

Optimization of Cu (In, Ga)Se₂ Based Thin Film Solar Cells: Simulation

Authors : Razieh Teimouri

Abstract : Electrical modelling of Cu (In,Ga)Se₂ thin film solar cells is carried out with compositionally graded absorber and CdS buffer layer. Simulation results are compared with experimental data. Surface defect layers (SDL) are located in CdS/CIGS interface for improving open circuit voltage simulated structure through the analysis of the interface is investigated with or without this layer. When SDL removed, by optimizing the conduction band offset (CBO) position of the buffer/absorber layers with its recombination mechanisms and also shallow donor density in the CdS, the open circuit voltage increased significantly. As a result of simulation, excellent performance can be obtained when the conduction band of window layer positions higher by 0.2 eV than that of CIGS and shallow donor density in the CdS was found about $1 \times 10^{18} \text{ (cm}^{-3}\text{)}$.

Keywords : CIGS solar cells, thin film, SCAPS, buffer layer, conduction band offset

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