

Optical properties of zinc-borotellurite doped samarium

Abstract

Glasses with chemical compositional $\{[(\text{TeO}_2)_{0.7}(\text{B}_2\text{O}_3)_{0.3}]_{0.7} [\text{ZnO}]_{0.3}\}_{1-x} \{\text{Sm}_2\text{O}_3\}_x$, (where $x=0, 0.005, 0.01, 0.02, 0.03, 0.04, 0.05$ mol %); were prepared by conventional melt-quenching technique. The structural properties of the prepared glasses were determined by X-ray diffraction (XRD) analysis and FTIR analysis. It was confirmed that the prepared glasses are amorphous. The bonding parameters of the glasses were analyzed by using FTIR analysis and were confirmed to be ionic in nature. The density, molar volume, and optical energy band gap of these glasses have been measured. The refractive index, molar refraction and polarizability of oxide ion have been estimated by using Lorentz-Lorentz relations. The optical absorption spectra of these glasses were revealed that fundamental absorption edge shifts to higher wavelengths as the content of Sm_2O_3 increases. The refractive index, optical energy band gap and Urbach energy had been calculated and explained.

Keyword: Borotellurite glass; Optical band gap; Optical absorption coefficient; Fourier Transform Infrared Analysis(FTIR)