FABRICATION OF FTO/ TIO_2/CU_2ZnSnS_4/AL_2O_3 /AG FOR THIN FILM PV APPLICATIONS

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ABSTRACT

Due to the challenges posed by silicon, CdTe and CIGS cells (Liu et al., 2008, Le Jeune et al., 2006; Chitambar, 2010) new materials for designing of photo voltaic cells have been discovered. The kesterite compound, Cu_2ZnSnS_4 (CZTS) has been the centre of interest to many scientists. CZTS is an earth abundant, cheaper, nontoxic alternative to the other chalcogenide compounds such as CdTe and $CuInGa(S,Se)_2$ (CIGS). In addition its direct and tunable band gap energy, high optical absorption coefficient make it a good candidate for its application as an absorber (seol et al.,). CZTS has been prepared using vacuum and non-vacuum solution deposition methods. Highest recorded efficiencies for vacuum deposition is 8.4% and via solution route 10.1% (Ramasamy et al., 2012). In a recent report a CZTSSe cell was fabricated with an efficiency of 12.6% using hydrazine pure solution (wang et al., 2013)

In this current research CZTS will be deposited by SILAR route i.e Successive ionic layer adsorption and reaction method. SILAR is one of the chemical methods for making uniform and large area thin films, which is based on immersion of the substrate into separately placed cations and anions. Al_2o_3 layer will be used as a back surface field (BSF). Al_2o_3 increases light sensitivity resulting in increased current and cell efficiency. This dielectric layer further 'limits' the attraction of electrons to the silver metallization layer, meaning any electrons generated near the rear of the cell are free to move up towards the emitter and the likelihood that they will reach the interface between the base and emitter and contribute to the current of the cell.

Keywords Kesterite; Chalcogenide; Silar,

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