

# 27th Workshop on Crystalline Silicon Solar Cells & Modules: Materials and Processes

30 July - 2 August 2017  
The Village at Breckenridge

## SUNDAY, 30 JULY

8:00 - 9:00 am REGISTRATION & CONTINENTAL BREAKFAST

### WELCOME

9:00 - 9:15 am Bhushan Sopori (Consultant, USA)

### SESSION 1

#### **PHOTOLUMINESCENCE AND ELECTROLUMINESCENCE: BRICKS TO MODULES**

Chair: Takashi Fuyuki

9:15 - 10:00 Daniel Chung (UNSW, Australia): *"Assessment of Photoluminescence Imaging on Multicrystalline Silicon Bricks and its Correlation to Wafer and Solar Cell Quality"*

10:00 - 10:30 Felix Frühauf (Max Planck Halle, Germany): *"Quantitative Evaluation of Luminescence for High Resolution  $J_{01}$  Images"*

10:30 - 11:00 BREAK

11:00 - 11:30 Hieu Nguyen (ANU, Australia): *"Characterising Heavily-Doped Regions in Silicon Using Spectrally-Resolved Photoluminescence"*

11:30 - 12:00 Steve Johnston (NREL, USA) *"Characterizing Defects in Wafers, Cells, and Modules"*

Noon - 1:30 pm LUNCH BUFFET

### SESSION 2

#### **STABILITY ISSUES IN HIGH-EFFICIENCY SILICON SOLAR CELLS**

Chair: Qi Wang

1:30 - 2:00 D. Bredemeier (ISFH, Germany): *"Light-induced Lifetime Degradation and Regeneration in Multicrystalline Silicon: Kinetics and Defect Model"*

2:00 - 2:30 Mallory Jensen (MIT, USA) *"Progress Towards a Predictive Model for Light- and Elevated Temperature-Induced Degradation"*

2:30 - 3:00 D. Sperber (Uni Konstanz, Germany) *"Instabilities of Bulk Lifetime and Surface Passivation During LID Treatments of FZ Silicon"*

3:00 - 3:30 BREAK

### SESSION 3

#### **SOLVING ENGINEERING BARRIERS TO MAXIMIZING PV IN ENERGY TRANSFORMATION**

Chair: Ron Sinton

3:30 - 4:00 Greg Wilson (NREL, USA): *"A Multi-TW Future for PV"*

4:00 - 4:30 Open Discussion: The Next Factor of 10 in Scale-up of PV

6:00 - 8:00 pm WELCOME RECEPTION, BUFFET, and NERD ENTERTAINMENT

**MONDAY, 31 JULY**

7:00 - 8:00 am CONTINENTAL BREAKFAST

**SESSION 4**

**MODULE DEGRADATION AND ADVANCED MODULE RESEARCH**

Chair: Peter Hacke (NREL, USA)

8:00 - 8:30 Tamizhmani Govindasamy (ASU, USA): "*Degradation Analysis of Field-Aged Photovoltaic Modules*"

8:30 - 9:00 Takashi Fuyuki (Active Solar Innovation, Japan): "*On-site Exploring of Installed Mega Solar Systems by Outdoor Electroluminescence Diagnosis with Fundamental Current Voltage Analysis*"

9:00 - 9:30 Volker Naumann (Fraunhofer CSP, Germany): "*New Perspectives on the Sources of PID-s in Silicon Solar Cells*"

9:30 - 10:00 BREAK

10:00 - 10:30 Steve Harvey (NREL, USA) "*Investigating PID Shunting in Polycrystalline Silicon Modules via Multi-Scale, Multi-Technique Characterization*"

10:30 - 11:00 Ralph Preu (ISE PVTech, Germany) "*Solar Cell Demand for Bifacial and Singulated-Cell Module Architectures*"

**SESSION 5**

**DISCUSSION: OPPORTUNITIES FOR INNOVATIONS IN THE MODULE AREA**

11:00 - Noon Moderator: Roland Einhaus

Noon - 1:30 pm LUNCH BUFFET

**AFTERNOON BREAK FOR SIDE MEETINGS**

7:00 - 9:00 pm POSTER SESSION & RECEPTION

**TUESDAY, 1 AUGUST**

7:00 - 8:00 am CONTINENTAL BREAKFAST

**SESSION 6**

**HIGH-EFFICIENCY CELL DEVELOPMENT**

Chair: Toshio Oshita

8:00 - 8:30 Thibaut Desrues (CEA, France): *"Advanced mono-like Si and Ultrasimplified PERT Cells Fabrication processes"*

8:30 - 9:00 Pauls Stradins (NREL, USA): *"Overcoming Bottlenecks to High Efficiency n-Cz Si PV: Bulk, Junctions, and Contacts"*

9:00 - 9:30 Stanislau Herasimenka (ASU, USA): *"22.7% SHJ cells with Cu Plated Contacts and a Roadmap to 24%"*

9:30 - 10:00 Christophe Allebé (CSEM, Switzerland): *"PECVD-Based Approaches for Improved Industrial Solar Cell Processes"*

10:00 - 10:30 BREAK

**SESSION 7**

**INDUSTRIAL PRODUCTION CELLS**

Chair: Dirk Baetzner

10:30 - 11:00 Qi Wang: (Jinko Solar, China): *"PERC Solar Cells Development and Manufacturing"*

11:00 - 11:30 Ralph Müller (ISE, Germany) *"Impact of Crystal Defects on Record Efficiency n-type Multicrystalline Silicon Solar Cells"*

Noon - 1:30 pm LUNCH BUFFET

1:30 - 2:00 Gianluca Coletti (ECN, Netherlands): *"Polysilicon Passivating Contacts for n-type PERT Devices and Future Technology Development"*

**SESSION 8**

**DISCUSSION: HIGH-EFFICIENCY CELL DESIGNS: MULTI vs. MONO; P-TYPE vs. N-TYPE TECHNOLOGY**

2:00 - 3:00 Moderator: Ethan Good

3:00 - 3:30 BREAK

**SESSION 9**

**RESEARCH FUNDING CHALLENGES AND OPPORTUNITIES IN Si**

Chair: Chris Honsberg

3:30 - 4:30 Panel: Nicolas Grant, Kris Davis, TBD

7:00 - 9:00 pm POSTER SESSION & RECEPTION

**WEDNESDAY, 2 AUGUST**

7:00 - 8:00 am: BREAKFAST BUFFET

**SESSION 10**

**SOLAR CELL PASSIVATION**

Chair: Stuart Bowden

8:00 - 8:30: Sebastian Bonilla (Oxford, UK): "*New Perspectives on Charge-Assisted Surface Passivation of Silicon Solar Cells*"

8:30 - 9:00: Nicolas Grant (Warwick, UK): "*Superacid-Treated Silicon: Extending the Limit of Carrier Lifetime for High Efficiency Photovoltaic Devices*"

**SESSION 11**

**METROLOGY**

Chair: Adrienne Blum

9:00 - 9:30: Kris Davis (Univ Central Florida, USA): "*Developments in Manufacturing Metrology Across the Supply Chain*"

9:30 - 10:00: Harrison Wilterdink (Sinton Instruments, USA): "*Optimization of Power Rating for Industrial Modules*"

10:00 - 10:30: **BREAK**

**SESSION 12**

**DISCUSSION & WORKSHOP: PID, LeTID, LID  
Status, agreement, disagreement, and prioritization for unfinished work**

10:30 - 11:00: Moderator: Giso Hahn

11:30 - Noon: **SILICON WORKSHOP WRAP-UP**

THANK YOU FOR YOUR PARTICIPATION...SEE YOU NEXT YEAR!!!