Influence of annealing on the structure and optical properties of Zn40Se60 thin films

M.A. Abdel-Rahim, M.M. Hafiz, A. Elwhab, B. Alwany

Abstract:

Thin films of Zn40Se60 were prepared by the vacuum thermal evaporation technique. The influence of annealed temperature on the structural and optical properties was investigated using the X-ray diffraction (XRD), scanning electron microscopy (SEM) and optical transmission. The XRD studies show that the as-deposited film is amorphous in nature, but the crystallinity improved with increasing the annealing temperature. Furthermore, the particle size and crystallinity increased whereas the dislocation and strain decreased with increasing the annealing temperature. SEM studies showed that the annealing temperature induced changes in the morphology of the as-deposited sample. Various optical constants have been calculated for as-deposited and annealed films. The mechanism of the optical absorption follows the rule of direct transition. It was found that the optical energy gap (Eg) decreased with increasing the annealing temperature. These results can be interpreted by the Davis and Motte model. On the other hand, the maximum value of the refractive index (n) is shifted towards the long wavelength by increasing the annealing temperature.

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