

Effect of annealing temperature on the optical spectra of CdS thin films deposited at low solution concentrations by CBD technique.

ABSTRACT

Two different concentrations of CdCl₂ and (NH₄)₂CS were used to prepare CdS thin films, to be deposited on glass substrate by chemical bath deposition (CBD) technique. CdCl₂ (0.000312 M and 0.000625 M) was employed as a source of Cd²⁺ while (NH₄)₂CS (0.00125 M and 0.000625 M) for S²⁻ at a constant bath temperature of 70 °C. Adhesion of the deposited films was found to be very good for all the solution concentrations of both reagents. The films were air-annealed at a temperature between 200 °C to 360 °C for one hour. The minimum thickness was observed to be 33.6 nm for film annealed at 320 °C. XRD analyses reveal that the films were cubic along with peaks of hexagonal phase for all film samples. The crystallite size of the films decreased from 41.4 nm to 7.4 nm with the increase of annealing temperature for the CdCl₂ (0.000312 M). Optical energy band gap (E_g), Urbach energy (E_u) and absorption coefficient (α) have been calculated from the transmission spectral data. These parameters have been discussed as a function of annealing temperature and solution concentration. The best transmission (about 97%) was obtained for the air-annealed films at higher temperature at CdCl₂ (0.000312 M).

Keyword: Air-annealing; Cadmium sulphide; Chemical bath deposition; Window layer.