

A Multiprobe Analysis to Identify the Performance Bottlenecks in HIT Cell (PV-4)



A joint India-U.S. research consortium funded under the *Joint Clean Energy Research & Development Center (JCERDC)*

Scientific Achievement:

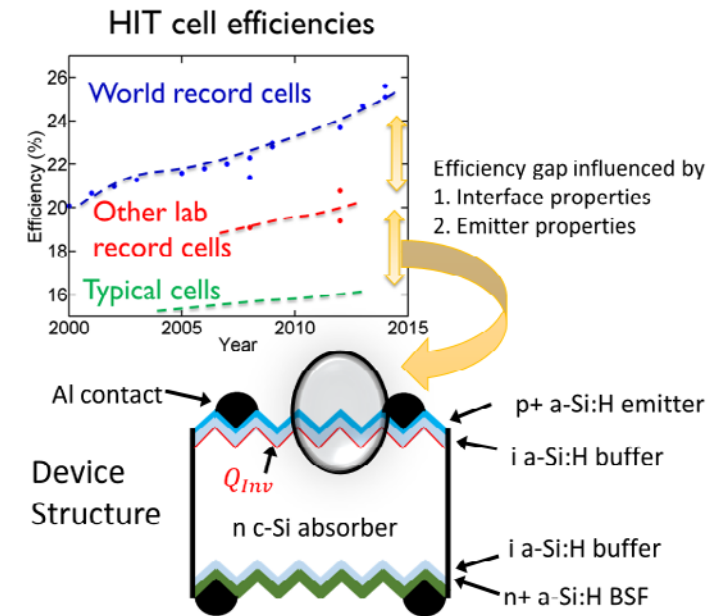
Developed a systematic characterization framework to extract key parameters in HIT solar cells.

Significance and Impact:

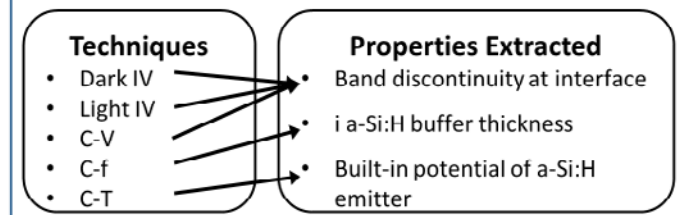
The approach will significantly shorten the technology development time for HIT cells and can be used for quality control during manufacturing. The approach is also relevant for all thin-film technology with similar device structures (e.g., CdTe, CIGS) and similarly complex interplay of device parameters.

Research Details:

- The efficiency gap between record and typical HIT cells is strongly correlated to the emitter and interface properties.
- The response of a-Si/c-Si interface charge can provide a microscopic view of the surrounding interface and emitter properties.
- Using our multiprobe simulation and experimental framework, we analyzed the dark and light I-V, C-V, C-f, and C-T-based characterization techniques.
- Based on the output current and capacitance responses, we were able to extract several key parameters that affect the performance of the HIT cells.



Multiprobe approach for self-consistent emitter and interface parameter extraction



Publication(s): R. V. K. Chavali, S. Khatavkar, B. M. Arora, P. Nair, J. Gray, and M. Alam, "Multi-Probe Characterization of Inversion Charge for Parameterization of HIT™ Cells," in *40th IEEE PVSC*, 2014.

Contact(s): Ashraf Alam (alam@purdue.edu), Raghu Chavali (rchavali@purdue.edu), and Pradeep Nair (prnair@ee.iitb.ac.in)