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Built-in Potential Measurements in a-Si:H p-i-n Solar Cells

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Abstract: We have measured the open-circuit voltage V_{oc} and the short-circuit current density J_{sc} of amorphous silicon (a-Si:H) p-i-n solar cells deposited by radio-frequency plasma-enhanced chemical vapor deposition (RF-PECVD) at different monochromatic illuminations, and temperatures. From the measurements, the built-in potential V_{bi} was determined by using two different methods: activation energy and differential temperature. The results from both methods were analyzed and compared as a function of excitation wavelength. It was observed that there is good agreement between the two methods. We found that V_{bi} increases until about 650 nm, and then decreases with increasing wavelength. This behaviour is explained and interpreted in different ways.

Key Words: 73.50.Pz; 72.80.Ng;/photovoltaic effects; amorphous thin films; built-in potentials

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