Composition effect on the structure and optical parameters of Ge–Se–Te thin films

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Abstract:

The present work reported the influence of Ge content variation on the optical properties of GexSe50Te50-x (x=0, 5, 15, 20, 35 at%). Vacuum thermal evaporation technique was employed to prepare amorphous GexSe50Te50-x thin films. The stoichiometry of the chemical composition was checked by energy dispersive X-rayspectroscopy (EDX), whereas the thin films structure was determined by an X-ray diffraction and scanning electron microscope (SEM). The optical absorption measurements were performed at room temperature in the wavelength range of 200–900 nm. Many optical constants were calculated for the studied thin films utilizing the optical absorption data. It was observed that the optical absorption mechanism follows the rule of the allowed direct transition. The optical bandgap was found to increase from 2.31 to 2.60 eV as the Ge content increases from 0 to 35 at%. This result was explained in terms of the chemical bond approach.

Keywords:

Optical properties Thin films Ge–Se–Te chalcogenide glasses

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