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Band gap engineering of mixed $Cd_{(1-x)}Zn_{(x)}$ Se thin films.

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Abstract

This paper deals with band gap engineering in CdZnSe thin films. This was achieved by adding different amounts of zinc selenide (ZnSe) to cadmium selenide (CdSe). The weight percentage of ZnSe (x) was varied from 0 to 1 in steps of 0.2. The films were prepared using thermal evaporation technique. The structural analysis was carried out using X-ray diffraction. Surface morphology and elemental composition of the grown films was investigated using scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) respectively. As deposited cadmium selenide thin films were dark reddish in color, changes to lemon-yellow with increase in ZnSe concentration. Electrical transport studies have been carried out using two probe method. Resistivity of the mixed films increased with increase in ZnSe concentration and it shows semiconducting behavior. It is observed that activation energy for conduction increases from 0.39 eV to 0.85 eV with increase in ZnSe concentration. Optical properties of the films were analyzed from absorption and transmittance studies. It is observed that the optical band gap increases gradually from 1.67 eV to 2.60 eV as 'x' varied from 0 to 1.

Key words: CdZnSe(CZS), Inorganic materials, Thin films, Semiconductors, Optical materials, transition metal alloys and compounds.

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