

## Effect of neodymium ions on density and elastic properties of zinc tellurite glass systems

### ABSTRACT

The aim of this work is to determine the effect of  $\text{Nd}^{3+}$  ion concentration on the elastic properties of zinc-tellurite glass for the development of waveguide lasers. A series of Neodymium doped zinc-tellurite (NZT) glass system of composition  $[(\text{TeO}_2)_{0.70} (\text{ZnO})_{0.30}]_{(1-x)} \text{Nd}_2\text{O}_3 (x)$ ,  $x = 0, 0.01, 0.02, 0.03, 0.04$  and  $0.05$ , were synthesized by using conventional melt-quenching method. XRD analysis confirmed the amorphous nature of the glass; the FTIR confirmed the presence of  $\text{TeO}_3$  and  $\text{TeO}_4$  in the glass network. The density of the glass system increases with increase in neodymium concentration. The longitudinal ultrasonic velocity decreases from  $3737.01$  to  $3045.23 \pm 10 \text{ ms}^{-1}$ , and the shear velocity decreases from  $1959.31$  to  $1887.81 \pm 10 \text{ ms}^{-1}$ . The experimental results have shown that the elastic properties depend on the composition of the glass systems and the effect of neodymium ( $\text{Nd}_2\text{O}_3$ ) within the glass network.

**Keyword:** Tellurite glass; Neodymium; Zinc oxide; Elastic moduli