

Effect of Environmental Conditions on the Substrate Cu(In,Ga)Se₂ Solar Cell Performances

Authors : Mekhannene Amine

Abstract : In this paper, we began in the first step by two-dimensional simulation of a CIGS solar cell, in order to increase the current record efficiency of 20.48% for a single CIGS cell. Was created by utilizing a set of physical and technological parameters a solar cell of reference (such as layer thicknesses, gallium ratio, doping levels and materials properties) documented in bibliography and very known in the experimental field. This was accomplished through modeling and simulation using Atlas SILVACO-TCAD, an tool two and three dimensions very powerful and very adapted. This study has led us to determine the influence of different environmental parameters such as illumination (G) and temperature (T). In the second step, we continued our study by determining the influence of physical parameters (the acceptor of concentration NA) and geometric (thickness t) of the CIGS absorber layer, were varied to produce an optimum efficiency of 24.36%. This approach is promising to produce a CIGS classic solar cell to conduct a maximum performance.

Keywords : solar cell, cigs, photovoltaic generator, illumination, temperature, Atlas SILVACO-TCAD

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