S. Kirner, L. Korte, B. Stannowski, R. Schlatmann and B. Rech

Helmholtz-Zentrum, Germany

4WePo.7.43

Effect of Amorphous Silicon Oxide Layer on p-Type Microcrystalline Silicon Oxide/n-Type Crystalline Silicon Heterojunction Solar Cells and Their Temperature Dependence

Taweewat Krajangsang[1)], Apichan Moollakorn[1)], Sorapong Inthisang[1)], Amornrat Limmanee[1)], Aswin Hongsingthong[1)], Perawut Chinnavornrungsee[1)], Kobsak Sriprapha[1)], Nattaphong Boriraksantikul[2)] and Jaran Sritharathikhun[1)]

[1)]Solar Energy Technology Laboratory (STL), National Electronics and Computer Technology Center (NECTEC), Thailand, [2)]PTT Research & Technology Institute, PTT Public Company Limited, Thailand

4WePo.7.44

TCO Work Function Engineering for the a-Si:H/ TCO-contact in SHJ Solar Cells

Kurt-Ulrich Ritzau, Martin Bivour, Heiko Steinkemper, Sebastian Schröer, Patrick Reinecke, Florian Wagner and Martin Hermle

Fraunhofer ISE, Germany

4WePo.7.45

Insight on Rear Emitter Silicon Heterojunction Solar Cells and Transfer to Industrial Production

P. J. Ribeyron, D. Muñoz, R. Varache, A. Danel, S. Harrison, C. Roux and D. Heslinga

CEA, LITEN, Department of Solar Technologies, France

4WePo.7.46

Analysis on Low Fill Factor of Amorphous/Crystalline Silicon Heterojunction Solar Cell

Lei Zhao, Hongwei Diao, Guanghong Wang, Chunlan Zhou and Wenjing Wang

Key Laboratory of Solar Thermal Energy and Photovoltaic Systems of Chinese Academy of Sciences, Institute of Electrical Engineering, The Chinese Academy of Sciences, China

4WePo.7.47

Surface Investigation of Photovoltaic Mono-crystalline Silicon Wafers

Tetsuo Fukuda, Nobutaka Suzuki Katsuhiko Shirasawa and Hidetaka Takato

Fukushima Renewable Energy Institute, AIST (FREA), National Institute of Advanced Industrial Science and Technology (AIST), Japan

4WePo.7.48

Withdrawn

4WePo.7.49

Electrode Formation Using Electroless Plating in the Crystalline Silicon Solar Cells with Various Anti-reflection Layers

M. S. Jeong[1)], M. G. Kang[2)], S. J. Choi[3)], J. I. Lee[2)] and H.-e. Song[2)]

[1]Graduate School of Energy Science and Technology, Chungnam National University, South Korea, [2] Photovoltaic Laboratory, Korea Institute of Energy Research, South Korea, [3]Department of Energy Environment Policy and Technology, Green School, Graduate School of Energy and Environment, Korea University, South Korea

4WePo.7.50

Low Cost Potential of Micro-grooved Back-contact Back-junction Silicon Solar Cell: A Theoretical Evaluation

B. Zhang[1], J. F. Yang[1] and J. P. Long[2]

[1]School of Energy Science and Engineering, University of Electronic Science and Technology of China, China, [2]College of Materials and Chemistry & Chemical Engineering, Chengdu University of Technology, China

4WePo.7.51

Withdrawn

4WePo.7.52

Electrolytic Reduction of SiO_2 on Liquid Zn Cathode in Molten Salt for Solar-grade Silicon Production

T. Shimao[1], X. Yang[1,2], K. Yasuda[1,3], T. Nohira[1,2], R. Hagiwara[1], K. Ichitsubo[4], K. Masuda[4] and T. Homma[2,5]

[1]Graduate School of Energy Science, Kyoto University, Japan, [2]CREST, Japan Science and Technology Agency, Japan, [3]Environment, Safety, and Health Organization, Kyoto University, Japan, [4]R&D Center, Taiheiyo Cement Corporation, Japan, [5]Faculty of Science and Enginnering, Waseda University, Japan

4WePo.7.53

Plasma Texturing for Improving High Efficiency Mono-Like Crystalline Silicon Solar Cells

Cheng-Wen Kuo, Ta-Ming Kuan, Cheng-Chi Liu, Chih-Chiang Huang, Li-Guo Wu and Cheng-Yeh Yu

TSEC Corporation, Taiwan

4WePo.7.54

The Electrical Properties of Boron Emitter with Various Etching Times of Boron Rich Layer (BRL)

Sungjin Choi[1,3], Se Young Song[2],3), Min Gu Kang[3], Jeong In Lee[3], Donghwan Kim[4] and Hee-eun Song[3]

[1]Department of Energy Environment Policy and Technology, Green School, Graduate School of Energy and Environment, Korea University, South Korea, [2] Graduate School of Energy Science and Technology, Chungnam National University, South Korea, [3] Photovoltaic Laboratory, Korea Institute of Energy Research, South Korea, [4]Department of Materials Science and Engineering, Korea University, South Korea

4WePo.7.55

Local Workfunction Mapping of Interface on Heterojunction Si Solar Cell Using KFM

F. Yamada, T. Kamioka, T. Tachibana, K. Nakamura, Y. Ohshita and I. Kamiya

Toyota Technological Institute, Japan

4WePo.7.56

Investigation of Electronic Chemical Properties in SiN Passivation Layer on Crystalline Si by X-ray Photoelectron Spectroscopy

Y. Yamashita[1], N. Ikeno[1], T. Tachibana[2], Y. Ohshita[2] and A. Ogura[1]

[1]Meiji Univ., Japan [2]Toyota Tech. Inst., Japan

4WePo.7.57

Development of Novel Local Self-Contacting Al Paste for Cost-Effective Bifacial Solar Cells

K. Y. Wu[1], H. S. Chung[1], C. L. Huang[1], C. L. Liu[2], W. C. Sun[3] and S. M. Yu[3]

[1]New Materials Research & Development Department, China Steel Corporation, Taiwan, [2]Thintech Materials Technology Corporation, Taiwan, [3]Material and

Chemical Research Laboratories, Industrial Technology Research Institute, Taiwan

4WePo.7.58

Production of Si in Thermite Reaction of Silica Using Alkaline Earth Metals

K. Yasuda[1,2], D. Itakura[1)], Y. Mizutani[1)], T. Nohira[1,3], R. Hagiwara[1)] and T. Homma[3,4]

[1)]Graduate School of Energy Science, Kyoto University, Japan, [2)]Environment, Safety and Health Organization, Kyoto University, Japan, [3)]CREST, Japan Science and Technology Agency, Japan, [4)]Faculty of Science and Engineering, Waseda University, Japan

4WePo.7.59

TCAD Modeling of Rear Surface Passivation in Monocrystalline Silicon Solar Cells

Ramachandran Vijayan, Dr V. Muthubalan and Dr R. Bairava Ganesh

School of Electrical and Electronics Engineering, Sastra University, India

4WePo.7.60

High-speed Fabrication of Electroplated Diamond Wire for Slicing a Crystal Silicon

T. Suzuki, J. Muraoka and M. Kato

Yamagata research institute of technology, Japan

4WePo.7.61

How Good Are Random Pyramids at Light Trapping?

S. Manzoor and Z. C. Holman

Arizona State University, School of Electrical, Computer, and Energy Engineering, USA

4WePo.7.62

Comprehensive Assessment of the p-n Junction Formation Technologies for Solar Cell Emitter Uniformity, Contact Formation and Performance

Nian Chen, Ahrar Chowdury, Veysel Unsur and Abasifreke Ebong

Department of Electrical and Computer Engineering, University of North Carolina at Charlotte, United States

4WePo.7.63

Correspondence between Sheet Resistances and Emitter Profiles of Homogeneously and Selectively Emitters Formed by Screen-Printing Phosphorus Diffusion

Ali Hamdi[1)], Abdullah Uzum[2)], Mohammed Al-Matwakel[1)], Hatem Al-Ndhari[1)], Marwan Dhamrin[2)] and Koichi Kamisako[2)]

[1)]Sana´a University, Science Faculty, Physics Department, Yemen, [2)]Tokyo University of Agriculture and Technology, Japan

4WePo.7.64

Investigating the Effect of Phosphorous Vacancy Complexes on the Majority Carrier Mobility in Compensated Cz Silicon

Song Zhang[1)], Eivind Johannes Øvrelid[2)], Mari Juel[2)] and Gabriella Tranell[1)]

[1)]Department of Materials Science and Engineering, NTNU, Norway, [2)]SINTEF Materials Technology, Norway

4WePo.7.65LN

Synthesis and Imprint of Antireflection Layer on Top of a Crystalline Silicon Solar Cell to Improve Light Trapping

Yu-Shun Cheng, Yu-Cheng Hong and Chie Gau

Institute of Aeronautics and Astronautics/Research Center for Energy Technology and Strategy, National

Cheng Kung University, Taiwan

4WePo.7.66LN

GQD Films for Down-conversion Layer on Photovoltaics by Kinetic Spray

K. D. Lee[1], M. J. Park[2], D. Kim[3], B. Kang[1], S. Kim[1], H. Kim[1], H.-S Lee[1], Y. Kang[4], S. S. Yoon[3], B. H. Hong[2] and D. Kim[1]

[1]Department of Materials Science and Engineering, Solar Energy Research Center of Korea University, Korea, [2]Department of Chemistry, College of Natural Sciences, Seoul National University, Korea, [3]Department of Mechanical Engineering, Korea University, Korea, [4]KU· KIST Green School Graduate School of Energy and Environment, Korea University, Korea

4WePo.7.67LN

Surface Mount Technology for Hetero-junction Back Contact Si Solar Cells

T. Hieda[1], N. Asano[1], C. Okamoto[1], T. Ohnishi[1], M. Kobayashi[1], H. Tadokoro[1], R. Suganuma[1], Y. Matsumoto[1], J. Nakamura[1], H. Katayama[1], K.Higashi[2], T. Kamikawa[2], K. Kimoto[2], M. Harada[2], T. Sakai[2], H. Shigeta[2], T. Kuniyoshi[2], K. Tsujino[2], L. Zou[2], N. Koide[2] and K. Nakamura[3]

[1]Energy System Solutions Division, SHARP Corporation, Japan, [2]Corporate Research & Development Division, SHARP Corporation, Japan, [3]Meiji University, Japan

4WePo.7.68LN

Investigation of High Performance Slicing Wafer Was Fabricated with Various Wire Cycle Time in Fixed Abrasive Wire Saw Technology

Ting-Chun Wang, Yen-Chun Chou, Shang- Wei Yang, Yu-Chung Chen and Chien-Chun Wang

Motech Industries, Inc., Taiwan

4WePo.7.69LN

Metrology Strategy for Quality Control of Heterojunction Cell Concepts

F. Korsós[1], M. Wilson[2], A. Findlay[2], A. Savtchouk[2], J. Lagowski[2], M. Tallián[1], M. Watanabe[3]

[1]Semilab Co. Ltd, Hungary, [2]Semilab SDI LLC, FL,USA, [3]Semilab Japan K.K., Japan

4WePo.7.70LN

Enhanced Light Absorption of Optimal Subwavelength-scale Silicon Structure for Thin c-Si Solar Cell Application

Jea-Young Choi, Christiana Honsberg

Arizona State University, USA

Wednesday, November 26
10:15 - 11:30 Annex Area 6

6WePo.2 Organic, Dye Sensitized and Perovskite Solar Cells 1

Chairpersons:
Itaru Osaka (RIKEN, Japan)
Ashraf Uddin (The University of New South Wales, Australia)

6WePo.2.1

Peptide Addition Effect of the Active Layer Precursor Solution Containing Poor Solvent on Photoelectrochemical Characteristics of the Thin Film Organic Photovoltaic Cells

S. Shindo and H. Ymanane

Kitakyushu National College of Technology, Japan

6WePo.2.2

Charge Generation in Highly Efficient All-Polymer Solar Cells Studied by Transient Absorption Spectroscopy

S. Ishida[1], D. Mori[1], H. Benten[1], H. Ohkita[1,2] and S. Ito[1]

[1]Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University, Japan, [2]Japan Science and Technology Agency (JST), PRESTO, Japan

6WePo.2.3

Influence of Fullerene Aggregation on the Geminate Charge Recombination in Poly(3-alkylthiophene)/PCBM Blended Films

D. Kawamura[1], H. Benten[1], H. Ohkita[1,2] and S. Ito[1]

[1]Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University, Japan, [2]Japan Science and Technology Agency, PRESTO, Japan

6WePo.2.4

The Enhancement of Performance and Stability in Inverted Solar Cells by Introducing Anthracene Derivative as the Electron Transporting Layer

J. P. Han[1], E. J. Lee[1], S. W. Heo[1], H. J. Song[2] and D. K. Moon[1]

[1]Konkuk University, Republic of Korea, [2]Korea Institute of Industrial Technology, Republic of Korea

6WePo.2.5

Stability Improvement of PTB7:$PC_{71}BM$ Bulk-Heterojunction Organic Solar Cells with an Inverted Structure

A. Yoshida[1], K. Kiriishi[1], J. Qiu[1], K. Hashiba[1], S. Fujii[2], H. Kataura[2] and Y. Nishioka[1]

[1]Department of Precision Machinery Engineering, College of Science and Technology, Nihon University, Japan, [2]Nanosystem Research Institute, National Institute of Advanced Industrial Science and Technology, Japan

6WePo.2.6

Withdrawn

6WePo.2.7

Insertion Effects of Interlayers for High Performance Polymer Based Organic Solar Cell

J. Tanaka[1)], T. Kuwabara[1)], K. Takahashi[1)] and T. Taima[1,2)]

[1)]Kanazawa univ., Japan, [2)]JST-PRESTO, Japan

6WePo.2.8

Synthesis and Characterization of Quinacridone-based Polymer for OPVs

H. Y. Kim, M. H. Choi and D. K. Moon

Konkuk university, Republic of Korea

6WePo.2.9

Synthesis and Characterization of Benzodithiophene Series Conjugated Polymers for Organic Photovoltaics

T. H. Lee, S. J. Jeon, E. J. Lee and D. K. Moon

Konkuk University, Republic of Korea

6WePo.2.10

Development of Solution-Processed Bilayer P3HT/*O*-Acetylgalactosylated Fulleropyrrolidine Heterojunction Organic Photovoltaics

