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Modelling and Simulation of Light and Temperature Efficient Interdigitated Back- Surface-Contact Solar Cell with 28.81% Efficiency Rate

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Abstract : Back-contact solar cells improve optical properties by moving all electrically conducting parts to the back of the cell. The cell's structure allows silicon solar cells to surpass the 25% efficiency barrier and interdigitated solar cells are now the most efficient. In this work, the fabrication of a light, efficient and temperature resistant interdigitated back contact (IBC) solar cell is investigated. This form of solar cell differs from a conventional solar cell in that the electrodes are located at the back of the cell, eliminating the need for grids on the top, allowing the full surface area of the cell to receive sunlight, resulting in increased efficiency. In this project, we will use SILVACO TCAD, an optoelectronic device simulator, to construct a very thin solar cell with dimensions of 100x250um in 2D Luminous. The influence of sunlight intensity and atmospheric temperature on solar cell output power is highly essential and it has been explored in this work. The cell's optimum performance with 150um bulk thickness provides 28.81% efficiency with an 87.68% fill factor rate making it very thin, flexible and resilient, providing diverse operational capabilities.

Keywords : interdigitated, shading, recombination loss, incident-plane, drift-diffusion, luminous, SILVACO
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