

A Multiprobe Analysis to Triangulate the HIT Cell Parameters (PV-4, PVCore-2)



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

Scientific Achievement:

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

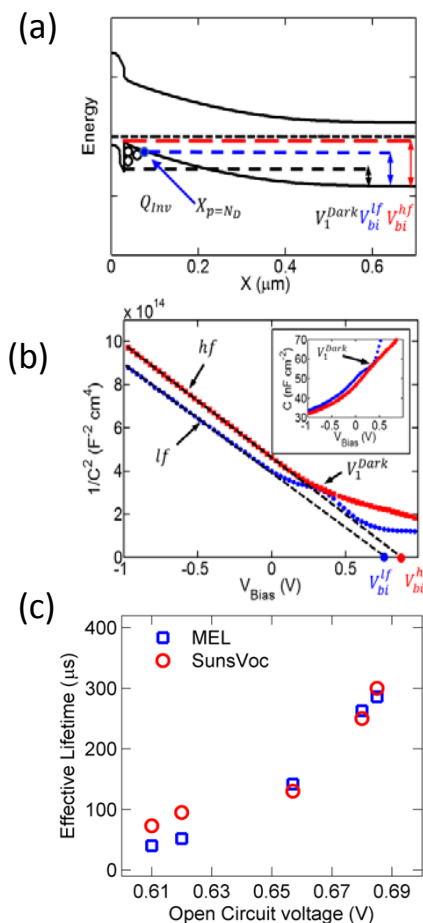
Significance and Impact:

The approach will significantly shorten the technology development time for HIT cells and can be used for quality control during manufacture; also relevant for CdTe and CIGS solar cells.

Research Details:

- The efficiency gap between record and typical HIT cells is strongly correlated to the emitter, absorber, and their interface properties.
- The response a-Si/c-Si interface charge (Q_{Inv}) can provide a microscopic view of the surrounding interface and emitter properties (Fig. 1a).
- Using our multi-probe simulation and experimental framework, we analyzed the dark and light I-V, C-V (Fig. 1b), C-f and C-T based characterization techniques that probe the Q_{Inv} .
- Modulated electroluminescence (MEL) technique is used to estimate the minority-carrier lifetime (Fig. 1c).
- Based on the above-listed multi-probe measurements, one can extract key parameters that dictate the performance of the HIT cells.

Collaborators: Purdue University, IIT Bombay, Moser-Baer, NREL



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 *Photovoltaic Specialists Conference 40th IEEE*, 2014.
- S. Khatavkar et al., "Measurement of minority carrier lifetime through modulated electroluminescence technique," submitted for publication.

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