Y. Uemura[1,2)], M. Yoshitake[1)], K. Mizuki[1,2)], Y. Nishihara[3)], M. Chikamatsu[3)] and T. Hatta[1,2)]

[1)]Department of Nanoscience, Faculty of Engineering, Sojo University, Japan, [2)]Kumamoto Institute for Photo-Electro Organics (PHOENICS), Japan, [3)]Research Center for Photovoltaic Technologies (RCPVT), National Institute of Advanced Industrial Science and Technology (AIST), Japan

6WePo.2.11

Novel Triphenylamine-based Oligothiophene Star-Shaped Molecules as Donor Materials for the Efficient Bulk Heterojunction Solar Cells

Y. N. Luponosov[1)], J. Min[2)], C. J. Brabec[2)] and S. A. Ponomarenko[1)]

[1]Enikolopov Institute of Synthetic Polymeric Materials of the Russian Academy of Sciences, Russia, [2]Institute of Materials for Electronics and Energy Technology, Friedrich-Alexander-University Erlangen-Nuremberg, Germany

6WePo.2.12

A New Star-shaped Oligomer for Organic Photovoltaics

A. N. Solodukhin[1], Y. N. Luponosov[1], J. Min[2], T. Ameri[2], N. Kausch-Busies[3], C. J. Brabec[2] and S. A. Ponomarenko[1]

[1]Institute of Synthetic Polymeric Materials RAS, [2] Institute of Materials for Electronics and Energy Technology, Friedrich-Alexander-University Erlangen-Nuremberg, [3]Heraeus Precious Metals GmbH & Co. KG, Conductive Polymers Division (Clevios)

6WePo.2.13

Synthesis and Characterization of Two-Copolymer Solar Cells Containing Quinacridone-Quaterthiophene Units Effect of Side Chain Position

D. H. Kim[1], K. H. Hwang[1], E. J. Lee[1], H. J. Song[2] and D. K. Moon[1]

[1]Konkuk University, , Republic of Korea, [2]Korea Institute of Industrial Technology, Republic of Korea

6WePo.2.14

Effect of Side-Chain Positions on Quinacridone and Quinoxaline Based Conjugated Polymers for Organic Photovoltaics

K. H. Hwang, D. H. Kim and D. K. Moon

Konkuk University, Republic of Korea

6WePo.2.15

Fabrication of PCPDTBT:PCBM Solar Cells by Using Carbon Disulfide as Solvent and Its Effect on Polymer Solar Cell Performance

Viet Thanh Hau Pham, Nguyen Tam Nguyen Truong, Kieu Thanh Trinh, Chang Duk Kim and Chinho Park

Department of Chemical Engineering and Technology, Yeungnam University, Korea

6WePo.2.16

Doping Effects of Fluorinated Organic Dyes on the Open-circuit Voltage of Bulk-heterojunction Photovoltaic Devices

T. Watanabe and K. Yamashita

Department of Electronics, Graduate School of Science and Technology, Kyoto Institute of Technology, Japan

6WePo.2.17

OPV Characteristics of Novel Benzo- or Naphtho-dithiophene Based Copolymers

S. J. Moon, S. K. Lee, J. C. Lee and W. S. Shin

Research Center for Energy Materials, Korea Research Institute of Chemical Technology, Korea

6WePo.2.18

***pn*-Homojunction Organic Solar Cells Formed in the Co-deposited Films Using a Novel Push-Pull Type Organic Semiconductor**

M. Kikuchi[1,3], Y. Shinmura[1,3], T. Kaji[1,3], T. Kono[2,3], Y. Yoshida[2,3] and M. Hiramoto[1,3]

[1]Institute for Molecular Science, Japan, [2]Research Center for Photovoltaic Technology, Japan, AIST, [3] CREST/JST, Japan

6WePo.2.19

***pn*-homojunction Solar Cells Formed by Ppm-level Doping Technique**

Masayuki Kubo[1,2], Toshihiko Kaji[1,2] and Masahiro Hiramoto[1,2]

[1]Institute for Molecular Science, Japan, [2]CREST/JST, Japan

6WePo.2.20

Sensitization of Doping in Organic Co-deposited Films

Y. Shinmura[1,2], Y. Yamashina[1,2], T. Kaji[1,2] and M. Hiramoto[1,2]

[1]Institute for Molecular Science, Japan, [2]JST, CREST, Japan

6WePo.2.21

Nanoscale Conductivity in Poly(3-hexylthiophene) Films Studied by Conductive Atomic Force Microscopy

M. Osaka[1], H. Benten[1], H. Ohkita[1,2] and S. Ito[1]

[1]Graduate School of Engineering, Kyoto University, Japan, [2]Japan Science and Technology Agency, PREST, Japan

6WePo.2.22

X-ray Photoelectron Spectroscopy Investigation of Photo-degraded Photoactive Layer of Organic Solar Cell Modules

S. H Kim[1,2], S. H Park[1,3], H. J Shin[1,4] and D. H Kim[2,4]

[1]Energy-Nano materials research center, KETI, South Korea, [2]Graduate School of energy and environment, Korea University, South Korea, [3]Department of Electrical and Computer Engineering, Korea University, South Korea, [4]Department of Material Science and Engineering, Korea University, South Korea

6WePo.2.23

Density Functional Theory (DFT) Study on the Reactions of Fullerene (C_{60}) with Radicals

Tetuji Iyama, Koichi Kato and Hiroto Tachikawa

Division of Materials Chemistry, Graduate School of Engineering, Hokkaido University, Japan

6WePo.2.24

Interaction of Radicals and Atoms with C_{60} and Graphene Surfaces: Density Functional Theory (DFT) Study

Hiroto Tachikawa, Takahiro Fukuzumi and Tetuji Iyama

Division of Materials Chemistry, Graduate School of Engineering, Hokkaido University, Japan

6WePo.2.25

Theoretical Limit of Power Conversion Efficiency for Organic Photovoltaics

K. Seki[1], A. Furube[2] and Y. Yoshida[3]

[1]NRI, National Institute of Advanced Industrial Science and Technology (AIST), Japan, [2]RIIF, National Institute of Advanced Industrial Science and Technology (AIST), Japan, [3]RCPVT, National Institute of Advanced Industrial Science and Technology (AIST), Japan

6WePo.2.26

One-Dimensional Singlet Exciton Diffusion in Crystalline Poly(3-hexylthiophene) Films

Y. Tamai[1], Y. Matsuura[1], H. Ohkita[1,2], H. Benten[1] and S. Ito[1]

[1]Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University, Japan, [2]Japan Science and Technology Agency (JST), PRESTO, Japan

6WePo.2.27

Hole-Transport Properties of Defect Fullerenes C_{69}: A Theoretical Study on Singlet and Triplet States

K. Tokunaga

Division of Liberal Arts, Kogakuin University, Japan

6WePo.2.28

Surface Potential Measurement of Fullerene Derivative / Copper Phthalocyanine on Indium Tin Oxide Electrode by Kelvin Probe Force Microscopy

N. Satoh[1,2], S. Katori[1,3], K. Kobayashi[1], K. Matsushige[1] and H. Yamada[1]

[1]Kyoto University, Japan, [2]Chiba Institute of Technology, Japan, [3]Tsuyama National College of Technology, Japan

6WePo.2.29

Synthesis of ZnO Nanocrystals and Application in Hybrid Heterojunction Solar Cells

J. J. Dong, H. Y. Hao and J. Xing

School of Science, China University of Geosciences (Beijing), China

6WePo.2.30LN

Withdrawn

6WePo.2.31LN

Electronic Properties Enhancement with Graphene Oxide Blended PEDOT:PSS for Anode Buffer layer in Organic Photovoltaics

P. Goutham Raj, Anil Kanwat and Jin Jang

Department of Information Display, Advanced Display Research Center, Kyung Hee University, South Korea

6WePo.2.32LN

Optical and Morphological Studies of Poly-3-hexylthiophene (P3HT) / CdTe nanoparticles (NPs)/ TiO_2 Nanorods (NRs) Blend for Hybrid Solar Cells

S. Ananthakumar[1], J. Ramkumar[1], S. Moorthy Babu[1] and Y.Hayakawa[2]

[1]Crystal Growth Centre, Anna University, India, [2]Research Institute of Electronics, Shizuoka University, Japan

6WePo.2.33LN

Interface Engineering for High Performance Organic Photovoltaic

Hyeong Pil Kim, Dong Cheon Kim, Anil Kanwat, Abd. Rashid bin Mohd Yusoff and Jin Jang

Department of Information Display, Advanced Display Research Center, and Kyung Hee University, Korea

6WePo.2.34LN

Flexible Transparent AgNWs/AZO Electrode for Thin Film Solar Cells

Dongcheon Kim, Anil Kanwat, Taehun Kim, Jin Jang

Advanced Display Research Center, Department of Information Display, Kyung Hee University, Korea

6WePo.2.35LN

Beyond Energy: A Comprehensive LCA Study of Organic Photovoltaic Solar Cells

M. Tsang[1)], G. Sonnemann[2)] and D. Bassani[3)]

[1)]University of Bordeaux, Institute of Molecular Sciences, France, [2)]CNRS (Le Centre National de la Recherche Scientifique), Institute of Molecular Sciences, France

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Wednesday, November 26
13:00 - 14:25 Annex Area 6

6WePo.3 Organic, Dye Sensitized and Perovskite Solar Cells 2

Chairpersons:
Takaya Kubo (The University of Tokyo, Japan)
Regan Wilks (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany)

6WePo.3.1

Performance Improvement of Small Molecular Organic Solar Cells with Inverted Structure by Using an ITO Cathode Coated by Ultrathin Calcium Layer

X. Hao, S. Wang, T. Sakurai and K. Akimoto

Institute of Applied Physics, University of Tsukuba, Japan

6WePo.3.2

Inverted Type Polymer Solar Cells with Nanostructured Titanium Oxide Thin Film as Buffer Layer

N. Kishi, N. Morito and T. Soga

Department of Frontier Materials, Nagoya Institute of Technology, Japan

6WePo.3.3

Low Temperature Fabrication of Solution-Processed ZnO/Ag Nanowire Composite Electrodes for Flexible Device Application

Won-Jung Shin, Chan-Su Moon, Wonki Cho, Bo Seok Kim and Seung Jae Baik

Department of Electrical, Electronic and Control Engineering, Hankyong National University, Korea

6WePo.3.4

Nanostructured Electron Collector for Inverted Organic Solar Cell and Design toward Improved Module Efficiency

Gyeong Seok Hwang, Seung Jae Go and Byung Doo Chin

Department of Polymer Science and Engineering, Dankook University, Korea

6WePo.3.5

Hole Transit in P3HT:PCBM Solar Cells with Embedded Gold Nanoparticles

C.-E. Cheng[1,2], Z. Pei[3], C.-C. Hsu[4], C.-S. Chang[1] and F. S.-S. Chien[2]

[1]Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung University, Taiwan, [2]Department of Applied Physics, Tunghai University, Taiwan, [3]Graduate Institute of Optoelectronic Engineering, Department of Electrical Engineering, National Chung Hsin University, Taiwan, [4]Department of Physics, National Chung Cheng

University, Taiwan

6WePo.3.6

Efficiency Improvement in Nano-structured Organic Solar Cells

C. Wang[1)], P. Ruankham[2)], E. Kim[2)], T. Sagawa[2)] and M J. Cryan[1)]

[1)]Department of Electronic & Electrical Engineering, University of Bristol, UK, [2)]Graduate School of Energy Science, Kyoto University, Japan

6WePo.3.7

Ternary Hybrid Solar Cells with Wide and Narrow Bandgap Polymers

Hyung Do Kim[1)], Hideo Ohkita[1,2)], Hiroaki Benten[1)] and Shinzaburo Ito[1)]

[1)]Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University, Japan, [2)]Japan Science and Technology Agency (JST), PRESTO, Japan

6WePo.3.8

A Highly Ordered Triple-tube-framed Nanostructure Formed in TiO_2 Nanotubes for Hybrid Solar Cells

T. Ma[1)], N. Yamada[1)], D. Tadaki[1)], Y. Kimura[2)] and M. Niwano[1)]

[1)]Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University, Japan, [2)]Department of the Computer Science, Tokyo University of Technology, Japan

6WePo.3.9

Plasmonic Metallic Nanostructures for Enhanced Light Harvesting in Organic Photovoltaic Devices

Chih -Yao Chen, Fang-Chu Lin and I-Chen Chen

Institute of Materials Science and Engineering, National Central University, Taiwan

6WePo.3.10

Organic Solar Cells Efficiency Improvement by Addition of ZnO Nanopartilces in the Active Layer

S. Saravanan[1,3], Yasser A. M. Ismail[2], M. Silambarasan[1], N. Kishi[3] and T. Soga[3]

[1]Centre for Photonics and Nanotechnology, Sona College of Technology, INDIA, [2]Department of Physics, Faculty of Science, Al-Azhar University, EGYPT, [3]Department of Frontier Materials, Nagoya Institute of Technology, JAPAN

6WePo.3.11

Alloyed Silicon-Tin Nanocrystals with Quantum Confinement Effect for Hybrid Solar Cells

M. Lozach[1], V. Svrcek[1], D. Mariotti[2] and K. Matsubara[1]

[1]Research Center for Photovoltaic Technologies, National Institute for Advanced Industrial Science and Technology (AIST), Japan, [2]Nanotechnology and Advanced Materials Research Institute (NAMRI), University of Ulster, UK

6WePo.3.12

Efficient Organic/Poly Crystalline Silicon Heterojunction Solar Cells

Q. Liu[1], T. Ohki[1], D. Liu[2], R. Ishikawa[1], K. Ueno[1] and H. Shirai[1]

[1]Graduate School of Science and Engineering, Saitama University, Japan, [2]International Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science, Japan

6WePo.3.13

Oxygen Passivation of Silicon Nanocrytals: Its Influences on Trap States, Carrier Mobility, and Hybrid Solar Cell Performance

Yi Ding, Shu Zhou, Ryan Gresback, Michihiro Sugaya and Tomohiro nozaki

Department of Mechanical Sciences and Engineering, Tokyo Institute of Technology, Japan

6WePo.3.14

Analysis of Solution-Processed $CH_3NH_3PbX_3$ Perovskite for Organic-Inorganic Hybrid Solar Cells

S. Kim[1)], T. Chung[1)], S. Lee[1)], K. D. Lee[1)], H. Kim[1)], Y. Kang[2)], H.-S. Lee[1)] and D. Kim[1)]

[1)]Department of Materials Science and Engineering, Korea University, Korea, [2)]KU·KIST Green School Graduate School of Energy and Environment, Korea University, Korea

