

## **Polarizability, optical basicity and electric susceptibility of Er<sup>3+</sup> doped silicate borotellurite glasses**

### **ABSTRACT**

Glasses system was fabricated using the chemical composition  $\{[(\text{TeO}_2)_{0.7} (\text{B}_2\text{O}_3)_{0.3}]_{0.8} (\text{SiO}_2)_{0.2}\}1 - x (\text{Er}_2\text{O}_3)_x$  with  $x = 0.01, 0.02, 0.03, 0.04$  and  $0.05$  by melt-quenching method. The glasses were subjected to FTIR and XRD to study the glass structural changes and amorphous nature respectively. The absorption spectrum of the glasses were obtained from UV–Vis spectroscopy and used to calculate the energy band gap. Using the Archimedes principle, the density and the molar volume were determined. From the density, molar volume, and energy band gap, other parameters such as refractive index, molar refractive index, metallization criterion, reflection loss, transmission coefficient, polarizability, optical basicity, polaron radius, dielectric constant, optical dielectric constant, electric susceptibility, average electronegativity and others parameters were obtained by calculation. The polarizability values and the optical basicity were found to increase with Er<sup>3+</sup> ions concentration increase. The dielectric constant, optical dielectric constant and the linear electric susceptibility decreased with increase in Er<sup>3+</sup> ions concentration. The properties studied for the erbium doped glass system suggest the glass system has a potential in the EDFA application.

**Keyword:** Erbium; Polarizability; Optical basicity; Linear electric susceptibility and metallization criterion