

Modeling Multi-junction Solar Cells using SCAPS
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The objective of this work is to effectively model photovoltaic thin-film multi-junction solar cells using Solar Cell Capacitance Simulator (SCAPS), a software primarily developed to analyze single-junction devices. The tandem structure studied here consists of a modified standard cadmium telluride based top cell which uses n-MZO (magnesium doped zinc oxide) as an emitter layer (as opposed to n type cadmium sulfide) and a silicon-based bottom cell with n type silicon as an emitter layer. Parameters including the thickness of the emitter and absorber layers were varied to improve the open circuit voltage, short circuit current, fill-factor, and efficiency of the device. The results of this research support the idea that tandem cells could help improve the performance of solar cells by using the entire spectrum of solar irradiation.