6WePo.3.15

The Light Stability of Perovskite Solar Cells

Govindhasamy Murugadoss[1)], Soichiro Tanaka[1)], Gai Mizuta[1)], Shusaku Kanaya[1)], Hitoshi Nishino[2)] and Seigo Ito[1)]

[1)]Department of Electric Engineering and Computer Science, School of Engineering, University of Hyogo, Japan, [2)]Energy Technology Laboratories, Japan

6WePo.3.16

Hole Transporting Materials Based on Sulfur-containing Donors for Efficient Perovskite Solar Cells

Jian Liu and Liyuan Han

Photovoltaic Materials Unit, National Institute for Materials Science, Japan

6WePo.3.17

Perovskite Solar Cells with Inverted Cell Structure Based on Novel Transparent, Conductive Hole Selective Layers

Wei Chen[1,2)] and Liyuan Han[1)]

[1)]Photovoltaic Materials Unit, National Institute for Materials Science, Japan, [2)]Wuhan Michael Grätzel Center for Mesoscopic Solar Cells, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, P. R. China

6WePo.3.18

Crystal Variation of $CH_3NH_3PbI_3$ Perovskite by Deposition of Inorganic CuSCN Hole Conductor for Mesoscopic Solar Cell

Shusaku Kanaya[1], Govindhasamy Murugadoss[1], Soichiro Tanaka[1], Gai Mizuta[1], Hitoshi Nishino[2] and Seigo Ito[1]

[1]Department of Electric Engineering and Computer Science, School of Engineering, University of Hyogo, Japan, [2]Energy Technology Laboratories, Osaka Gas Co., Ltd., Japan

6WePo.3.19

Effects of $CH_3NH_3PbI_3$ Thickness and Structure and Flat and Porous TiO_2 Electrodes for the Perovskite Solar Cells

Gai Mizuta[1], Govindhasamy Murugadoss[1], Shusaku Kanaya[1], Soichiro Tanaka[1], Hitoshi Nishino[2] and Seigo Ito[1]

[1]Department of Electric Engineering and Computer Science, School of Engineering, University of Hyogo, Japan, [2]Energy Technology Laboratories, Osaka Gas Co., Ltd., Japan

6WePo.3.20

Morphology Controlling of Solution Processed Perovskite for Planar-structured Solar Cells

Yongzhen Wu and Liyuan Han

Photovoltaic Materials Unit, National Institute for Materials Science, Japan

6WePo.3.21

X-Ray Crystallographic Studies on the Formation of $CH_3NH_3PbI_3$ Layers

N. Maruyama[1], M. Endo[1], Y. Nakaike[1], A. Wakamiya[1,2], T. Sasamori[1], N. Tokitoh[1], Y. Ogomi[3], S. Hayase[3] and Y. Murata[1]

[1]Institute for Chemical Research, Kyoto University, Japan, [2]JST-PRESTO, Japan, [3]Graduate School of Life Sciences and Systems Engineering, Kyushu Institute of Technology, Japan

6WePo.3.22

Optical and Photoconductive Properties of Perovskite $(CH_3NH_3)PbI_3$ Thin Film for Thin-film Sollar Cells

R. Ishikawa, T. Yamanaka, Z. Honda, K. Ueno and H. Shirai

Graduate School of Science and Engineering, Saitama University, Japan

6WePo.3.23

Optical Analysis on Perovskite Films According to CH_3NH_3I and PbI_2 Concentration

H. Seo[1], S. Hashimoto[1], G. Uchida[2], N. Itagaki[1], K. Koga[1] and M. Shiratani[1]

[1]Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan, [2]Joining and Welding Research Institute, Osaka University, Japan

6WePo.3.24

Effect of Surface Passivation and Modification of Perovskites Capping Layer on Photo-voltage Performance of Perovskite Solar Cells

A. Islam, C. Qin, Y. Wu, X. Yang, J. Liu and L. Han

Photovoltaic Materials Unit, National Institute for Materials Science, Japan

6WePo.3.25

Study of Planar Heterojunction Perovskite Photovoltaic Cells Using Compact Titanium Oxide by Chemical Bath Deposition

K. Yamamoto[1], T. Kuwabara[1,2], K. Takahashi[1,2] and T. Taima[1,2,3)

[1]Graduate School Natural Science and Technology and [2]Research Center for Sustainable Energy and

Technology, Kanazawa University, Japan, [3]JST-PRESTO, Japan Science and Technology Agency (JST), Japan

6WePo.3.26

Photovoltaic Properties of $BiFeO_3$/$BaTiO_3$ Multilayered Thin Films Prepared by Sol-gel Method

Savita Sharma[1,3], Monika Tomar[2], Ashok Kumar[4], Nitin K. Puri[3] and Vinay Gupta[1]

[1]Department of Physics and Astrophysics, University of Delhi, India, [2]Physics Department, Miranda House, University of Delhi, India, [3]Department of Applied Physics, Delhi Technological University , India, [4]CSIR-National Physical Laboratory, India

6WePo.3.27

Ferroelectric PZT Thin Films for Photovoltaics Application

Reema Gupta[1], Monika Tomar[2] and Vinay Gupta[1]

[1]Department of Physics and Astrophysics, India, University of Delhi, [2]Physics Department, Miranda House, University of Delhi, India

6WePo.3.28LN

Withdrawn

6WePo.3.29LN

Novel Small-molecule Hole Transporting Materials(HTM) Based on a New Indolocarbazole Derivative for Perovskite Solar Cells

I. Lim, S.-H. Han

Department of Chemistry, Hanyang University, Republic of Korea

6WePo.3.30LN

Validation of TiO_2/Sb_2S_3/CuI as a Photovoltaic Material by Using a Planar Cell Structure

R. Suzuki, Y. Takeda, N. Kato, K. Higuchi and T.

Motohiro

Toyota Central R&D Labs., Japan

Wednesday, November 26
14:45 - 16:10 Annex   Area 6

6WePo.4 Organic, Dye Sensitized and Perovskite Solar Cells 3

Chairpersons:
Tae-Hyuk Kwon (Ulsan National Institute of Science and Technology, Korea)
Masatoshi Yanagida (National Institute for Materials Science(NIMS), Japan)

6WePo.4.1

Properties of DSSCs Affected by Accelerating UV Light Exposure

Der-Ray Huang, Yi-An Chen, Run-Lin Liou and Chih-Hung Tsai

Department of Opto-Electronic s Engineering, National Dong Hwa University, Taiwan

6WePo.4.2

A Novel Cosensitization Method Using the Lewis Acid Sites of a TiO_2 Photoelectrode for Dye-Sensitized Solar Cells

N. Shibayama[1,2], H. Ozawa[1], Y. Ooyama[3] and H. Arakawa[1]

[1]Department of Industrial Chemistry, Faculty of Engineering, Tokyo University of Science, Japan, [2]Technical Research Institute, Toppan Printing Co., Ltd., Japan, [3]Department of Applied Chemistry, Graduate School of Engineering, Hiroshima University, Japan

6WePo.4.3

Enhance the Performance of Dye-sensitized Solar Cells Using Phosphor Co-doped TiO_2 Photoelectrode to Improve the Light Harvesting

H. W. Choi, H. H. Yoon and Y. M. Kim

Department of Electrical Engineering, Gachon University, Korea

6WePo.4.4

Electron Donating Group Effects On Dithienothiophene-based Dyes For Dye-Sensitized Solar Cells

Jeong Soo Kim[1)], Byoung Man Kim[2)], Hyun Kyu Han[1)], Jung Seung Nam[1)], Duck Ho No[2)], Hyun Ho Shin[1)], Andrew B Holmes[3)] and Tae-Hyuk Kwon[1,2)]

[1)]Department of Chemistry, School of Natural Sciences, Ulsan National Institute of Science and Technology (UNIST),Republic of Korea, [2)]School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology (UNIST), Republic of Korea, [3)]School of Chemistry, Bio 21 Institute, University of Melbourne, Australia

6WePo.4.5

Improved Conversion Efficiency of Dye-Sensitized Solar Cells due to Reduction in Ion Diffusion Resistance with Void Incorporation into Titanium Oxide Films

H. Hamasaki, S. Ohkub, H. Tsurumaki, K. Yamada and S. Shiratsuchi

Graduate School of Engineering, Kyushu Institute of Technology, Japan

6WePo.4.6

Effect of Dye Anchoring Groups on Dye Adsorption Characteristics of Dye-Sensitized Solar Cells

Galhenage A. Sewvandi, M. Kakimoto and Qi Feng

Department of Advanced Materials Science, Faculty of

Engineering, Kagawa University, Japan

6WePo.4.7

A Novel Photoanode for Enhancement in Conversion Efficiency of Natural Dye Sensitized Solar Cell

Mridula Tripathi and Priyanka Chawla

Department of Chemistry, C.M.P. Degree College University of Allahabad, India

6WePo.4.8

Improving the Efficiency of DSSCs with Diatom Structure

Der-Ray Huang, Run-Lin Liou, Yan-Jang Jiang and Chih-Hung Tsai

Department of Opto-Electronics Engineering, National Dong Hwa University, Taiwan

6WePo.4.9

Synthesis of Anatase TiO_2 Nanoparticles by Using Liquid-liquid Method and Their Applications for Dye-sensitized Solar Cells

T. Narabe, M. Hagiwara and S. Fujihara

Department of Applied Chemistry, Faculty of Science and Technology, Keio University, Japan

6WePo.4.10

Synthesis of Dodecahedron ZnO Aggregates Using Metal-Organic Frameworks as Precursors and Their Application for Dye-sensitized Solar Cells

T. Enomoto[1)], E. Hosono[2)], H. Zhou[2)], M. Hagiwara[1)] and S. Fujihara[1)]

[1)]Department of Applied Chemistry, Faculty of Science and Technology, Keio University, Japan,
[2)]National Institute of Advanced Industrial Science and Technology, Japan

6WePo.4.11

Surface Textured of Al-doped ZnO Transparent Conductive Films by Wet-etching Methods for Dye-sensitized Solar Cells Application

Jung-Jie Huang[1)], Ming-Lin Li[1)], Jian-Yang Lin[2)] and Yu-Lee Hsueh[3)]

[1)]Department of Materials Science and Engineering, MingDao University, TAIWAN, [2)]Department of Electronic Engineering, National Yunlin University of Science and Technology, TAIWAN, [3)]Graduate School of Engineering Science and Technology, National Yunlin University of Science and Technology, Taiwan

6WePo.4.12

High haze TCO Glass with Nano-particle Layer for Dye-sensitized Solar Cells

Rena Otsuka[1)], Takafumi Takano[1)], Ryo Murakami[1)] and Masayuki Okuya[1, 2)]

[1)]Department of Electronics and Materials Science, Shizuoka University, Japan, [2)]Research Institute of Green Science and Technology, Shizuoka University, Japan

6WePo.4.13

Metal to Oxide Monolayer Heterogeneous Junction on Nanocatalysts Boosts the Dye-sensitized Solar Cell

P.-C. Huang[1)], Y.-T. Liu[2)], T.-L. Lin[1)] and T.-Y. Chen[1)]

[1)]Department of Engineering and System Science, National Tsing Hua University, Taiwan, [2)]Department of Environmental Science and Engineering, Tunghai University, Taiwan

6WePo.4.14

Application of Foam-like TiO_2 Films to Dye-sensitized Solar Cells

I. O. Oladeji[1)], C. H. Cheng[2)], M. J. Jeng[2)], L. B. Chang[2)] and L. Chow[3)]

[1]Sisom Thin Films LLC, USA, [2]Department of Electronic Engineering, Chang Gung University, Taiwan, [3]Department of Physics, University of Central Florida, USA

6WePo.4.15

Withdrawn

6WePo.4.16

Facile Preparation Method of Moth-Eye Nanopatterened Dye-Sensitized Solar Cells Appearing Light-Harvesting and Self-Cleaning Effects

Cheol Hun Park, Sung Yeon Heo, Sang Jin Kim, Jung Pyo Jung and Jong Hak Kim

Department of Chemical and Biomolecular Engineering Yonsei University, Korea

6WePo.4.17

Mesoporous SnO_2 Interfacial Layer Template by Comb-like Copolymer for Dye-sensitized Solar Cell

H. R. Jeon[1], W. S. Chi[1], J. Y. Lim[1], J. H. Kim[1] and J. T. Park[2]

[1]Department of Chemical and Biomolecular Engineering, Yonsei University, South Korea, [2] Department of Chemical Engineering, Massachusetts Institute of Technology, United States

6WePo.4.18

Photochemical Properties of Dye-sensitized Solar Cell using Mixed Natural Organic Dyes and Titanium Dioxide Nano Particles

N. A. Ludin[1], N. E. Safie[1], N. H. Hamid[2], N. S. Abdul-Karim[1], K. Sopian[1], A. W. Azhari[1] and S. Sepeai[1]

[1]Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, Malaysia, [2]Faculty of Forestry, Universiti Putra Malaysia, Malaysia

6WePo.4.19

Strategies to Improve the Deposition of CdS and CdSe for Quantum Dot-Sensitized Solar Cells

I-Ping Liu, Kuan-Jung Chen, Huai-Ping Cho, Li-Tung Chen and Yuh-Lang Lee

Department of Chemical Engineering, National Cheng Kung University, Taiwan

6WePo.4.20

Preparation of Cobalt (II/III)-Based Gel-State Electrolyte with Titanium Carbide Nanofiller for Dye-Sensitized Solar Cell Application

Li-Tung Chen, I-Ping Liu, Kuan-Jung Chen, Ting-Wei Chang, Song-Chuan Su and Yuh-Lang Lee

Department of Chemical Engineering, National Cheng Kung University, Taiwan

6WePo.4.21

Withdrawn

6WePo.4.22

Effect of Carbon Black and Titanium Blocking Layer on Zinc Oxide Electrode Using for Dye Sensitized Solar Cells

S. Y. Lee and S. H. Kim

School of Energy, Materials and Chemical Engineering, Korea University of Technology and Education, South Korea

6WePo.4.23

P-spice Modeling for Large Area Z-type Module of Transparent DSC with 2-dimensional Diode Equivalent Circuit

J.-H. Pak[1)], J.-C. Lee[2)] and M. Shin[1)]

[1)]School of Electronics, Telecommunications, and Computer Engineering, Korea Aerospace University, South Korea, [2)]Research Center, Dong-Jin Semichem, Pan-Gyo Techno-valley, South Korea

6WePo.4.24

Preparation of Silver Nanowire Applications in the Light Scattering Layer of a Dye-sensitized Solar Cell

Menq-Jion Wu[1)], Jung-Jie Huang[2)], Chun-Fa Hsu[1)] and Si-Jia Chen[3)]

