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Development of a luminescence imaging system for the characterization of PV cells

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As the deployment of renewable energy increases, particularly Photovoltaic (PV), non-destructive techniques become more important for characterising the materials from the cell level to complete module level. Luminescence imaging is a non-destructive characterisation technique that allows for spatially resolved optoelectrical characterisation of cells. This paper presents the development of a system comprising Photoluminescence (PL) and Electroluminescence (EL) imaging. The system is capable of imaging different technology cells at different operational points of the cells. The design, construction and optimisation of the system is discussed and preliminary results are presented. The PV technologies investigated include Si, III/V CPV (Concentrator Photovoltaic) and perovskite cells. The system is optimised based upon illumination intensity and homogeneity across the sample test plane. Different optical filters are used dependent on the material of the device imaged, allowing the system to image a range of PV devices, including tandem devices. The results demonstrate that defective regions in cells may be identified and characterised with respect to luminescence properties and associated material and device properties.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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