Propriétés électriques de cellule solaire à base dediSéléniure de Cuivre Indium Galium CuIn(1?x)GaxSe2 (CIGS)

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Abstract : The work of this memory of Magister is a numerical simulation study of electricalcharacteristics of a solar cell and thin-film heterojunction ZnO / CdS (n) / CIGS (p) / Mousing Silvaco software Atlas-2D. The electrical characteristics of current density versusvoltage J (V) under AM1.5 illumination are simulated: the conversion efficiency ?= 20.1%,the open-circuit voltage Voc = 0.68 V, the current density of short Circuit Jcc = 36.91 mA /cm ² and the form factor FF = 80%. These simulation results are in very good agreement withthose found experimentally. The photovoltaic parameters of the solar cell are studied andanalyzed by the variation of parameters: thickness and doping of CdS and CIGS layers, thecomposition of Galium compared to indium x. It was found that the variation of theparameters of the front-layer (CdS) has generally less significant effects on the electricalcharacteristics 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 optimalvalue around 0.31 corresponding to an energy gap of 1.16 eV, this result is in good agreementwith that found experimentally. A small improvement in the performance of CIGS solar cellwas made by the addition of the window layer ZnO: Al.

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