[1)]Department of Mechatronics Engineering, National Changhua University of Education, Taiwan, [2)]Department of Materials Science and Engineering, MingDao University, Taiwan, [3)]College of Materials Science and Engineering, Fujian University of Technology, China

6WePo.4.25

Secure & Efficient Dye-Sensitized Solar Cells with Nano-clay Electrolyte

Satoshi Uchida[1)], Takaya Kubo[2)] and Hiroshi Segawa[2)]

[1)]Komaba Organization for Educational Excellence College of Arts and Sciences (KOMEX), The University of Tokyo, Japan, [2)]Research Center for Advanced Science and Technology(RCAST), The University of Tokyo, Japan

6WePo.4.26

Fabrications of Flexible Dye-Sensitized Solar Cells without Soaking Using Ultrasonic Spray Coating Technology

Hyun-Gyu Han[1)], Hasitha C. Weerasinghe[2,3)], Eung Lee[1)], Yi-Bing Cheng[4)], David J. Johnes[2)], Andrew B. Holmes[2,3)] and Tae-Hyuk Kwon[1)]

[1)]Department of Chemistry, School of Natural Sciences, Ulsan National Institute of Science and Technology (UNIST), Republic of Korea, [2)]School of Chemistry, Bio[2)1)]Institute, University of Melbourne, Australia, [3)]Commonwealth Scientific and Industrial Research Organisation (CSIRO) Materials Science and Engineering, Australia, [4)]Department of Materials Engineering, Monash University, Australia

6WePo.4.27

Low-Temperature Synthesis of ZnO Electrodes for Dye-sensitized Solar Cells via Chemical Bath Deposition Method Using Alcohol Solvents

H. Ohashi, M. Hagiwara and S. Fujihara

Department of Applied Chemistry, Faculty of Science and Technology, Keio University, Japan

6WePo.4.28

Low-temperature Fabrication of Dye-sensitized Solar Cells on Flexible Substrates with a Protective Layer

T. Yasufuku, T. Yamamura, K. Ezaka, N. Kishi and T. Soga

Department of Frontier Materials, Nagoya Institute of Technology, Japan

6WePo.4.29

Enhancing Electron Transport in Mesoporous TiO_2 Film by Sol-Gel Based Interconnecting Networks for Dye-Sensitized Solar Cell

Po-Chun Huang, Tsan-Yao Chen, Yi-Lin Wang, Yuan Hu and Tsang-Lang Lin

Department of Engineering and System Science, National Tsing Hua University, Taiwan

6WePo.4.30

Ammonia Treated ZnO Nanaoflowers Based CdS/CdSe Quantum Dot Sensitized Solar Cell

Soo-Kyoung Kim and Hee-Je Kim

Department of Electrical Engineering, Pusan National University, South Korea

6WePo.4.31

Synthesis, Characterisation, Electrical and Photovoltaic Properties of Nano Crystalline Fe Doped TiO_2

Sagar Bhardwaj[1)], Aisha Malik[1)], S. Hameed[1)] and M M

Haque[2)]

[1)]Department of Electrical Engineering, Aligarh Muslim University, India, [2)]Department of Chemistry, Aligarh Muslim University, India

6WePo.4.32

ZnO-based Dye-sensitized Solar Cells: Nanostructures, Dyes and Electrolyte Solutions

G. Oskam[1)], E. Canto[1)], N. Gómez[1)], J. Idígoras[2)], J. A. Anta[2)], Á. Sastre-Santos[3)], F. Fernández-Lázaro[3)], M. Macías[4)], A. Borrás[4)], A. Barranco[4)] and A. R. González-Elipe[4)]

[1)]Department of Applied Physics, CINVESTAV-IPN, Mérida, México, [2)]Departamento de Sistemas Físicos, Químicos y Naturales, Universidad Pablo de Olavide, Spain, [3)]Área de Química Orgánica, Instituto de Bioingeniería, Universidad Miguel Hernández, Spain, [4)]Instituto de Ciencia de Materiales de Sevilla, CSIC-Universidad de Sevilla, Spain

6WePo.4.33

TNO Transparent Conductive Oxide Films for Dye-sensitized Solar Cells

Rena Otsuka[1)], Takeshi Endo[1)], Ryo Iwaki[1)] and Masayuki Okuya[1, 2)]

[1)]Department of Electronics and Materials Science, Shizuoka University, Japan, [2)]Research Institute of Green Science and Technology, Shizuoka University, Japan

6WePo.4.34

TCO-less Dye-Sensitized Solar Cells Consisting of Dye-Cocktail and Cobalt Redox Shuttle based Electrolyte

M. Z. Molla, Y. Ogomi, S. S. Pandey, T. Ma and S. Hayase

Kyushu Institute of Technology, Japan

6WePo.4.35

Solar Windows Originated from Highly Transparent Dye-sensitized Solar Cells

K. Zhang, C. Qin and A. Islam. L. Han

Photovoltaic Materials Unit, National Institute for Materials Science, Japan

6WePo.4.36

Large-sized Dye-sensitized Solar Cells and Perovskite Solar Cells

Tingli Ma[1)], Yuhei Ogomi[1)], Shigeki Fujisawa[2)], Shyam Pandey[1)] and Shuzi Hayase[1)]

[1)]Kyushu Institute of Technology, Japan, [2)]Ushio, INC, Japan

6WePo.4.37

Withdrawn

6WePo.4.38

Solid Nanocomposite Polymer Electrolyte for Enhancement in Stability of Natural Dye Sensitized Solar Cell

Mridula Tripathi and Priyanka Chawla

Department of Chemistry, C.M.P. Degree College, University of Allahabad, Allahabad, India

6WePo.4.39

Restorative Effects of Heating on the Performance of Dye-sensitized Solar Cells

M. Berginc, U. Opara Krašovec, and M. Topič

University of Ljubljana, Faculty of Electrical Engineering, Slovenia

6WePo.4.40LN

A Simple, Room Temperature, Solid-state Synthesis Route for Metal Oxide Nanostructures

S. A. Patil[1)], D. V. Shinde[1)], D. Y. Ahn[1)], D. V. Patil[1)], K. K. Tehare[2)], V.V. Jadhav[2)], J. K. Lee[3)], R. S. Mane[2)], N. K.

Shresthaa[1)] and S.H.Han[1)]

[1)]Department of Chemistry, Hanyang University, Republic of Korea, [2)]Center for Nanomaterials and Energy Devices, School of Physical Sciences, Swami Ramanand Teerth Marathwada University, India, [3)]Energy Storage Research Centre, Korea Institute of Science and Technology, Republic of Korea

6WePo.4.41LN

Photovoltaic and Impedance Characteristics of Dye-Sensitized Solar Cell Using Polymer Gel Electrolyte

Waode Sukmawati Arsyad[1,2)], Herlin Pujiarti[1)], Herman[1)] and Rahmat Hidayat[1)]

[1)]Physics of Photonics and Magnetism Research Division, Faculty of Mathematics and Natural Sciences, Bandung Institute of Technology, Indonesia, [2)]Physics Department, Faculty of Mathematics and Natural Sciences, Halu Oleo University, Indonesia

6WePo.4.42LN

DFT Study of Chromophore Structures of Coumarin Styryl Dyes as Sensitizer for Dye-Sensitized Solar Cells

S. Tontapha[1)], P. Chaiamornnugool[1)], W. Sang–aroon[2)] and V. Amornkitbamrung[3)]

[1)]Integrated Nanotechnology Research Center, Department of Physics, Faculty of Science, Khon Kaen University, Thailand, [2)]Department of Chemistry, Faculty of Engineering, Rajamangala University of Technology Isan, Thailand, [3)]Integrated Nanotechnology Research Center, Department of Physics, Faculty of Science, Khon Kaen University, Thailand

6WePo.4.43LN

Realization of High-efficiency Platinum-free Dyed-Sensitized Solar Cell via a Ni_3S_2 Composite Counter Electrode

W. Maiaugree[1)], A. Tangtrakarn[1,2,3)] and V.

Amornkitbamrung[1,2,3)]

1)Department of Physics, Faculty of Science, Khon Kaen University, Thailand, 2)The Integrated Nanotechnology Research Center, Khon Kaen University, Thailand, 3)Thailand Center of Excellence in Physics, CHE, Ministry of Education, Thailand

6WePo.4.44LN

Fabrication and Characterization of Platinum-Graphene Based DSSCs

Yinghe Zhang[1)], Shigeki Kuroiwaa[1)], Tawfique Hasan[2)]

1)Applied Chemistry, Waseda University, Japan, 2)Cambridge Graphene Centre, Cambridge University, UK

6WePo.4.45LN

Titanium Thin Film Based TiO_2 Nanostructures for DSSCs: Studies of Photocurrent and Photovoltage

Sadia Ameen, Hyung-Kee Seo, Minwu Song, M. Nazim, Hyung-Shik Shin

Energy Materials & Surface Science Laboratory, Solar Energy Research Center, School of Chemical Engineering, Chonbuk National University, Republic of Korea

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Wednesday, November 26
14:45 - 16:10 Annex Area 7

7WePo.10 Characterization and Modules Reliability 3

Chairperson:
Kohji Masuda (JET, Japan)

7WePo.10.1

An Convenient Way to Monitor the PID Resistant ARC Coating for Crystalline Silicon Solar Cells

Z. W. Peng, C. J. Lan and H. L. Chen

Motech Industries, Inc., Taiwan

7WePo.10.2

Results of 3 Years of Thin Film Module Energy Yield Inter-comparison: Link Indoor to Outdoor Performance Data

G. Friesen, M. Pravettoni, S. Dittmann, A. Virtuani, M. Marzoli, D. Strepparava and R. Meoli

University of Applied Sciences and Arts of Southern Switzerland (SUPSI), Institute for applied sustainability to the built environment (ISAAC), Switzerland

7WePo.10.3

High Performance Si PV Module at Low Solar Irradiance

Hyun Young Son, Hoon Oh, Indeok Chung, Nari Yoon, Won-jae Lee and Eun-Chel Cho and In-Sik Moon

PV Research Dep´t, Green Energy Business Division, Hyundai Heavy Industries, Co., Ltd., Korea

7WePo.10.4

Optical Loss Analysis of Colored PV Modules Using Comprehensive Ray Tracing

M. R. Vogt[1)], H. Holst[2)], M. Winter[1)], S. Knoc[1)], A. Ruppenthal[3)], M. Köntges[2)], R. Brendel[1,2)] and P. P. Altermatt[1)]

[1)]Dep. Solar Energy, Inst. Solid-State Physics, Leibniz University of Hannover, Germany, [2)]Institute for Solar Energy Research Hamelin (ISFH), Germany, [3)] Momentive Performance Materials GmbH, Germany

7WePo.10.5

Changes of Solar Cell Parameters During Damp-Heat Exposure

J. Zhu[1)], R. Gottschalg[1)], M. Koehl[2)], S. Hoffmann[2)], K. A. Berger[3)], S. Zamini[3)], I. J. Bennett[4)], E. Gerritsen[5)], P. Malbranche[5)], P. Pugliatti[6)], A. Di Stefano[6)], F. Aleo[6)], D. Bertani[7)], F. Paletta[7)], F. Roca[8)], G. Graditi[8)], M. Pellegrino[8)], O. Zubillaga[9)], P. Cano[9)], A. Pozza[10)] and T.

Sample[10)]

[1)]Centre for Renewable Energy Systems Technology (CREST), Loughborough University, UK, [2)]Fraunhofer ISE, Germany, [3)]AIT, Austria, [4)]ECN, Netherlands, [5)]CEA-INES, France, [6)]ENEL, Italy, [7)]RSE, Italy, [8)]ENEA, Italy, [9)]Tecnalia, Spain, [10)]JRC, Italy

7WePo.10.6

Analysis for Degradation of Crystalline Silicon PV Modules by EL and PL

K. Shirasawa[1)], S. Asao[1)], K. Takano[2)], K. Sugihara[2)] and H. Takato[1)]

[1)]National Institute of Advanced Industrial Science Technology, Japan, [2)]International Test & Engineering Services Co., Ltd., Japan

7WePo.10.7

Non-contact Measurement of Electric Potential of PV Cells in a Module and Novel Characterization Technologies

Y. Hishikawa, K. Yamagoe and T. Onuma

National Institute of Advanced Industrial Science and Technology (AIST), Research Center for Photovoltaic Technologies (RCPVT)

7WePo.10.8

Crosslinking and Post-crosslinking of EVA in PV Modules

G. Oreski[1)], A. Rauschenbach[1)], C. Hirschl[2)], G. Eder[3)] and G. Pinter[4)]

[1)]Polymer Competence Center Leoben, Austria, [2)]Carinthian Tech Research AG, Austria, [3)]OFI Österreichisches Forschungsinstitut für Chemie und Technik, Austria, [4)]University of Leoben, Institute of Material Science and Testing of Plastics, Austria

7WePo.10.9

Measured and Guaranteed Degradation of c-Si PV Modules: A Module Level Performance Study after a Decade of Field Operation

T. Aziz, N. Ketjoy and C. Sirisamphanwong

School of Renewable Energy Technology (SERT)
Naresuan University Phitsanulok, Thailand

7WePo.10.10

Evaluation of Soiling Loss Measurement Methodologies for Different PV Module Technologies

J. J. John, S. Chattopadhyay, R. Dubey, A. Kottantharayil and J. Vasi

Indian Institute of Technology Bombay, India

7WePo.10.11

Detection and Analysis of PID Affected Solar Modules in the Field

Thomas Kaden[1)], Stephan Hoffmann[2)], Peter Bentz[3)], Hans Joachim Moeller[1)] and Michael Koehl[2)]

[1)]Fraunhofer Technologiezentrum Halbleitermaterialien (THM), Germany, [2)]Fraunhofer-Institut für Solare Energiesysteme (ISE), Germany, [3)]Solar-Fabrik, Germany

7WePo.10.12

Spatial and Temporal Photovoltaic Module Temperature Variations in Outdoor Conditions

B. Herteleer[1,2,3,4)], H. Goverde[2,3,4)], F. Catthoor[3)], J. Driesen[2,4)] and J. Cappelle[1)]

[1)]E&A Research Group, Belgium, [2)]ESAT/ELECTA, Belgium, [3)]IMEC vzw, Belgium, [4)]EnergyVille, Belgium

7WePo.10.13

Measurement of Residual Stress in Copper Interconnectors on Crystalline Silicon Solar Cells by X-ray Diffraction

