32nd Workshop on Crystalline Silicon Solar Cells & Modules: Materials and Processes

July 27th – July 30th, 2025

Breckenridge, Colorado

Sponsorship from:

Sinton instruments

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Sunday, July 27th

8:00 – 9:00 am	Registration & Breakfast
9:00 – 9:30 am	***Workshop Welcome and Introduction***

Session 1: *Characterization of Solar Cells, Modules, and Arrays*

9:30 – 10:00 am	**Thorsten Trupke or Oliver Kunz** (BT Imaging) - Drone Inspection of PV arrays
10:00 – 10:30 am	**Adrienne Blum Karpen** (Sinton Instruments) – Accurate determination of key parameters for high-efficiency silicon solar cells

10:30 – 11:00 am	Break
11:00 – 11:30 am	**Max Liggett** (University of Central Florida) - To be announced
11:30 – 12:00 pm	**Greg Horner** (Tau Science) - Optically pumped imaging of cells and modules
12:00 – 1:30 pm	Lunch

Session 2: ***The Potential for Perovskite on Silicon Solar Cells***

1:30 – 2:00 pm	**Stefaan de Wolf** (KAUST) – Record Si/PRV tandem with enhanced stability through systematic improvements of contact passivation, bulk, and grain boundaries.
2:00 – 2:30 pm	**Kai Zhu** (NREL) – Perspective on perovskite PV field (with focus on tandems)
2:30 – 3:00 pm	Break
3:00 – 3:30 pm	**Michael Deceglie (NREL)** - Room for improvement in perovskite modules, tests, and models
3:30 – 4:00 pm	**Florent Sahli** (CSEM) – An overview of CSEM and EPFL PVlab research activities on 2T, 3T and 4T perovskite/silicon solar cells
4:00 – 4:30 pm	Break

Session 3: ***Industrial Challenges in the US***

4:30 – 5:00 pm	**Markus Beck** (former DOE Program Manager) - Opportunities and challenges establishing a domestic c-Si PV manufacturing ecosystem
5:00 – 5:30 pm	**Feri Farzad** (Hanwha, Q-cells) – Building a Robust and Sustainable Vertical U.S. PV Supply Chain: From Ingot to Module Manufacturing
6:30 – 8:00 pm	Welcome Reception with Dinner

Monday, July 28th

7:00 – 8:00 am	Breakfast

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Session 4: Scaling Silicon Production Towards the TW/year

8:00 – 8:30 am	**Mike Woodhouse** (NREL) - Cost of PV around the world
8:30 – 9:00 am	**Yifeng Chen** (Trina Solar) – To be announced
9:00 – 9:30 am	**Budi Tjahjono** (Silfab Solar) – To be announced
9:30 – 10:00 am	**Pirmin Preis** (ISC - Konstanz) - Challenges and chances of GW solar cell manufacturing ramp up outside of China
10:00 – 10:30 am	Break

Session 5: ***Poly-Silicon production, Cz-Si crystal growth, and scaling Si PV***

10:30 – 11:00 am	**Dennis Seibert** (PVA TePla) – Crystal Growth for PV Applications – Current Challenges & Developments
11:00 – 11:30 pm	**Ugur Kaya** (RCT Solutions) - Ingot and wafer production outside China *(presented by Markus Beck of RCT Solutions)*
11:30 – 12:00 pm	**Adam S. Tesanovich** (Talon PV) – To be announced
12:00 – 1:30 pm	Lunch

Free Afternoon to Enjoy Local Activities

6:30 – 8:30 pm	Poster Session and Reception (Sponsored by Sinton Instruments)

Tuesday, July 29th

7:00 – 8:00 am	Breakfast

Session 6: ***High-Efficiency Cell Development***

8:00 – 8:30 am	**Armin Richter** (Fraunhofer-ISE) – Trends in high efficiency silicon solar cell research and development
8:30 – 9:00 am	**Ajeet Rohatgi** (Georgia Tech University) – Successful Implementation of LECO to Achieve 21.5% PERC and 24% TOPCon Cells With Screen-Printed Cu Contacts
9:00 – 9:30 am	Break
9:30 – 10:00 am	**Udo Romer** (ISFH) – Laser ablation for POLO² IBC solar cells
10:00 – 10:30 am	**Lachlan Black** (ANU) - Transparent carrier-selective contacts

based on metal oxides: Recent progress and challenges

10:30 – 11:00 am Break

Session 7: *Research needs up/down the Silicon value chain*

11:00 – 12:00 pm Panel Discussion
- Brenden Frazier (Solx)
- Jim Wood (SEG Solar)
- Other companies and researchers – To be announced

12:00 – 1:30 pm Lunch

Session 8: *Materials Research Advances for Si PV and Beyond*

1:30 – 2:00 pm **Bart Macco** (TU Eindhoven) **-** (Spatial) ALD of ZnO:Al passivating contacts

2:00 – 2:30 pm **Shohei Fukaya** (Nagoya University) - Dopant-Free Si Solar Cells with Double-Sided TiOx: Insights into Passivation Mechanisms via X-ray Photoelectron Spectroscopy

Session 9: *Present and Future Challenges in Silicon Technology*

2:30 – 3:30 pm Group Discussion

3:30 – 4:00 pm Break

Session 10: *Degradation and Reliability*

4:00 – 4:30 pm **Archana Sinha** (Kiwa PVEL) - Unseen Risks of UV-Induced Degradation and Metastability

4:30 – 5:00 pm **Elizabeth Palmiotti** (NREL) - Spontaneous Glass Breakage in Glass-Glass Modules - Glass Physics

5:00 – 5:30 pm **Gergely Zimanyi** (University of California – Davis) - Molecular dynamic modeling of SHJ and TOPCon cells revealing optimal [H] and degradation/recovery modes

5:30 – 6:30 pm Break

6:30 – 8:30 pm Poster Session and Reception

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Wednesday, July 30th

7:00 – 8:00 am	Breakfast

Session 11: *Innovations in Silicon PV*

8:00 – 8:30 am	**Tonio Buonassisi (MIT)** – AI for PV
8:30 – 9:00 am	**Dirk Steyn (NREL)** – Nanopinhole contacts as an alternative to TOPCon

Session 12: *Metallization in Cells and Modules*

9:00 – 9:30 am	**Stefan Lange** (Fraunhofer Center for Si PV) – A Microscopic Look at the Working Principle of LECO: From PERC to TOPCon Solar Cells
9:30 – 10:00 am	**Li Wang** (UNSW) – Ultra-lean Silver Screen Printing
10:00 – 10:30 am	Break
10:30 – 11:00 am	**Bryon Mazor** (Source Energy Company) – Silicon PV Arrays for space applications
11:00 – 11:30 am	**Peter Hacke** (NREL) - Cell interconnect/metal reliability project work on cell metallization failure

Session 13: Discussion & Wrap-up: Conclusions and Open Questions from the Workshop

11:30 – 12:00 pm	Summary and Q&A
12:00 pm	**Workshop Adjourns**