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The potential and effect of diffusion capacitance on fast point-by-point Current-Voltage measurements of photovoltaic cells in LBIC

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The use of the Light Beam Induced Current (LBIC) measurement technique to study the spatial distribution of performance-limiting defects in photovoltaic (PV) cells is well established. The point-by-point current-voltage (I-V) measurements that are measured when scanning a light beam across a PV cell are used to extract and map comparative device and performance parameters qualitatively. The well-known capacitive hysteresis effect caused by a rapidly changing bias when fast I-V measurements are made is also observed during spot-illuminated LBIC I-V measurements. Fast I-V measurements are necessary to reduce the total LBIC scan time when more than 10 000 I-V measurements are done per square centimetre of cell area. Normally care needs to be taken to avoid erroneous parameter extractions due to this hysteresis effect. This paper details diffusion capacitance that gives rise to the hysteresis effect and its link with the density of charge carriers generated by the LBIC beam probe. The results show that in addition to extracted I-V parameters, the spatially distributed diffusion capacitance measurements may be developed as a useful tool to augment normal LBIC I-V measurements to map and identify performance limiting defects and perturbations present in PV cells.

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No

Level for award
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N/A

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