A. Morlier, F. Haase and M. Köntges

ISFH, Institute for Solar Energy Research Hamelin, Germany

7WePo.10.14

The Temperature Variation of Test Specimen Due to White Bias Light Irradiation During the Spectral Response Measurement of Solar Cells and Its Effect on the Spectral Response Measurement Result

S. K. Ahn[1)], K. S. Lee[1)], D. H. Kim[2)] and J. H. Yun[1)]

[1)]Photovoltaic Laboratory, Korea Institute of Energy Research, Korea, [2)]Department of Materials Science and Engineering, Korea University, Korea

7WePo.10.15

The Acceleration of Degradation by HAST and Air-HAST in c-Si PV Modules

Soh Suzuki[1)], Tadanori Tanahashi[1)], Takuya Doi[2)] and Atsushi Masuda[2)]

[1)]ESPEC CORP., Japan, [2)]National Institute of Advanced Industrial Science and Technology, Japan

7WePo.10.16

Propagation of Measurement Uncertainties in Mismatch Factor Correction for Photovoltaic Device Calibration

B. Mihaylov, M. Bliss, T. R. Betts and R. Gottschalg

Centre for Renewable Energy Systems Technology School of Electronic, Electrical and Systems Engineering, Loughborough University, United Kingdom

7WePo.10.17

Study on Interchangeability of Crystalline PV Modules

N. Yamanaka[1)], S. Nishikawa[1)], Y. Takahashi[2)], Y. Ishihara[2)] and H. Kato[3)]

[1]Nihon University, Japan, [2]Doshisha University, Japan, [3]Japan Electrical Safety & Environment Technology Laboratories, Japan

7WePo.10.18

Degradation Analysis of Silicone-encapsulated Photovoltaic Modules After 28 Years Operation

Sadao Sakamoto[1],Atsuo Itoh[2], Hiroto Ohwada[2], Tomoyoshi Furihata[2], KIM Hyung-Bae[2], Naoki Yamakawa[2], Atsushi Yaginuma[2], Tomoo Imataki[3] and Momoki Watanabe[3]

[1]Gifu-University (AIST) Japan, [2]Shin-Etsu Chemical Co., Ltd, Japan, [3]Sharp Co., Japan

7WePo.10.19

Power Rating for Bifacial PV

K. Sugibuchi, S. Goda and N. Ishikawa

PVG Solutions Inc., Japan

7WePo.10.20

Time-resolved Photoluminescence Characterisation of Laser Induced Defects in Laser-doped Region

K. Wang, Z. Hameiri and H. Kampwerth

School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Australia

7WePo.10.21

Characteristics Evaluation of Various Photovoltaic Power Generation Systems

Hideaki Masaki, Koki Nagai, Keiichiro Hakuta, Masashi Nagura and Masahiro Sone

NTT FACILITIES, Inc., Japan

7WePo.10.22

Mathematical Modeling for Characteristic Analysis of Input and Output Parameter of Roof Top Photovoltaic System and Residential Air Conditioning Load

J. Saelao[1)], K. Treepak[2)] and N. Patcharaprakiti[3)]

[1)]Department of Mathematical, Faculty of Science, Maejo University, Thailand, [2)]Department of Electrical Engineering, Faculty of Engineering, Rajamangala University of Technology Lanna Payap, Thailand, [3)] Department of Electrical Engineering, Faculty of Engineering, Rajamangala University of Technology, Lanna Chiangrai, Thailand

7WePo.10.23

Application of Passivation Film on Thin-Film Photovoltaic Cells

M. Yamashita, T. Fujimoto, T. Niwa, T. Jinda and M. Mori

Toray Engineering Co.,Ltd., Japan

Wednesday, November 26
10:15 - 11:30 Annex **Area 8**

8WePo.8 Systems, BOS components and Grid Integration 1

Chairpersons:
Kazuhiko Kato (AIST, Japan)
Wilfried G.J.H.M. Van Sark (Utrecht University Copernicus Institute, The Netherlands)

8WePo.8.1

Autonomous Solar Power Forecasting System

A. Okhorzina[1)], A. Yurchenko[1)] and A. Kozloff[2)]

[1)]National Research Tomsk Polytechnic University, [2)] Institute of Atmospheric Optics SB RAS, Russia

8WePo.8.2

Global Solar Radiation Prediction Using Multipoint Meteorological Data

Y. Takigawa[1)], K. Yukita[1)], Y. Goto[1)], K. Ichiyanagi[1)], K. Kobayashi[2)] and Y, Miwa[2)]

[1]Aichi Institute of Technology, Japan, [2]Chubu Electric Power Co.,INC, Japan

8WePo.8.3

Development of Short Term Irradiance Forecasting Using LFM Model, in Japan

Takashi OOZEKI[1], Joao Gari da Silva Fonseca Jr.[1], Hideaki Ohtake[1], Takumi Takashima[1], Yoshinori Yamada[2] and Kazuhiko Ogimoto [3]

[1]National Institute of Advanced Industrial Science and Technology (AIST), JAPAN, [2]Meteorological Research Institute (MRI), Japan Meteorological Agency (JMA), [3] The University of Tokyo

8WePo.8.4

A Study on Forecast Method for Short Period Variation of Solar Radiation by Using Cloud Image Data

Ryuji Kawai[1], Katsuhiro Ichiyanagi[1], Kazuto Yukita[1], Yasuyuki Goto[1], Kazuhiro Kobayashi[2] and Yasushi Miwa [2]

[1]Aichi Institute of Technology, Japan, [2]Chubu Electric Power Co., Inc., Japan

8WePo.8.5

Impact of PV Power Prediction Technology on Power System Operation

Y. Udagawa[1,2], K. Ogimoto[1], T. Ikegami[3], T. Oozeki[4], H. Ootake[4] and S. Fukutome[5]

[1]The University Of Tokyo, Japan, [2]KOZO KEIKAKU ENGINEERING Inc, Japan, [3]Tokyo University of Agriculture and Technology, Japan, [4]The National Institute of Advanced Industrial Science and Technology, Japan, [5]JP Business Service Corporation, Japan

8WePo.8.6

Initial Results of PV System Performance with Two Different System Installations: The Case of A 1 kWp HIT PV System in A Suburb of Bangkok, Thailand

A. Hongsingthong[1)], S. Kittisontirak[1,3)], P. Chinnavornrungsee[1)], S. Songtrai[1)], A. Limmanee[1)], J. Sritharathikhun[1)], N. Akarapanjavit[2)], N. Boriraksantikul[2)], T. Taratiwat[2)], K. Sriprapha[1)] and W. Titiroongruang[3)]

[1)]Solar Energy Technology Laboratory (STL), National Electronics and Computer Technology Center (NECTEC), Thailand, [2)]PTT Research & Technology Institute, PTT Public Company Limited, Thailand, [3)] Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand

8WePo.8.7

Effect of Sun Radiation on Solar Cell Modules with Different Directions

Der-Ray Huang, Shao-Yu Fang and Huan-Sheng Zeng

Department of Opto-Electronics Engineering, National Dong Hwa University, Taiwan

8WePo.8.8

Investigate of Solar PV Rooftop Energy with Various of Tile and Angel in Winter Season at the Northern Thailand

S. Teerasak[1)], J. Sakorn[2,3)], W. Muangjai[1)] and T. Jutturit[2)]

[1)]College of Integrated Science and Technology, [2)] Department of Electrical Engineering, Faculty of Engineering Rajamangala University of Technology Lanna, Thailand, [3)]Pasang Technical College, Thailand

8WePo.8.9

Evaluation of the Performance of Large Scale PV Plant in West China

Hailing Li[1)], Fang Lv[1)], Yonghui Zhai[1,2)], Shiyu Sang[2)], Ye Zhang[2)] and Sicheng Wang[3)]

[1]Institute of Electrical Engineering, Chinese Academy of Science, [2]Photovoltaic and wind power systems quality test center of Chinese Academy of Sciences, [3]Energy Research Institute National Development and Reform Commission

8WePo.8.10

Change to 8TuO.12.3

8WePo.8.11

Outdoor Characterization of InGaP and GaAs solar cells Using the Optical Wavelength Splitter

Y. Masuda[1], Y. Takiguchi[1], Y. Ueda[2], A. Hosono[3], S. Ishii[3], Y. Ogawa[3], T. Okamoto[3] and M. Konagai[1,4]

[1]Department of Physical Electronics, Tokyo Institute of Technology, Japan, [2]Department of Electrical Engineering, Tokyo University of Science, Japan, [3]Department of Electrical and Electronic Engineering, Kisarazu National College of Technology, Japan, [4]Photovoltaic Research Center (PVSEC), Tokyo Institutel of Technology, Japan

8WePo.8.12

Performance Improvement on 120 kW_p PV System of PV Microgrid System

N. Ketjoy, A. Chimtavee, R. Ngoenmeesri, N. Khaosaad and M. Konyu

School of Renewable Energy Technology (SERT), Naresuan University, Thailand

8WePo.8.13

The Impact of Haze on Performance Ratio and Current Generation of PV Systems in Singapore

H. Liu[1,2], A. M. Nobre[1,3], D. Yang[1], J. Y. Ye[1,2], F. R. Martins[4], R. Rüther[3], T. Reindl[1], A. G. Aberle[1] and I. M. Peters[1]

[1]Solar Energy Research Institute of Singapore (SERIS), Singapore, [2]NUS Graduate School for Integrative Sciences & Engineering (NGS), Singapore, [3]Universidade Federal de Santa Catarina (UFSC),

Campus Universit rio Trindade, Brazil, [4]Universidade Federal de São Paulo (UNIFESP), Campus Baixada Santista, Brazil

8WePo.8.14

A New Weather Classification Based on Solar Irradiance Variability

A. Usami

Central Research Institute of Electric Power Industry, Japan

8WePo.8.15

Meeting the Challenge of Anti-Reflective Coatings for Ultra-Thin Photovoltaic Cover Glass

B. Brophy, Z. R. Abrams, Y. S. Yang and P. Gonsalves

Enki Technology Inc., USA

8WePo.8.16

Techno-economic of Commercial PV Power Plant: Case Study 3 MWp CIS PV Power Plant in Thailand

C. Sirisamphanwong, N. Ketjoy, K. Mansiri and R. Ngonmeesri

School of Renewable Energy Technology (SERT) Naresuan University, Thailand

8WePo.8.17

Comparison of the Solar Irradiance Resource Datasets for Energy Yield Modeling and Standardization in Japan

L. P. Johnson

Sunpulse K.K., Japan

8WePo.8.18

On Site Measurements of Current-voltage Characteristics of Photovoltaic String

J. Asai[1], H. Naito[2] and M. Kondo[3]

[1]Nippon Kernel System, Japan, [2]Osaka Prefecture University, Japan, [3]National Institute of Advanced

Industrial Science and Technology (AIST), Japan

8WePo.8.19

An Apply MPPT PSO Algorithm within Partially Shaded Condition for Highland Area at Thailand

W. Muangjai[1)], T. Somsak[1)], K. Oranpiroj[2)] and J. Thongpron[2)]

[1)]College of Integrated Science and Technology, [2)]Department of Electrical Engineering, Faculty of Engineering Rajamangala University of Technology Lanna, Thailand

8WePo.8.20

Two-Mode Multi-Channel High Accuracy Real-Time Data Logger for Photovoltaic Energy Harvesting Systems

Afida Ayob[1)], A. M. Buhari[2)], M. Shakeri[1)], C. Puvaneswaran[2)], K. Sopian[2)] and N. Amin[1, 2)]

[1)]Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, The National University of Malaysia, Malaysia, [2)]Solar Energy Research Institute, The National University of Malaysia, Malaysia, [3)]Advanced Materials Research Chair, Chemistry Department, College of Sciences, King Saud University, Saudi Arabia

8WePo.8.21

Performance and Yield Comparison of Eight Different Micro-Inverters

S. Krauter

University of Paderborn, Department of Electrical Energy Technology - Sustainable Energy Concepts, Germany

8WePo.8.22

Robust Battery Operation of Green Base Stations Considering Forecast of PV Output

Y. Hara[1)], T. Yamazaki[1)], S. Wakao[1)], K. Nukada[2)], T.

Tamura[2] and M. Takahata[2]

[1]Waseda University, Japan, [2]NTT DOCOMO, Inc., Japan

8WePo.8.23

Study on BESS Operation Planning Considering with SOC of Individual Houses for Harmonized EMS

K. Uchida[1,2] and Y. Ueda[1,2]

[1]Tokyo University of Science, Japan, [2]JST CREST

8WePo.8.24

Application of PV Output Prediction Interval to Battery Operation of Green Base Stations

T. Yamazaki[1,3], Y. Hara[1,3], S. Wakao[1,3], Y. Fujimoto[2,3], Y. Hayashi[1,3], K. Nukada[4], T. Tamura[4] and M. Takahata[4]

[1]Dept. Of Electrical Engineering & Bioscience, Waseda University, Japan, [2]Institute for Nanoscience & Nanotechnology, Waseda University, Japan, [3]JST, CREST, Japan, [4]NTT DOCOMO, Inc., Japan

8WePo.8.25

Energy Control Optimization of Green Base Stations to Reduce Disaster Risk and Energy Cost Based on PV Power Production Forecasts

K. Nukada, M. Takahata and T. Tamura

Research Laboratories, NTT DOCOMO, INC., Japan

8WePo.8.26

Evaluation of the Effectiveness of Voltage Control Methods using Acceptable Amount of PV Installation

R. Takahashi, R. Miyoshi, N. Takahashi and Y. Hayashi

Department of Electrical Engineering and Bioscience, Waseda University, Japan

8WePo.8.27

Behavior of Influential Parameters during Fault Occurrence due to Photovoltaic integration to Distribution System

S. Ananwattanaporn and A. Ngaopitakkul

Department of Electrical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand

8WePo.8.28

A Low-Cost PV System for Cellular Base Stations

Hosei Matsuoka and Masaki Nakamura

Research Laboratories, NTT DOCOMO, Inc.

