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Chemically Deposited $CdS_{1-X}Se_X$Thin Films and Characterization

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Abstract: Nanocrystalline cadmium sulfoselenide ($CdS_{1-x}Se_x$; x=0.2, 0.5)thin films are successfully deposited onto a Flourine doped Tin Oxide (FTO:SnO_2 ; 18-20 Ωcm^{-2}) coated glass substrates under optimized growth conditions by chemical bath deposition technique (CBD). The as-deposited thin films were yellow-orange in colour and were vacuum annealed at a temperature of 250 ^oC for 5hour. The X-Ray diffraction (XRD) analysis reveals that the films are polycrystalline with hexagonal phase. The crystallite size of the $CdS_{0.8}Se_{0.2}$ and $CdS_{0.5}Se_{0.5}$ thin films were found to be 39.1nm and 42.2 nm respectively.The band gap of the films found to be decreased slightly with increase in composition of selenium. The surface micrographs of the films obtained from the field emission scanning electron microscope (FESEM) shows that both the films exhibitflakes-like morphology with spherical shaped nano clusters. $CdS_{0.5}Se_{0.5}$ films are relatively uniform, compact, well covered,well adherent to the substrate than compared to $CdS_{0.8}Se_{0.2}$ thin films.The surface wettability test showed hydrophilic and hydrophobic nature of $CdS_{0.8}Se_{0.2}$ and $CdS_{0.5}Se_{0.5}$ thin films respectively. The Photoelectrochemical (PEC) analysis reveals that thin film of $CdS_{0.5}Se_{0.5}$ is more photoactive than $CdS_{0.8}Se_{0.2}$ thin film.
Keywords:Thin films, cadmium sulfoselenide, chemical bath deposition, flakes-like morphology, PE.

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