Influence of Annealing Temperature Variations on the Properties of Chemically Deposited Nanocrystalline Zinc-Selenide Thin Films

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In the present report, influence of annealing temperature variations on the optical, morphological, and structural properties of chemically deposited nanocrystalline zinc-selenide thin films is studied employing an *X*-ray diffractometer, scanning electron microscope, and UV spectroscope. As-synthesized and annealed films exhibit nanocrystalline nature with cubic structure. The result shows that ZnSe thin films contain spherical particles that are composed of nanocrystals ranging from 3 to 7 nm crystallite size. The SEM studies reveal that the inter-crystalline spaces have been found to be reduced with an increase in grain size as annealing temperature increases. The EDS data reveal that the obtained thin films are rich in selenium. However, thermal annealing assisted to reduce the non-stoichiometric nature of the films by reducing selenium content that was found to be reduced with a rise in annealing temperature. The reduction in strains and dislocation density was observed after the annealing process. The band-gap energy was found to be raised from 2.56 to 2.76 eV with a rise in annealing temperature. The transmittance of more than 80% was recorded by as-synthesized and annealed films as well.

Keywords: chemical bath deposition, annealed ZnSe films, optical properties.

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