Abstract number 46

Analysis of Optimized Deposition Temperature of ZnO:Al Thin Film on Sn_xSe_yZnO:Al P-N Junction Solar Cell

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Solar energy has revolutionized the energy sector in the entire world by offering affordable, abundant and safe power source to the growing demands. The technology in solar cell production has advanced considerably in recent years. Solar cell with very high conversion efficiency has been manufactured. The efficiencies of solar cells depend on materials used, deposition method and deposition conditions as they control the optoelectronic properties of the layers. Solar cell samples prepared with a coat of ZnO:Al exhibit too little degradation and very good solar cell properties (Zhao *et al.*, 2002). In this research Zinc Oxide will be doped in various percentages of Aluminum ranging from 0% to 6% by mass to increase charge carriers. To obtain the optimum doping concentration, the optical and electrical properties of ZnO:Al thin film samples will be analyzed using a solid spec 3700 DUV optical spectrum analyzer and four point probe method respectively. The thin films of optimized Al doped ZnO will be deposited at different deposition temperature ranging from 400K-600K and tin selenide by reactive evaporation and evaporation technique respectively using Edward 306Auto evaporation system. The absorptance, transmittance and reflectance data of optimized ZnO:Al in the range from 300nm-2500nm will be obtained using UV-VIS NIR spectrophotometer solid state 3700 DUV. The resulting optical measurements will be analyzed using scout software to determine optical constant for thin solar cells. The electrical properties of Sn_xSe_y and ZnO:Al thin films will studied using four points probe method using Keithley 2400 source meter using Lab View programme. Sn_xSe_y-ZnO:Al solar cell will be fabricated using the optimized doping concentration of Al and deposition temperature. The performance of the p-n junction such as short circuit current (Isc), open circuit voltage (Voc), fill factor (FF) and conversion efficiency (η) will be studied using a solar cell simulator

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