

30th Workshop on Crystalline Silicon Solar Cells & Modules: Materials and Processes

30 July - 2 August 2023
Beaver Run at Breckenridge

SUNDAY, 30 JULY

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

WELCOME

9:00 - 9:30 am **Workshop Welcome: Ron Sinton, Sinton Instruments (USA)** "The critical importance of Si PV and making it happen"

SESSION 1

Characterization of Solar Cells, Modules, and Arrays

Chair: Paul Stradins (NREL)

9:30 - 10:00 Thorsten Trupke (UNSW, Australia): "Daylight PL Evaluation of Solar Arrays"

10:00 - 10:30 Andreas Fell, (Fraunhofer ISE) "Marrying Artificial Intelligence and Physics for Fast and Deep Interpretation of Solar Cell Characterization"

10:30 - 11:00 BREAK

11:00 - 11:30 T.Nishihara, Spring-8, (Japan) "Investigation of problems in crystalline silicon heterojunction solar cells by HAXPES" (tentative)

11:30 - 12:00 Harvey Guthrey, NREL (USA) Visualizing Engineered Pinholes for Passivating Contacts

Noon - 1:30 pm LUNCH BUFFET

SESSION 2

The Potential for Perovskite on Silicon Solar Cells

Chair: Franz Josef Haug, EPFL (Switzerland)

1:30 - 2:00 Stefaan De Wolff, KAIST (Saudi Arabia), "Field Testing of Perovskite Solar Cells In A Hot Climate"

2:00 - 2:30 Dr. Nikos Kopidakis, NREL (USA) "Accurate measurement of the performance of perovskite-silicon tandems: experience from a PV calibration laboratory"

2:30 - 3:00 Dr. Jiang Liu, Longji, (China) "Perovskite on Silicon Tandem Solar Cells"

3:00 - 3:30 BREAK

SESSION 3

Industrial Innovations and Challenges

Chair: Giso Hahn, Uni Konstanz (Germany)

3:30 - 3:50 Sneha Sinha, Electroniks (USA) "Metal complex Inks for PV"

3:50-4:10 Thad Druffel, Bert Thin Films (USA) "Screen print metallization using Cu-based pastes"

4:10-4:30 Radovan Kopecek, ISC Konstanz (Germany) "Copper and Aluminum Screen Printed Contacts for bifacial IBC Solar Cell Technology for Production and Deployment in US"

4:30-5:00 Sebastien Gatz, Von Ardenne (Germany) "Challenges for PV production: Views from a German Vacuum Equipment Manufacturer"

6:00 - 8:00 pm WELCOME RECEPTION with DINNER BUFFET

MONDAY, 31 JULY

7:00 - 8:00 am | CONTINENTAL BREAKFAST

SESSION 4

Scaling Silicon Production Towards the TW/year scale

Chair: Daniel Macdonald, ANU (Australia)

8:00 - 8:30 | Peter Fath, RCT Solutions GMBH (Germany) "The Solar Symphony: Vertically Integrated Silicon PV Mult GW production for enhanced efficiency and sustainability"

8:30 - 9:00 | Yifeng Chen, Trina (China) "Technology Evolution of the PV Industry"

9:00 - 9:30 | Benjamin Lee, Hanwha Q-Cells (Germany) "Manufacturing for Si PV: the present and the future"

9:30 - 10:00 | Break

10:00 - 10:30 | P. Basore: SETO (USA) "The Silicon PV supply chain in the US"

10:30 - 11:00 | Michael Woodhouse, NREL (USA) "Benefits of the U.S. Inflation Reduction Act (IRA) for Solar PV Manufacturing, System Performance, Reliability and LCOE"

SESSION 5

Discussion: Manufacturing Scale, Supply Chain, and Trade

11:00 - Noon | Moderator: Ron Sinton, Sinton Instruments (USA)

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: David Young, NREL (USA)

8:00 - 8:30 Dr. Yong Liu, Longi (China) "The Development of Very-High-Efficiency HJT Cells"

8:30 - 9:00 Di Kang, ANU, (Australia) "Degradation of Poly Si Contacts"

9:00 - 9:30 Franz Josef Haug, EPFL, (Switzerland), "Passivating contacts on silicon solar cells"

9:30-10:00 Break

SESSION 7

Industrial Production Cells: Pros and Cons of HJT and Polysilicon Solar Cells

Chair: Adrienne Karpen (Sinton Instruments) USA

10:00-10:30 Dan Macdonald, ANU, (Australia) "Towards silicon solar cells in mass production with efficiencies above 26% - poly-silicon or amorphous silicon contacts?"

10:30 - 11:00 Moderator: Teresa Barnes: Ask any question! Submit any type of question during the workshop into the box. We will group the questions and find answers (or suggest a path towards answers).

SESSION 8

Discussion: Next Generation Si: HJT vs. TopCon Pros and Cons

11:00 - Noon Moderator: Radovan Kopocek ISC (Germany)

Noon - 1:30 pm LUNCH BUFFET

SESSION 9

Present and Future Challenges in Silicon Technology

Moderator: Peter Hacke NREL (USA)

1:30-2:00 Nicolas Grant, University of Warwick, (UK) "Ga-doped Si" (tentative title)

2:00-2:30 Teresa Barnes, NREL (USA) "A review of the module recycling topic"

2:30-3:00 Andrew Diggs, U. CA Davis (USA) "Soldeg: A powerful platform to analyze the degradation of heterojunction and TOPCon cells from femtoseconds to gigaseconds"

3:00 - 3:30 BREAK

SESSION 9

The Changing Roles of R&D Institutes and National Labs: International best practice

Chair: Dan Friedman, NREL (USA)

Panelist: Ben Lee, Thorsten Trupke, Paul Basore

3:30 - 4:30 Panel: TBD

4:30-4:45 Sarah Gomach, NREL USA "Solar Prize competition"

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

WEDNESDAY, 2 AUGUST

7:00 - 8:00 am | CONTINENTAL BREAKFAST

SESSION 11 | ***EQUIPMENT MANUFACTURING: EQUIPMENT DRIVES THE PROCESS DEVELOPMENT***

Chair: Mike Woodhouse, NREL (USA)

8:00 - 8:30 | Todd Barnum, Linton Crystal (USA) "TBD"

8:30 - 9:00 | Helge Haverkamp, Centrotherm (Germany) "PECVD Technology in c-Si production"

SESSION 12 | ***Innovative Silicon Module Concepts and Implementations***

Chair: Abby Meyer (Aerospace Corp.) USA

9:00 - 9:30 | N. Yamada (Japan) "Exploring Si Solar Cell Durability in Curved Configurations for Vehicle Applications"

9:30 - 10:00 | B. Habersberger, DOW (USA) "Encapsulant technologies: Overview and technical factors for materials selection in PV modules "

10:00-10:30 | Break

10:30-10:45 | Andy Ritenour, Amazon (USA) "An industry view on the use of Si solar cells in space"

SESSION 13 | ***DISCUSSION & WRAPUP: Conclusions and Open Questions from the Workshop***

10:45 - 12:00 | Moderator: Denis DeCeuster

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