EFFECT OF SUBSTRATE DEPOSITION TEMPERATURE ON THE PROPERTIES OF Sn_xSe_y/ZnO:Sn THIN FILM SOLAR CELLS.

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ABSTRACT

Deposition conditions like substrate temperature strongly influences electrical and optical properties of thin films solar cell. Thin films of Tin selenide will be deposited on a glass substrate using thermal evaporation deposition technique. Sn_xSe_y thin films will be prepared using different ratios at a constant temperature. Optical and electrical characterization will be done to obtain optimal ratio for better performance. The effect of substrate temperature during deposition on optical and electrical properties of the optimum ratio thin film will be investigated for a range of temperature between 100 ^{0}C and 200 ^{0}C. ZnO:Sn will be deposited on a glass substrate using thermal evaporation technique. Electrical and optical properties of transparent and conductive ZnO:Sn thin films will be investigated for various Tin doping concentrations at a constant temperature. The optimum thin film will be used to study the effect of substrate temperature during deposition of ZnO:Sn thin films. Absorption, transmittance and reflection data in the range of 200nm-1800nm will be measured using UV-VIR SPECTRO 320 spectrophotometer. The resulting optical measurements will be analyzed using Scout Software to calculate optical constants like optical band gap Eg, refractive index and dielectric constants for the thin films. Sheet resistance of the thin films of both Sn_xSe_y and ZnO:Sn will be measured using the four point probe method. The electrical characteristics shall be obtained using Keithley programmable electrometer interfaced with computer using Lab View program. Diode characteristics like reverse saturation current (Io), open circuit voltage (Voc), fill factor (FF) and efficiency (η) will be calculated from the data obtained from the I-V curve using solar simulator.