Characterization of optical constants and dispersion parameters of highly transparent Ge20Se76Sn4 amorphous thin film

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Abstract:

Amorphous chalcogenide Ge20Se76Sn4 thin films of six different thicknesses (50–350 nm) are prepared by the thermal evaporation technique. Optical transmission and reflection spectra, in the wavelength range of the incident photons from 250 to 2500 nm, are used to study the effect of the film thickness on some optical properties. It is found that the effect of film thickness leads to increase in the absorption coefficient, refractive index, extinction coefficient and the width of the tails of localized states in the gap region. The decrease in optical band gap energy with increasing the film thickness is attributed to the formation of a band tail which narrows down the band gap. Dispersion analyses of refractive index reveal a decrease in the single-oscillator energy and an increase in the dispersion energy with increase in film thickness.

Keywords:

Chalcogenide glass Film thickness Optical constants Dispersion parameters

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