

Optical properties of ternary TeO₂-B₂O₃-ZnO glass system.

ABSTRACT

A series of ternary tellurite based glasses [(TeO₂)₇₀ (B₂O₃)₃₀]_{100-x} [ZnO]_x glasses with different compositions of ZnO (x= 5 to 30 wt.% in steps of 5 wt.%) have been synthesized by melt quenching method. The role of ZnO to the glasses structure was studied by IR spectroscopy. FTIR spectra revealed broad, weak and strong absorption bands in the investigated range of wavenumber from 280-4000 cm⁻¹ which associated with their corresponding bond modes of vibration and the glass structure. The indirect optical band gap and the direct optical band gap are in the range 2.08-3.12 and 1.54-2.36 eV, respectively. A decrease in the values of energy band gap E_g may come down to the reason that the non-bridging oxygen ion content increases with increasing ZnO content and shifting the band edge to lower energies. The optical band gap and Urbach energies were calculated from the absorption spectra measured between 190 and 900 nm at room temperature. The refractive index, n of the glasses change from 1.84-2.00 while the molar refractivities decrease from 13.06 to 12.00 with the increase of ZnO in mol%.

Keyword: Tellurite glass; Optical band gap; Glass system.