A Numerical Modeling on Light I-V Curves of Hetero-Junction Amorphous Silicon Solar Cells

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In this work, AMPS-D (Analysis of Microelectronic and Photonic Structures) mode was used to simulate hetero-junction amorphous silicon solar cell. The influence of energy band mismatch at p/i interface and Schottky barrier at TCO/p or n/metal interfaces on light I-V characteristics was investigated on a solar cell with a pin structure of TCO/p-a-SiC:H/i-a-Si:H/n-a-Si:H/metal. Simulation shows that the energy band mismatch at p/i interface is the main cause of the abnormal bending of the light I-V curves in a voltage range of less than the open circuit voltage (V_{oc}). Schottky barrier E_p at TCO/p or E_n at n/metal interfaces causes the light I-V curve bending in a voltage range higher than V_{oc} .

Keywords: AMPS-1D, hetero-junction, amorphous silicon, solar cell

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