

# Propriétés électriques de cellule solaire à base de Sélénure de Cuivre Indium Galium $\text{CuIn}_{(1-x)}\text{Ga}_x\text{Se}_2$ (CIGS)

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**Abstract :** The work of this memory of Magister is a numerical simulation study of electrical characteristics of a solar cell and thin-film heterojunction ZnO / CdS (n) / CIGS (p) / Mousing Silvaco software Atlas-2D. The electrical characteristics of current density versus voltage  $J$  (V) under AM1.5 illumination are simulated: the conversion efficiency  $\eta = 20.1\%$ , the open-circuit voltage  $V_{oc} = 0.68$  V, the current density of short circuit  $J_{sc} = 36.91$  mA /cm<sup>2</sup> and the form factor  $FF = 80\%$ . These simulation results are in very good agreement with those found experimentally. The photovoltaic parameters of the solar cell are studied and analyzed by the variation of parameters: thickness and doping of CdS and CIGS layers, the composition of Galium compared to indium  $x$ . It was found that the variation of the parameters of the front-layer (CdS) has generally less significant effects on the electrical characteristics of the cell in comparison with the parameters of the absorption layer (CIGS). The simulation results showed that the molar fraction  $x$  of the CIGS layer has an optimal value around 0.31 corresponding to an energy gap of 1.16 eV, this result is in good agreement with that found experimentally. A small improvement in the performance of CIGS solar cell was made by the addition of the window layer ZnO: Al.

**Keywords :** Keywords: Numerical simulation -Silvaco- Atlas-2D – CIGS solar cell –solar cell parameters.