

# Two-dimensional Modelling and Simulation of CIGS thin-film solar cell

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**Abstract :** Abstract: 2 D Silvaco Atlas software is used for the study of a CIGS thin film solar cell in the configuration: ZnO(200 nm)/n-type CdS(50 nm)/ p-type CIGS(350 nm)/Mo. The cell performance is evaluated by implementing the defects created at the grain boundaries of the polycrystalline CdS and CIGS material and at the interface CdS/CIGS. The J-V characteristics and the external quantum efficiency EQE are simulated under AM 1.5 illumination. The conversion efficiency  $\eta$  of 20.35 % is reached and the other characteristic parameters are simulated: the short circuit current density  $J_s$  equals 35.62 mA/cm<sup>2</sup>, the open circuit voltage  $V_{oc}$  is of 0.69 V and the fill factor FF is of 82.7 %. The calculated external parameters of the solar cell are in good agreement with the measured characteristics. The simulation results also showed that the rise of the CdS thickness decreases all output parameters and the external quantum efficiency while the rise of the CIGS thickness improves all photovoltaic parameters and the external quantum efficiency. The highest efficiency of 21.08 % is reached for the CIGS thickness of 5  $\mu$ m.

**Keywords :** Computer modeling, Silvaco Atlas, CIGS solar cell, solar cell parameters.