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Measurement of diffusion capacitance of mono-crystalline and poly-crystalline photovoltaic cells using LBIC

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Abstract content
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The ability to characterise silicon photovoltaic (PV) cells using non-destructive procedures is valuable for the photovoltaic manufacturing industry. This enables the identification of potential problems during cell manufacturing processes and elimination of these problems thus improves PV module performance. This study investigates the merits of an expansion of the Light Beam Induced Current (LBIC) technique to map the magnitude of an observed hysteresis effect on a cell's current-voltage (I-V) curve. This effect is found when the applied bias voltage on a cell is rapidly changed in the forward and reverse direction when the spot-illuminated I-V curve of a cell is measured. The difference in the short circuit current (Isc) of the forward and reverse swept I-V curve can be linked to the density of the charge carriers generated by the raster scanned light beam. In this study a signal generator is used to apply a forward and reverse bias sweep on spot illuminated poly and mono crystalline silicon cells to determine the relative magnitude of the diffusion capacitance at each illuminated measurement point. Preliminary results show that several PV cell defect features can be associated with changes in the cell's diffusion capacitance.

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