

## Polarizability and optical basicity of Er<sup>3+</sup> ions doped tellurite based glasses

### ABSTRACT

The refractive indices ( $n$ ) and densities ( $\rho$ ) of  $\{[(\text{TeO}_2)_{0.70}(\text{B}_2\text{O}_3)_{0.30}]_{1-x}(\text{ZnO})_x\}_{1-y}(\text{Er}_3\text{O}_2)_y$  glasses with  $y = 0.00$ ,  $y = 0.005$ ,  $y = 0.01$ ,  $y = 0.02$ ,  $y = 0.03$ ,  $y = 0.04$ ,  $y = 0.05$  were measured at room temperature. The theoretical value of average electronic polarizability and oxide ion polarizability were calculated by using Lorentz-Lorenz equation on the basis of refractive index and band gap energy. The value of electronic polarizability and oxide ion polarizability is found to be increased with increasing refractive index and decreasing band gap energy. The optical basicity was measured on the basis of oxide ion polarizability and calculated from refractive index and band gap energy. The value of optical basicity was found to be increased with increasing refractive index and band gap energy. The metallization criterion has been calculated on the basis of refractive index and band gap. It was found to be decreased with increasing refractive index and decreasing band gap. The large value of metallization criterion indicates that the glass materials are an insulators.

**Keyword:** Tellurite based glass; Polarizability; Optical basicity; Metallization criterion