

OPTICAL AND ELECTRICAL CHARACTERIZATION OF $Cd_xSe_{1-x}S$ AND Cu_2S THIN FILMS FOR SOLAR CELL APPLICATION

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ABSTRACT

Solar energy from the sun is abundant, most affordable, clean to use and inexhaustible. Solar energy, has therefore, been harnessed to generate electricity using solar cells. Solar cells convert solar energy directly into electricity. Properties of thin film solar cells strongly depend on various deposition techniques among them is the Chemical Bath Deposition (CBD). This technique yields stable, adherent, uniform and hard films with good reproducibility by relatively simple process. In this research, CBD will be used to deposit thin films of Cadmium Seleno-Sulphide ($Cd_xSe_{1-x}S$) and Copper (I) Sulphide (Cu_2S) on glass substrates. Optoelectronic properties of both films will be investigated. Electrical properties like sheet resistivity (ρ) will be investigated using four point probe method. Optical properties like reflectance and transmittance will be determined using UV-VIS NIR 3700 spectrophotometer in the range between 300-2500 nm. Transmittance and reflectance will be simulated by scout software from which other optical parameters like band gap (E_g), refractive index (n), extinction coefficient (k) and absorbance (α) will be calculated. Conditions that will give $Cd_xSe_{1-x}S$ and Cu_2S optimum opto-electric properties will then be selected and used to fabricate a p-n junction thin film solar cell. The fabricated thin film will be characterized for solar cell applications by simulation method. Thus the solar cell's diode characteristics like dark current (I_0), open voltage (V_{oc}), fill factor (FF) and conversion efficiency (η) will be obtained.