

Synthesis and Characterizations of CuSe (CS) Nano-Thin Films for Photovoltaic Applications

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Abstract

Thin films of CuSe were successfully synthesized for photovoltaic applications using chemical bath deposition (CBD) technique on glass substrates at room and elevated temperatures. The optical and structural properties of these films were determined. The deposited materials were identified by X-ray diffraction (XRD) and suggest a cubic structure with a lattice constant of 5.697Å for films annealed at higher temperature of 523K. Transmittance and reflectance were found in the range of 50-60% and 30-40% using UV spectrophotometer; indicating high transmittance and low reflectance respectively. The absorption onset in the optical spectra of the annealed CuSe films showed a slight red shift in the infrared region. The peak absorption coefficient of $\sim 10^8 \text{ m}^{-1}$ was recorded with the film thickness between 0.10µm and 0.16µm or 100-160nm. The bandgap ranges from 2.0–2.3 eV for direct transition (E_{gd}) and 0.5–1.8 eV for indirect transition (E_{gi}) which shows that the film is a semiconductor nanofilm, a good candidate for nano-photovoltaic applications.

Key words. Thin film, chemical bath deposition (CBD), photovoltaics, optical and structural properties.

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