8WePo.8.29

An Economic Evaluation Comparison of Solar Water Pumping System With Engine Pumping System for Rice Cultivation

K. Treepak[1], J. Saelao[2] and N. Patcharaprakiti[3]

[1]Department of Electrical Engineering, Faculty of Engineering, Rajamangala University of Technology Lanna Payap, Thailand, [2]Department of Mathematical, Faculty of Science, Maejo University, Thailand, [3]Department of Electrical Engineering, Faculty of Engineering, Rajamangala University of Technology, Lanna Chiangrai, Thailand

8WePo.8.30

A 121 kWp PV-Diesel Generator Hybrid System in Kampong Chheuteal High School, Kampong Thom Province, Kingdom of Cambodia

S. Kittisontirak[1,2], P. Chinnavornrungsee[1], S. Songtrai[1], K. Chumpolrat[1], A. Hongsingthong[1], J. Sritharathikhun[1], K. Sripapha[1], P. Thajchayapong[1] and W. Titiroongruang[2]

[1]Solar Energy Technology Laboratory (STL), National Electronics and Computer Technology Center (NECTEC), THAILAND, [2]Faculty of Engineering,

King Mongkut's Institute of Technology Ladkrabang, THAILAND

8WePo.8.31

Reduction of Energy Storage Capacity in a Large-scale Photovoltaic Generation System

T. Makino, A. Takahashi, J. Imai and S. Funabiki

Okayama University, Japan

8WePo.8.32

Withdrawn

8WePo.8.33LN

Withdrawn

Wednesday, November 26
13:00 - 14:25 Annex Area 8

8WePo.9 Systems, BOS components and Grid Integration 2

Chairpersons:
Pathom Attaviriyanupap (Mitsubishi Electric Corporation, Japan)
Takayuki Tanabe (Meidensha Corporation, Japan)

8WePo.9.1

The Dutch Portal of Photovoltaic Energy

A. Tozzi[1)], O. Isabella[1)], F. Lantsheer[2)], G. Ganesan Nair[1)] and M. Zeman[1)]

[1)]Delft University of Technology, PVMD / Dimes, The Netherlands, [2)]Koninklijk Nederlands Meteorologisch Instituut (KNMI), WEER/RB&C, The Netherlands

8WePo.9.2

Photovoltaic Power Generation Forecast Using Numerical Weather Model and Statistical Method

T. Kaishima[1)], A. Okubo[1)], T. Takagi[1)] and K. Ogimoto[2)]

[1)]ITOCHU Techno-Solutions Corporation, Japan, [2)]The

University of Tokyo, Japan

8WePo.9.3

Hours-ahead Solar Irradiation Forecast based on Hybridization of Numerical Weather Simulation and Locally Measured Ground Data

M. Kakimoto[1)], Y. Hanyu[1)], H. Shin[1)], T. Kawahara[1)], H. Kobayashi[1)], H. Kusaka[2)], M. Okada[2)], Y. Akimoto[2)], Y. Takane[3)], R. Ikeda[2)] and S. Otaka[2)]

[1)]R&D Center Toshiba Corp., Japan, [2)]Graduate School of Life and Environmental Sciences, University of Tsukuba, Japan, [3)]Atmospheric Environmental Study Group, National Institute of Advanced Industrial Science and Technology, Japan

8WePo.9.4

Fluctuation Range Prediction of PV Output by Using Just-In-Time Modeling

H. Homma[1,3)], T. Yamazaki[1,3)], S. Yoshizawa[1,3)], H. Kikusato[1,3)], S. Wakao[1,3)],Y. Fujimoto[2,3)] and Y. Hayashi[1,3)]

[1)]Dept. of Electrical Engineering & Bioscience, Waseda University, JST CREST, Japan, [2)]Institute for Nanoscience & Nanotechnology, Waseda University, Japan, [3)]JST CREST, Japan

8WePo.9.5

Statistical Evaluation of Ramp-Event of Spatial Average Irradiance in Electric Power System Service Area

T. Kato[1)], T. Mukai[1)], Y. Manabe[2)], M. Kurimoto[1)], T. Funabashi[2)] and Y. Suzuoki[1)]

[1)]Dept. of Electrical Eng. and Comp. Sci., Grad. School of Eng., Nagoya Univ., Japan, [2)]Eco Topia Science Institute, Nagoya Univ., Japan

8WePo.9.6

Power Output Estimation of Flexible PV Module System for Off-grid Use

M. Shibasaki and T. Yachi

Tokyo University of Science, Japan

8WePo.9.7

Performance Evaluation of Photovoltaic Grid Connected System with Two Axes Tracking and Fixed Modules Under Hot - Wet Climate Condition of Thailand

K. Mansiri, N. Ketjoy, C. Sirisamphanwong and R. Ngomesee

School of Renewable Energy Technology (SERT), Thailand

8WePo.9.8

Combining Radiation Data with a Sunpath and Horizon Line to Determine the Annual Insolation on a Surface

J. Allan[1], Z. Dehouche[1] and S. Stankovic[2]

[1]School of Engineering and Design, Brunel University, United Kingdom, [2]ChapmanBDSP

8WePo.9.9

Two Years Demonstration results of Two Large a-Si Thin Film PV Power Plants at Different Locations

T. Aiamtha[1], A. Hongsingthong[2], P. Manosukritkul[3], P. Chinnavornrungsee[2], S. Songtrai[2], T. Krajangsang[2], J. Sritharathikhun[2], W. Titiroongruang[3] and K. Sriprapha[2]

[1]Bangkok Solar Power Co., Ltd, THAILAND, [2]Solar Energy Technology Laboratory, National Electronics and Computer Technology Center, THAILAND, [3] Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, THAILAND

8WePo.9.10

Evaluation of 60 kWp PV System Performance in Mexico City

José Antonio Urbano[1], Yasuhiro Matsumoto[1], Oscar Iván Gómez[1], René Asomoza[1], Gabriela López[1], Claudia López[2] and Ramón Peña[1]

[1]Electrical Engineering Department, Research Center

and Advanced Studies of the National Polytechnic Institute (CINVESTAV), Mexico, [2]Fronius Mexico S.A. de C.V., División de Electrónica Solar, Mexico

8WePo.9.11

Outdoor Measurements of Spectral-splitting Photovoltaic System Using GaAs Solar Cell and GaInP Solar Cell

T. Okamoto[1], A. Hosono[1], S. Ishii[1], Y. Ogawa[1], Y. Masuda[2], Y. Ueda[3] and M. Konagai[2,4]

[1]Department of Electrical and Electronic Engineering, Kisarazu National College of Technology, [2]Department of Physical Electronics, Tokyo Institute of Technology, [3]Department of Electrical Engineering, Tokyo University of Science, [4]Photovoltaic Research Center (PVREC), Tokyo Institute of Technology, Japan

8WePo.9.12

Demonstration of Failure Detection Method of PV Modules by second order differential of I-V Characteristics

H. Hatta and H. Kobayashi

Central Research Institute of Electric Power Industry (CRIEPI), Japan

8WePo.9.13

Estimation of the Output from the Photovoltaic Systems Using the Estimated Solar Radiation Distribution

T. Kinoshita, A. Takahashi, J. Imai and S. Funabiki

Okayama University, Japan

8WePo.9.14

Radiative Forcing of Solar Installations in Warm Urban Climates

Brian R. Burg, Patrick Ruch, Stephan Paredes and Bruno Michel

IBM Research, Switzerland

8WePo.9.15

Design Optimization of Bifacial PV

K. Sugibuchi, S. Goda and N. Ishikawa

PVG Solutions Inc., Japan

8WePo.9.16

New-fangled Platform for Sizing the Building Integrated Photovoltaics

K. Jayachandran[1)] and S. Saravanan[2)]

[1)]Center for Alternate Energy Research, University of Petroleum and Energy Studies, India, [2)]National Centre for Photovoltaic Research and Education, Indian Institute of Technology Bombay, India

8WePo.9.17

Heuristic Algorithm for Reconfiguring Solar Cell Interconnections within a Panel

B. Lefevre[1,2,3)], R. Appels[1)], M. Flies[1)], N. Charels[1)] and J. Driesen[1,2)]

[1)]KU Leuven, Belgium, [2)]Energyville, Belgium, [3)]imec vzw, Belgium

8WePo.9.18

Analysis of the Effect of Fill Factor on the Efficiency of Solar PV System for Improved Design of MPPT

D. K. Sharma and G. Purohit

School of Engineering, Sir Padampat Singhania University, India

8WePo.9.19

GPS Assisted Open Loop Circuitry Based Solar Tracker

P. Chelvanathan[1)], M. Shakeri[1)], M. A. Alghoul[1)], M. M. Alam[3)], K. Sopian[1)] and N. Amin[1,2,3)]

[1)]Solar Energy Research Institute, The National University of Malaysia, Malaysia, [2)]Department of Electrical, Electronic and System Engineering, Faculty of Engineering and Built Environment, The National University of Malaysia, Malaysia, [3]Advanced Materials Research Chair, Chemistry Department, College of Sciences, King Saud University, Saudi Arabia

8WePo.9.20

Effect of Season on Inverter Performance

K. Chumpolrat, V. Saengsuwan, N. Udomdachanut, S. Songtrai, S. Kittisontirak, S. Jaroensathainchok, A. Limmanee, T. Krajangsang, J. Sritharathikhun and K. Sriprapha

National Electronics and Computer Technology Center, Thailand

8WePo.9.21

A Study of the Distributed Power Electronics Ability in the PV System Energy Output Improvement

A. Chimtavee and N. Ketjoy

School of Renewable Energy Technology (SERT), Naresuan University, Thailand

8WePo.9.22

Measures to Match Load Profile with Actual PV Generation to Achieve An Effective Integration into the Energy System

S. Krauter

University of Paderborn, Department of Electrical Energy Technology, Germany

8WePo.9.23

Design Considerations on Peak Power Clipping Thresholds in Microgrids

T. Vogt[1], N. Fröhleke[1], J. Böcker[1] and S. Kempen[2]

[1]University of Paderborn, Germany, [2]AEG Power Solutions GmbH, Germany

8WePo.9.24

Energy Management Method with PV and Storage Battery by Optimal Combination of Various Control Modes

T. Matsuyuki[1)], S. Wakao[1)], T. Iwato[2)], T. Tanaka[2)], Y. Kanai[2)] and N. Yamashita[2)]

[1)]Dept. Of Electrical Engineering & Bioscience, Waseda University, Japan, [2)]NTT Energy and Environment Systems Laboratories, Japan

8WePo.9.25

Basic Study of Voltage Control Method with Demand Response

Satoru Akagi, Jun Yoshinaga and Yasuhiro Hayashi

Waseda University, Japan

8WePo.9.26

Dynamic Control Method Based on JIT for LVR in Distribution Systems

N. Takahashi[1)], H. Kikusato[1)], J. Yoshinaga[1)], Y. Hayashi[1)], S. Kusagawa[2)] and N. Motegi[2)]

[1)]Waseda University, Japan, [2)]TAKAOKA TOKO., LTD., Japan

8WePo.9.27

Impact of Protective Device Coordination due to Photovoltaic (PV) Connected in Distribution System

S. Ananwattanaporn[1)], S. Muangchareon[1)], A. Ngaopitakkul[1)], C. Pothisarn[1)], C. Jettanasen[1)], M. Leelajindakrairerk[1)] and S. Bunjongjit[2)]

[1)]Department of Electrical Engineering, Faculty of Engineering, King Mongkut´s Institute of Technology Ladkrabang, Thailand, [2)]Faculty of Engineering, Rajamangala University of Technology Rattanakosin, Thailand

8WePo.9.28

Analysis of the Variability of PV Power and Residual Load

Y. Udagawa[1,2], K. Ogimoto[1], T. Oozeki[3] and H. Ootake[3]

[1]The University Of Tokyo, Japan, [2]KOZO KEIKAKU ENGINEERING Inc, Japan, [3]The National Institute of Advanced Industrial Science and Technology, Japan

8WePo.9.29

Stand-alone Photovoltaic Systems for Rural Community Education Center in Thailand

K. Sriprapha, S. Kittisontirak, K. Chumpolrat, N. Udomdachanut, S. Kittisontirak, P. Chinnavornrungsee, J. Sritharathikhun, T. Krajangsang, A. Limmanee, K. Sriprapha and P. Thajchayapong

National Electronics and Computer Technology Center, Thailand

8WePo.9.30

Micro Combined Heat and Power Plants (μ-CHP) in Combination with Photovoltaics for Autonomous Local Power and Heat Supply

S. Krauter

University of Paderborn, Department of Electrical Energy Technology - Sustainable Energy Concepts, Germany

8WePo.9.31

Development of Intelligent Type Power Conditioner System with a Power Storage Device for Photovoltaic Generation

Kohta Sakai[1], Kazuto Yukita[1], Katsuhiro Ichiyanagi[1], Yasuyuki Goto[1], Kenji Ando[2] and Atsushi Miyamoto[2]

[1]Aichi Institute of Technology, Japan, [2]Nitto Kogyo Co., Inc., Japan

8WePo.9.32

Determination of Loss of Load Probability of Grid Connected Photovoltaic System Using Solar Shape Functions

K. Nakaravarayut[1], R. Songprakorp[1], A. Sangswang[2], V. Monyakul[3], C. Jivacate[4] and C. Limsakul[4]

[1]School of Energy Environment and Materials, King Mongkut's University of Technology Thonburi, Thailand, [2]School of Energy Environment and Materials, King Mongkut's University of Technology Thonburi, Thailand, [3]Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, Thailand, [4]CES Solar Cells Testing Center (CSSC), King Mongkut's University of Technology Thonburi, Thailand

8WePo.9.33LN

Bifacial Modules Used in Cable Based PV Carport Applications

F. Baumgartner[1], A. Büchel[2], H. Nussbaumer[1], T. Baumann[1], D. Schär[1], C. Comparotto[3], R. Harney[3] and A. Schneider[3]

[1]ZHAW Zurich University of Applied Science SoE, Switzerland, [2]LE - Light Energy Systems AG, [3]ISC International Solar Research Center Constance, Germany

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Wednesday, November 26
16:30 - 17:55 Annex Area 9

9WePo.11 PV Deployment; Industry, Market and Policy

Chairpersons:
Masanori Ishimura (NEDO, Japan)
Arnulf Jäger-Waldau (European Commission, DG JRC, Italy)

9WePo.11.1

Change to 9WeO.7.2

9WePo.11.2

Photovoltaics in Spain. Present and Future

J. Cárabe

CIEMAT, Photovoltaic Unit, Spain

9WePo.11.3

PV Systems in Indonesia: Dissemination and Development

Angéle Reinders[1)], Hans Veldhuis[1)], Armi Susandi[2)], Yuli S. Indartono[2)] and Abdurrachim Halim[2)]

[1)]University of Twente, Faculty of Engineering Technology, Department of Design, Production and Management, The Netherlands, [2)]Institut Teknologi Bandung, Faculty of Earth Sciences and Technology, Indonesia

9WePo.11.4

Withdrawn

9WePo.11.5

Analysis of Soiling Losses and Optimal Cleaning Schedule for Several PV Technologies at an Experimental Station in Central Saudi Arabia

