

Structural, morphological and optical properties of Zn-doped CdS thin films prepared by chemical bath deposition

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Abstract

Zinc-doped Cadmium Sulfide (ZCS)-thin films were grown on the glass substrates by using the chemical bath deposition technique. The correlation between X-ray diffractometer (XRD), atomic force microscopy (AFM) operated in contact mode and UV-Vis spectrophotometer has been carried out to investigate the microstructural and optical properties of ZCS films. The obtained diffraction patterns show a predominant peak at $2\theta = 26,7^\circ$, which can be assigned to the (111) plane of cubic CdS. Statistical analysis of the surface topography such as grains size and root mean square roughness were realized. The transmission spectra recorded in the UV-visible range reveal a relatively high transmission coefficient. Zinc was selected for doping because it was available and non-toxic nature. Furthermore, its ionic radius ($Zn^{2+}: 0,74 \text{ \AA}$) is narrower than the ionic radius of cadmium ($Cd^{2+}: 0,95 \text{ \AA}$) meaning a good condition for the doping and substituting process in the CdS network. The results obtained show that the films deposited with low doping concentrations have good physical properties, as well as, they were also compared with relevant literatures.