Composition and thermal induced effects on the optical constants of Ge20Se80-xBix thin films

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Abstract:

The effects of composition and thermal annealing near crystallization temperature, Tc on the optical and structural properties of Ge20Se80-xBix (x=0, 2.5, 5 and 7.5 at%) was investigated. The influence of incorporation Bi content in Ge20Se80-xBix system results in a gradual decrease in the indirect optical gap from 1.89 to 1.44 eV, this behavior can be explained as increased tailing. On annealing, the optical band gap Eg decreases gradually for the crystallized films while the refractive index increases, this behavior can be attributed to transformation from amorphous to crystalline and was explained in the light of dangling bond model. The refractive index n of as-prepared and annealed films has been analyzed according to the Wemple-DiDominico single oscillator model and the values of Eo and Ed were determined. The effect of annealing on the nature and degree of crystallization has been investigated by studying the structure using transmission electron microscope, X-ray diffraction and scanning electron microscope.

Keywords:

Structural; Optical; Annealing; Chalcogenide; Thin films

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