A. Alsaeeri[1)], Y. Yoshizawa[2)], M. Arai[2)], R. K Jones[1)], F. Albirdisi[1)] and A. Baras[1)]

[1)]King Abdullah City for Atomic and Renewable Energy, Saudi Arabia, [2)]The University of Tokyo, Japan

9WePo.11.6

Analysis of Influence of Resource Allocation in the PV R&D of Japan on PV Module Price and the Japan's FIT

E. Endo

National Institute of Advanced Industrial Science and Technology, Japan

9WePo.11.7

Modeling the Performance, Cost and Minimum Sustainable Price of Silicon-Based Tandem Solar Cells

S. C. Siah[1], D. M. Powell[1], Zekun Ren[2], J. P. Mailoa[1], I. M. Peters[3] and T. Buonassisi[1]

[1]Massachusetts Institute of Technology, United States, [2]Singapore-MIT Alliance for Research & Technology, Singapore, [3]Solar Energy Research Institute of Singapore, Singapore

9WePo.11.8

A Development of Software for Photovoltaic System Application Design and Economic Assessment in Thailand

A. Tiengpal[1], C. Mahachai[1], N. Patcharaprakiti[1] and K. Tripak[2]

[1]Department of Electrical Engineering, Rajamangala University of Technology Lanna Chiangrai, Thailand, [2]Department of Electrical Engineering, Rajamangala University of Technology Lanna Payap, Thailand

9WePo.11.9

Photovoltaic Power Systems in Israel: An Overview and the Experience of Rooftop 4kW PV Power System Ownership: Installation Procedure, Electricity Output and Revenues

Yona Siderer

Ben-Gurion University of the Negev, National Solar Center, Israel

9WePo.11.10LN

Towards a Prospective Consequential LCA of Large-scale PV Penetration in the UK

M. Raugei[1], C. Jones[2], P. Gilbert[2], S. Mander[2], P. Thornley[2], B. Azzopardi[1,3] and K. Hayatleh[1]

[1]Department of Mechanical Engineering and Mathematical Sciences, Oxford Brookes University,

UK, [2]Tyndall Centre for Climate Change Research, University of Manchester, UK, [3]Institute of Electrical and Electronics Engineering, Malta College of Arts, Science and Technology (MCAST), Malta

9WePo.11.11LN

Change to 9WeO.6.2

9WePo.11.12LN

PV Development as Prosumers: The Role and Challenges Associated to Producing and Self-consuming PV Electricity

Ir. Gaëtan Masson[1], Sinead Orlandi[2], Kristian Petrick[3], Valerick Cassagne[4], José Ignacio Briano[5], Maria Jesus, Baez Morandi[5] and Robert Margolis[6]

[1]IEA PVPS, Belgium, [2]ICARES, Belgium, [3]IEA-RETD, Spain, [4]Total SA, France, [5]Eclareon, Spain, [6]NREL, USA

9WePo.11.13LN

An Anticipatory Life-cycle Assessment Approach to Improve the Environmental Performance of CdTe Module Recycling Operations

D. T. Ravikumar, T P Seager and M. P. Fraser

School of Sustainable Engineering and the Built Environment, ASU, USA

9WePo.11.14LN

PV Modules' Learning Curve and Improved Term of PV Costs Trends

Gaetan Masson[1], Ioannis-Thomas Theologitis[2] and Paula Mints[3]

[1]ICARES Consulting, Belgium, [2]European Photovoltaic Industry Association, Belgium, [3]SPV Market Research, California, USA

9WePo.11.15LN

Simplified Prospective LCA Models for Residential PV Installations Based on sc-Si and Installed in Europe in 2050

C. Marini and I. Blanc

MINES ParisTech, PSL Research University, O.I.E. - Centre Observation, Impacts, Energie, Sophia Antipolis Cedex, France

9WePo.11.16LN

Adverse Health Effects of Indium Tin Oxide and Copper Indium Gallium Diselenide

A. Tanaka[1)], M.Hirata[1)], K. Koga [2)], M. Shiratani[2)], M. Nakano[3)], K. Omae[3)] and Y. Kiyohara[1)]

[1)]Department of Environmental Medicine, Graduate School of Medical Sciences, Kyushu University, Japan, [2)]Department of Electronics, Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan, [3)]Department of Preventive Medicine and Public Health, School of Medicine, Tokyo, Keio University, Japan

Side Events

Asian Nations Joint Workshop on Photovoltaics

(JSPS 11th Workshop on the Future Direction of Photovoltaics)

The scope of this workshop is to provide an opportunity to review and discuss the present status and future of innovative solar cells. The aim is to contribute to further development in the science and technology of photovoltaics in order to meet worldwide sustainable energy targets.

Organized by: The Japan Society for the Promotion of Science, The 175th Committee on Innovative Photovoltaic Power Generating Systems

Japanese Chair: Makoto Konagai, Tokyo Institute of Technology
Chinese Chair: Ying Zhao, Nankai University
Korean Chair: Jinsoo Song, KIER

Schedule of the Asian Nations Joint Workshop on Photovoltaics

Kyoto International Conference Center (Conf. venue of the WCPEC-6) Room B-1
Nov. 23 (Sun.), 2014

Opening Session Chairperson: Yuzuru Ueda

10:00-10:15 **Opening Remarks**
Makoto Konagai, Ying Zhao, Jinsoo Song

Session 1 Chairperson: Yuzuru Ueda

10:15-10:35 **Recent Progress in Development of Innovative Solar Cells in Japan**
Makoto Konagai (Tokyo Institute of Technology)

10:35-10:55 **China Photovoltaic Development Roadmap**
Yuwen Zhao, Honorary Director of China Photovoltaic Society (CPVS)

10:55-11:15 **History of Korean PV**
Jinsoo Song (KIER)

Session 2 Chairperson: Makoto Tanaka

11:15-11:30 **R&D Activities of NEDO and JST Programs in Japan**
Masafumi Yamaguchi (Toyota Technological Institute)

11:30-11:45 **Defect Engineering in Multicrystalline Silicon**
Deren Yang (Zhejiang University)

11:45-12:00 **Loss Factor Minimization Passivation Technology for High Efficiency Solar Cell Fabrication**
Junsin Yi (SungKyunKwan University)

12:00-13:30 **Lunch**

Session 3 Chairperson: Amornrat Limmanee

13:30-13:45 **Recent Progress in High Performance Silicon Solar Cells**
Makoto Tanaka (Panasonic)

13:45-14:00 **Opportunities for Thin Film Solar Cells**
Zhao Ying (Nankai University)

14:00-14:15 **Modeling of Light-induced Degradation and Regeneration Kinetics in Silicon Solar Cells of B-doped Cz Wafers**
Donghwan Kim (Korea University)

14:15-14:30 **R&D Progress of HIT Solar Cell in SIMIT-Trina Joint-lab**
Zhengxin Liu (Shanghai Institute of Microsystem and Information Technology)

14:30-14:45 **Recent Progress of Photovoltaic Industry and Research in Taiwan**
Chung-wen Lan (National Taiwan University)

14:45-15:00 **Performance of PV Modules and Systems in the Tropics**
Armin ABERLE (National University of Singapore)

15:00-15:15 **Break**

Session 4 Chairperson: Donghwan Kim

15:15-15:30 **Mission and Strategy for Next Generation PV Systems**
Michio Kondo (Fukushima Renewable Energy Research Center)

15:30-15:45 **High-Efficiency Crystalline Silicon PV Modules: a Strategic Decision Process for Low Levelized Cost of Electricity**
Zhiqiang Feng (Technology of Trina Solar)

15:45-16:00 **Perovskite Solar Cell Technology**
Nam-Gyu Park (Sungkyunkwan University)

16:00-16:15 **Current Status and Future Prospect of CIS-based Thin-film PV Technology**
Katsumi Kushiya (Solar Frontier)

16:15-16:30 **Current Status of CIGS Research and Development Activities in Korea**
Byung Tae Ahn (KAIST)

16:30-16:45 **Thailand's Solar PV Development: Toward Strategic Positioning in ASEAN**
Amornrat Limmanee, Aswin Hongsingthong, Taweewat Krajangsang, Sorapong Inthisang, Jaran Sritharathikhun and Kobsak Sriprapha (NSTDA)

16:45-17:00 **The Research and Demonstration of Distributed PV and its Hybrid Power System**
Honghua Xu (Beijing Corona Sciences & Technology Co., Ltd.)

18:00- **Welcome Reception (WCPEC-6)**

IEA PVPS Workshop at 6th WCPEC Kyoto, Japan

"Challenges and Promises to Large Scale PV Development"

Day: Tuesday, 25th November, 2014
Time: 10:00– 17:30
Site: Room D, Kyoto International Conference Center
Access: Open to all registered WCPEC-6 participants

In 2014, PV will provide at least 1% of the world electricity demand for the first time. While this percentage represents still a small contribution, PV's growth is at such a pace that it could become a significant source of electricity and modify radically the way how the world is powered in the coming decade. The IEA-PVPS has been researching the challenges associated with PV development for well over 20 years. This workshop will highlight the main challenges and promises PV will bear in the coming years and decades.

As an official event of the 6th WCPEC, this PVPS Programme Workshop is jointly organised by the IEA - International Energy Agency, the WCPEC-6 and NEDO, New Energy and Industrial Technology Development Organization.

Agenda (subject to change. See the latest agenda in IEA PVPS Website : http://www.iea-pvps.org/)

This workshop will be Chaired by
Dr. Hiroyuki Yamada, Vice chairman of IEA PVPS/ NEDO, Japan
Stefan Nowak, Chairman of IEA PVPS

9:30
Registration and Morning Coffee/Tea

10:00 – 11:00
<u>Opening session</u> – Mainstream PV Electricity as a Game Changer in An Evolving Energy World

This opening session will position the current and futures challenges and promises that the PV technology is bringing to the World. Declining prices, increase interest from dozens of governments, PV is changing the electricity and the energy landscape at the pace that could accelerate in the coming years.

Stefan Nowak	Chairman of IEA PVPS - Switzerland
Gaëtan Masson	Operating Agent of IEA PVPS Task 1 - Belgium
Christian Breyer	LUT - Finland

11:00 – 12:00
<u>Session 1</u> – PV as a Game Changer – But Can the Grid and the Electricity System Afford Such Changes?

This session will focus on the challenges linked to the integration of large shares of PV into distribution grids as well as in the electricity system in general. The question of very large scale PV systems and their impact on the electricity mix will also be considered, with a long-term perspective for the energy sector in general.

Roland Bründinger	Operating Agent IEA PVPS Task 14 - Austria
Ioannis-Thomas Theologitis	European PV Industry Association (EPIA) - Belgium
Thomas Stetz	Fraunhofer IWES - Germany

12:00 – 13:30 – Lunch Time

13:30 – 15:00
Session 2 – PV Market Development Trends: The Expected Rise of New Business Models

A focus on PV market development trends and new business models especially those concerning self-consumption. The future of utility-scale PV and competitiveness shall be discussed. This session will also look at the recent and possible future evolutions of Building Integrated PV Systems and the status and future of emerging new markets.

Arnulf-Jaeger Waldau	European Commission, Joint Research Center, Italy
Robert Margolis	NREL, USA
Thomas Meier	ENTEC, Switzertland
Anjali Shanker	Operating Agent IEA PVPS Task 9, France

15:00 – 15:30
Session 3 – PV Recycling Policies and Technology

Recycling PV has been considered a long time as a necessity for the PV industry in order to support environmental policies. This session will detail the existing status of recycling technologies and the policy options to frame its deployment.

Ricky Sinha First Solar, USA

15:30-16:00
Coffee & Tea Break

16:00 – 17:00
Session 4 – The Quest for Quality and Reliability – Competitiveness through Performance.

This session will focus on the latest developments in terms of performance analysis and quality improvements. It will detail how financial institutions hold the key to lowering the cost of PV electricity and how PV systems should benefit from the latest findings with regard to understanding components and system failures and losses of performances.

Gernot Oreski	University of Leoben, Austria
Ulrike Jahn	Operating Agent IEA PVPS Task 13, Germany

17:00-17:30

Session 5 – PV Development in Japan – An International and Domestic Perspective

This session will explore the recent changes in the PV support policies in Japan and will compare with similar regulatory initiatives in IEA PVPS countries. How could Japan implement its new energy strategy, incorporating high shares of variable renewables?

Izumi Kaizuka	RTS Corporation, Japan
Prof. Kazuhiko Ogimoto	University of Tokyo, Japan

17:30 Conclusion

Contact for further information: Mrs Izumi Kaizuka : kaizuka@rts-pv.com

AIST-NREL Joint Workshop on Photovoltaics

- Date: November 21st, 2014
- Venue: AIST-FREA, Koriyama, Fukushima, Japan
- Registration fee: Free
- Capacity: 100 seats
- Registration URL: https://docs.google.com/a/aist.go.jp/spreadsheet/viewform?formkey=dE91b1hsOUNydnJSV3ltYWgxQUFBNHc6MA

  * If you have a registration problem, please send an e-mail to pv_module-ml@aist.go.jp.
- Registration deadline: November 7th, 2014

  * If the number of registrants reaches the capacity, the registration will be closed.

