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Influence of annealing treatment on phase transformation of Ga15Se77Tl8 thin films

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Abstract

The present work describes the first order phase transformation in chalcogenide Ga15Se77Tl8 thin films. Simple melt quenching method was applied to prepare the bulk Ga15Se77Tl8 samples. Ga15Se77Tl8 thin films were prepared by the thermal evaporation on glass and silicon wafer substrates under the vacuum condition of 10(-5) Torr. The amorphous and glassy nature of synthesized sample was verified by differential scanning calorimeter. The phase transformation was studied at different temperatures of 343, 358 and 373 K for 2 h. The crystalline, morphological and optical properties were analysed to explain the phase transformation in as grown and thermally annealed films at different temperatures. It was found that as grown film revealed the amorphous nature, while the annealed films possessed the polycrystalline nature. From optical properties, the values of extinction (k) and absorption (alpha) coefficient for Ga15Se77Tl8 thin films enhanced with the increase of the incident photon energy as well as annealed temperature. The decrease in the optical band gap with respect to annealed temperatures was described on the basis of phase transformation from amorphous to polycrystalline state.

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