STRUCTURAL CHARACTERIZATION OF CdSe NANOPARTICLE THIN FILMS DEPOSITED BY CHEMICAL SOLVENT EVAPORATION AND TAPE CASTING TECHNIQUES

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Growth of CdSe nanoparticle thin films deposited on glass substrates by chemical solvent evaporation (CSE) and tape-casting (TC) techniques was studied. The technique to obtain the base solution was colloidal synthesis assisted by ultrasonic vibration. The base solution for both techniques was obtained with cadmium chloride (CdCl₂ 2.5H₂O) and elemental selenium. Obtained samples were annealing at 250 °C and 450 °C during 1 hour. Obtained samples were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM). XRD measurements show that initially samples deposited by CSE have a cubic structure, while those obtained by TC have a hexagonal structure. However, after annealing at 250 °C, all the samples showed a hexagonal structure. On the other hand, the average crystallite size of CdSe as deposited by CSE was 10.05 nm and 5.68 nm for TC techniques, which increased up to 97.71 nm and 18.89 nm for CSE and TC respectively after annealing process at 450 °C. The increase in the size of the crystals can be attributed to coalescence effect produced by the annealing temperature to which samples are subjected. After heat treatment, significant changes are observed in the morphology of the samples. We can see hexagonal nanorods with diameters of 80 nm and length around 1.5 microns. With these results, it is concluded that the heat treatment affects the size, shape and structure of the deposited particles. Additionally the XRD signal increases considerably, this indicates that the crystalline quality increases with heat treatment.

Keywords: CdSe nanoparticle, Thin films, structural characterization

References:


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