Program

10:00-10:15	Welcome Address
10:15-11:45	**Keynote Speech** K1 "Building on 37 years of progress – NREL's photovoltaic research program in 2014", G. Wilson (NREL, USA) K2 Y. Owadano (AIST, Japan) K3 S. Niki (AIST, Japan) K4 "FUTURE-PV Innovation - Toward an energy conversion efficiency exceeding 30%", M. Konagai (Tokyo Inst. Tech., MEXT/JST FUTURE-PV Innovation, Japan)
11:45-13:15	Lunch and Poster Session
13:15-16:15	**Technical Session** T1 Invited talk, tbd T2 "Progress in CIGS research at NREL" K. Ramanathan, M. Contreras, L. Mansfield, B. Egaas, S. Glynn, R. Garris (NREL, USA) T3 "CIGS research at AIST" H. Shibata, S. Ishizuka, Y. Kamikawa, T. Koida, T. Nagai, H. Tampo, J. Nishinaga, S. Choi, K. Kim, S. Kim, A. Yamada, S. Kimura, A. Ohara, H. Higuchi, M. Iioka, S. Takaesu, H. Takahashi, A. Kurokawa, K. Matsubara, S. Niki (AIST, Japan) T4 "Grain boundary carrier interactions in CIGS" H. Guthrey, C.-S. Jiang, J. Moseley, K. Ramanathan, M. Al-Jassim (NREL, USA) T5 "NREL PV reliability program overview" S. Kurtz1, J. Wohlgemuth1, M. Yamamichi2, M. Kondo2, T. Sample3 (1NREL, USA, 2AIST, Japan, 3JRC, Italy) T6 "PV reliability research at AIST" A. Masuda, K. Sakurai, T. Doi, K. Hara (AIST, Japan) T7 "Comparison of field-tested and accelerated lifetime-tested modules" P. Hacke1, K. Terwilliger1, S. Glick1, G. Perrin1, S. Kurtz1, N. Bosco1, J. Wohlgemuth1, R. Smith2 (1NREL, 2LLC, USA)

	T8 “Crystalline Si solar cell research at FREA” H. Takato (AIST, Japan) T9 “Energy rating of PV (tentative)” K. Otani (AIST, Japan)
16:15-16:30	Closing Remarks
16:30-17:30	Technical Tour of FREA

Poster Session

P1 “Primary PV reference cell calibration technology”
S. Igari, J. Kokubo, H. Zhou, R. Watanabe (AIST, Japan)

P2 “PV performance measurement technologies”
Y. Hishikawa, A. Sasaki, H.Shimura, K. Yamogoe, T. Onuma, T. Ueda, A. Fukabori (AIST, Japan)

P3 “Effects of the convex solid-liquid interface of Si single bulk crystals on the quality of ingots grown by the noncontact crucible method”
K. Nakajima1, R. Murai1, K. Morishita1, D. M. Powell2, M. Kivambe2, T. Buonassisi2 (1Kyoto Univ., Japan, 2Massachusetts Inst. Tech., USA)

P4 “Surface investigation of photovoltaic mono-crystalline silicon wafers”
T. Fukuda, N. Suzuki, K. Shirasawa, H. Takato (AIST, Japan)

P5 “The a-SiOx:H/c-Si heterojunction solar cell with high VOC of 738 mV”
H. Zhang1, K. Nakada2, S. Miyajima2, M. Konagai1,2 (1JST, 2Tokyo Inst. Tech, Japan)

P6 “Voltage map of Si solar cell by means of absolute EL imaging”
T. Mochizuki1, C. Kim2, L. Zhu2, H. Akiyama2, H. Takato1 (AIST, Univ. Tokyo, Japan)

P7 “Analysis for degradation of crystalline silicon PV modules by EL and PL”
K. Shirasawa1, S. Asao1, K. Takano2, K. Sugihara2, T.Ogai3, H. Takato1 (1AIST, 2ITES, 3Meiji Univ., Japan)

P8 “Analysis of PV modules degraded under high voltage”
T. Doi1, K. Masuda2, H. Kato2, Y. Uchida2, K. Shibata2, S. Kawai3, Y. Fukumoto3, F. Tamai3, A. Masuda1, M. Kondo1 (1AIST, 2JET, 3Indust. Tech. Center Saga, Japan)

P9 “Outdoor PID acceleration by regular water spraying”
K. Sakurai, R. Morinaga, R. Sato, M. Inoue, M. Akitomi, A. Masuda (AIST, Japan)

P10 “High-efficiency thin-film silicon solar cells using honeycomb textured substrates”

H. Sai1, K. Maejima2, T. Koida1, T. Matsui1, K. Matsubara1, M. Kondo1, S. Nakao3, Y. Takeuchi3, H. Katayama4, I. Yoshida2 (1AIST, 2PVTEC, 3Mitsubishi Heavy Industries, 4Panasonic, Japan)

P11 “Microstructured 3D thin film Si-based solar cells”
C. Niikura1,3, B. Janthong3, M. Konagai2,3 (1NIMS, 2Tokyo Inst. Tech., 3JST, Japan)

P12 “Light trapping by plasmonic silver nanodisk arrays”
H. Mizuno, H. Sai, K. Makita, Y. Hozumi, M. Kondo, K. Matsubara, H. Takato (AIST, Japan)

P13 “The light induced degradation in a-Si:H solar cells fabricated by the expanding thermal plasmas”
T. Nagai1, T. Matsui1, J. Melskens2, M. Fischer2, A. H. M. Smets2, M. Zeman2, M. Kondo1 (1AIST, Japan, 2Delft Univ. Tech., The Netherlands)

P14 “Influence on recombination process of CIGS solar cells induced by device processing”
J. Nishinaga, Y. Kamikawa, H. Shibata, S. Niki (AIST, Japan)

P15 “Highly efficient CIGS thin film sun-module using three-stage process”
Y. Kamikawa-Shimizu, A. Yamada, S. Ishizuka, M. Iioka, H. Higuchi, K. Matsubara, H. Shibata, S. Niki (AIST, Japan)

P16 “n-type transparent amorphous oxide semiconductor and p-type CIGS heterojunction solar cells”
T. Koida, A. Kurokawa, H. Takahashi, Y. Kamikawa-Shimizu, A. Yamada, H. Shibata, S. Niki (AIST, Japan)

P17 “The investigation of Ge substitution effects in Cu2ZnSnSe4 thin film solar cells”
S. Kim, K. M. Kim, H. Tampo, H. Shibata, S. Niki (AIST, Japan)

P18 “Control of conductivity type in co-evaporated CuFeS2 thin films”
K. M. Kim, H. Tampo, H. Shibata, S. Niki (AIST, Japan)

P19 “Smart stacking technology for multi-junction solar cells”
K. Makita, H. Mizuno, R. Oshima, T. Sugaya (AIST, Japan)

P20 “Fabrication of InGaP/(In)AlGaAs/GaAs triple junction top cells for smart stacked multijunction solar cells using molecular beam epitaxy”
T. Sugaya1, T. Mochizuki2, K. Makita1, R. Oshima1, K. Matsubara1, Y. Okano2, S. Niki1 (AIST, Tokyo City Univ., Japan)

P21 “Development of fabrication process for wire-array/silicon tandem solar cells”
Y. Yashiki1, Y. Shirayanagi1, K. Nakada2, M. Konagai1,2 (1JST, 2Tokyo Inst. Tech., Japan)

P22 “Engineering of the direct energy band gap of silicon at quantum confinement size”

V. Svrcek1, M. Lozach1, S. Mitra2, D. Mariotti2, K. Matsubara1 (1AIST, Japan, 2Univ. Ulster, UK)

P23 “Fabrication and characterization of CH3NH3PbI3 perovskite photovoltaic cells”

S. Kazaoui, T. N. Murakami, K. Sayama, N. Onozawa-Komatsuzaki, T. Funaki (AIST, Japan)

P24 “Advance of the dye-sensitized solar cells with the high-voltage and robust organic dye”

T. N. Murakami, N. Koumura (AIST, Japan)

P25 “Dye-sensitized solar cells using cyclometalated ruthenium complexes as near-IR sensitizers”

T. Funaki, N. Onozawa-Komatsuzaki, N. Koumura, K. Sayama (AIST, Japan)

P26 “Computational study of intermolecular interactions between Ru complex and organic dyes in cosensitized solar cells”

H. Kusama, T. Funaki, N. Koumura, K. Sayama (AIST, Japan)

WCPEC-6 Satellite Meeting on Organic Photovoltaic Cells

The 6th world conference on photovoltaic energy conversion (WCPEC-6) will be held in Kyoto on 23–27 November, 2014. On this occasion, we are planning to offer a satellite meeting of organic photovoltaic cells (OPV) in Kyoto the day before the WCPEC-6, 22 November, 2014. Very recently, organic–inorganic perovskite solar cells have emerged as a next-generation organic-based solar cell. The energy conversion efficiency has abruptly exceeded 15% and now is approaching to 20%. Therefore, research and development of OPV just stand at a crossroads now. In this time, we would like to offer an opportunity to discuss future research and development of OPV. What are the greatest advantages of OPV? What are the killer applications of OPV? What is the practical use of OPV? We would like to find a clue for resolving these issues in this satellite meeting.

Date & Time:
22 November, 2014, from 13:00 to 20:00

Venue:
Kyoto International Conference Center
(http://www.icckyoto.or.jp/en/access/index.html)

Registration Fee:
Free
Please register from URL below.

URL:
http://wcpec6satelite.web.fc2.com

Invited Speakers:
Prof. James Durrant (Imperial College London)
Prof. Kwanghee Lee (Gwangju Institute of Science and Technology)
Prof. Antonio Facchetti (Polyera/Northwestern University)
Prof. Shinzaburo Ito (Kyoto University)
Prof. Keisuke Tajima (RIKEN)
Prof. Kazuhiro Marumoto (Tsukuba University)
Dr. Hideo Yamagishi (CEREBA)

Program:

13:00 **Opening Remarks**

13:10 Kwanghee Lee (Gwangju Institute of Science and Technology)
Recent Advances in Polymer Solar Cells; Single Cells, Tandem Cells, and Printed Modules

13:50 Antonio Facchetti (Polyera/Northwestern University)
Metal Oxide Films and Nanomaterials for Organic Solar Cells

14:30 Shinzaburo Ito (Kyoto University)
Progress on All-polymer Solar Cells Prepared by Donor/Acceptor Polymer Blends

15:10 Coffee Break

15:25 James Durrant (Imperial College London)
Exciton and Charge Carrier Dynamics in Organic Solar Cells - The Impact of Morphology,
Energetics and Molecular Structure

16:05 Keisuke Tajima (RIKEN)
Interfaces and Nanostructures in Organic Solar Cells

16:45 Kazuhiro Marumoto (Tsukuba University)
Direct Observation of Charge Accumulation in High Efficiency Polymer Solar Cells During
Device Operation using Light-Induced Electron Spin Resonance

17:25 **Coffee Break**

17:35 Hideo Yamagishi (CEREBA)
Approach to the Development of Evaluation Technologies for Flexible OPV at CEREBA

18:15 Nam-Gyu Park (Sungkyunkwan University)
Size-Dependent Electric and Photovoltaic Properties of Perovskite Solar Cell
*joint session with WCPEC-6 Satellite Meeting "Perovskite Solar Cells"

19:00 Mixer

Sponsored by Sumitomo Chemical, JSPS and CEREBA.
Supported by Division of Molecular Electronics and Bioelectronics, JSAP

Organizing Committee:
Shuzi Hayase (Kyushu Institute of Technology)
Tetsuhiko Miyadera, Yuji Yoshida (AIST)
Hideo Ohkita (Kyoto University)
Itaru Osaka (RIKEN)
Makoto Kitano (Sumitomo Chemical)
Toshihiro Ohnishi (JSPS, Sumitomo Chemical)

10th Anniversary Event: Museum of Photovoltaics

(Presented by the 175th Committee on Innovative Photovoltaic Power Generating Systems, JSPS)

- Date: 1st day: 12:00-17:00 November 24th, 2014
  2nd day: 9:00-17:00 November 25th, 2014
- Venue: **Room I**, Kyoto International Conference Center (Conf. venue of the WCPEC-6)
- Entrance fee: Free
- Theme: History of photovoltaics development in Japan (Exhibition of earliest or latest solar cells with a brief description etc.)

WCPEC-6 Satellite Meeting on Perovskite solar Cells

Date & Time: 22 November, 2014, From 9:00

Venue: Kyoto International Conference Center (Room C1, Main Building 1F)
http://www.icckyoto.or.jp/en/access/index.html

Registration fee: Free

Please register from URL below.

URL:http://www.jst.go.jp/presto/solar/sympo/WCPEC6.html

Program

09:00-09:10 Opening Remarks
Research Supervisor Shuzi Hayase (Kyushu Institute of Technology)

09:10-09:25 Atsushi Wakamiya (Kyoto University)
"Solution process for fabrication of perovskite-based solar cells: A X-ray crystallographic study"

09:25-09:40 Yasuhiro Yamada (Kyoto University)
"Time-resolved optical characterization of perovskite semiconductors for solar cell applications"

09:40-09:55 Hideaki Araki (Nagaoka National College of Technology)
"Fabrication of organic-inorganic metal halide solar cells via gas phase reaction"

09:55-10:10 Yasuhiro Tachibana (RMIT University)
"Photo-induced charge transfer dynamics at the interfaces of perovskite thin films"

10:10-10:40 Prof. Mohammad Khaja Nazeeruddin (ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE)
[Invited Lecture] "Power from the sun : Perovskite solar cells"

10:40-10:55 Break

10:55-11:10 Qing Shen (The University of Electro-Communications)
"Uncovering the detailed mechanism behind high efficiency perovskite hybrid solar cells by studying charge separation and recombination dynamics"

11:10-11:25 Tetsuro Katayama (Osaka University)
"Observation of inhomogeneous deactivation process with UV excitation in submicron grains of lead iodide perovskite-based solar cell by means of femtosecond transient absorption microscopy"

11:25-11:40 Akinori Saeki (Osaka University)
"Electronic and energetic landscape of perovskite solar cell : A microwave conductivity study"

11:40-12:00 Free discussion

13:00-18:15 OPV satellite session

18:15-18:45 Prof. Nam-Gyu Park (Sungkyunkwan University)
[Invited Lecture] "Size-dependent electric and photovoltaic properties of perovskite solar cell"

International workshop for young researchers on thin film compound semiconductor solar cells

Date: November 28 (Fri.), 2014
Venue: Ryukoku University Avanti Kyoto Hall
(southern part of JR Kyoto station)
http://www.ryukoku.ac.jp/ryudaihall/access/

Organized by
Professional Group of "Multinary Compounds and Solar Cells" in The Japan Society of Applied Physics
Co-organized by
Ryukoku University, Innovative Materials and Processing Research Center

Registration (On-Site)
Member of Professional Group of "Multinary Compounds and Solar Cells": free
Non-member: 3,000 JPY (annual membership fee)

Keynote lecture : Hans-Werner Schock (Helmholtz-Zentrum Berlin, Germany)

Invited speakers and title (tentative) of the presentation

Shiro Nishiwaki (EMPA, Switzerland)
"Preparation of high quality CIGS absorber layer by thermal co-evaporation"

Paul Pistor (Martin-Luther-University, Germany)
"Co-evaporating compound solar cell absorbers: growth and characterization"

Shogo Ishizuka (AIST, Japan)
"Alkali effects and interface study on $CuGaSe_2$ thin-films and solar cells"

Shin Tajima (Toyota Central R&D Labs, Japan)
"Process and analysis of CZTS photovoltaic cell with high conversion efficiency"

Hideaki Araki (Nagaoka National College of Technology, Japan)
"Progress in thin film solar cells based on Cu_2SnS_3 and the related compounds, Cu_2GeS_3 and Cu_2SiS_3"

(Midsummer, Sweden)
"Preparation of CIGS and CZTS solar cells by sputtering"

Discussion:moderator Akira Yamada (Tokyo Tech)
"Toward high efficiency CZTS solar cells"

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