

## **Comparative studies of bismuth and barium boro-tellurite glass system: structural and optical properties**

### **ABSTRACT**

This paper aims to compare the structural and optical properties of ternary Boro-tellurite glass with the addition of two different chemical modifier. Six glass samples from composition  $[(\text{TeO}_2)_{0.7} (\text{B}_2\text{O}_3)_{0.3}]_{1-x} (\text{BaO})_x$  ( $x = 0.10, 0.20$  and  $0.30$  mol%) and  $[(\text{TeO}_2)_{0.7} (\text{B}_2\text{O}_3)_{0.3}]_{1-x} (\text{Bi}_2\text{O}_3)_x$  ( $x = 0.10, 0.20$  and  $0.30$  mol%) were prepared by melt quenching method with suitable melting and quenching temperature. The X-ray diffraction (XRD) pattern confirms the amorphous nature of all glasses and the Fourier transform infrared spectroscopy (FTIR) spectra explore the fundamental groups and the local structural units in two different boro-tellurite glasses. The density for both glass series increased as barium oxide and bismuth oxide content increased. The optical band gap,  $E_{opt}$  values for bismuthboro-tellurite glasses are between 2.15–2.4 eV, while barium-boro-tellurite glasses are between 2.25–2.44 eV. The highest concentration of  $\text{Bi}_2\text{O}_3$  in glass system shows the smallest  $E_{opt}$ . In conclusion, the obtained results shows that the addition of bismuth oxide in boro-tellurite glass improves its structural and optical properties.

**Keyword:** Barium; Bismuth; Boro-tellurite; Structural; Optical properties