

Electronic polarizability of zinc borotellurite glass system containing erbium nanoparticles

ABSTRACT

A series of zinc borotellurite glass containing erbium nanoparticles with composition of $\{[(\text{TeO}_2)_{0.70}(\text{B}_2\text{O}_3)_{0.30}]_{0.7}(\text{ZnO})_{0.3}\}_{1-y}(\text{Er}_2\text{O}_3)_y$, $y = 0.005, 0.01, 0.02, 0.03, 0.04, 0.05$ mole fraction were prepared by using conventional melt-quenching method. The optical properties of the prepared glass samples were measured by using high precision Elipsometer and UV-Vis spectrophotometer. The theoretical analysis for electronic polarizability, oxide ion polarizability and optical basicity were determined by using Lorentz-Lorenz equation on the basis of refractive index and optical band gap energy. It is observed that there is a linear increasing trend of electronic polarizability with increasing content of erbium nanoparticles. The oxide ion polarizability increases with refractive index and decreases with band gap energy. The optical basicity analysis shows that the glass samples possess high basicity.

Keyword: Electronic polarizability; Nanoparticles; Optical basicity; Oxide ion polarizability