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

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.