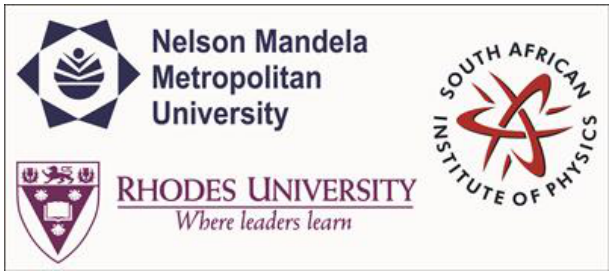

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Evaluation of photovoltaic modules using standard electrical power measurements and imaging techniques

Abstract content
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Photovoltaic (PV) characterisation techniques are quick and reliable tools to evaluate the performance of PV modules. Defects can be identified during visual inspection, electroluminescence (EL) imaging and thermographic inspection. These defects explain the reduced performance observed in the current-voltage (I-V) curves. It is important that these potential problem areas are detected to ensure efficient power generation and long life span of the module. In this study three different photovoltaic module technologies are used, namely monocrystalline, polycrystalline and Edge Defined Film-Fed Growth (EFG) silicon. These modules are subjected to the standard tests according to IEC 61215, as well as EL imaging and thermographic imaging. The results obtained from each of the tests are evaluated in order to assess the performance of each module. During visual inspection the modules are checked for any visible defects or failures according to the standard test. The I V curves for each module are measured using an indoor solar simulator. These two standard tests provide a baseline of the module performance. EL imaging and thermal imaging techniques are used to identify defects and failures that are not visible during the visual inspection. In all the modules, defects were detected in the EL image that were not identified in the visual inspection. The performance of the module was limited by these defects as evident in the I-V curves. Potential hot-spots detected in thermal imaging could be attributed to cell mismatch within the module.

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