

**PHYSICAL AND STRUCTURAL PROPERTIES OF ERBIUM DOPED
TELLURITE GLASS EMBEDDED WITH ZINC OXIDE
NANOPARTICLES**

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ABSTRACT

PHYSICAL AND STRUCTURAL PROPERTIES OF ERBIUM DOPED TELLURITE GLASS EMBEDDED WITH ZINC OXIDE NANOPARTICLES

Two series of tellurite glass were prepared by using melt-quenching techniques with the composition of $(85-x)\text{TeO}_2-10\text{Na}_2\text{O}-3\text{MgO}-2\text{Li}_2\text{CO}_3-x\text{Er}_2\text{O}_3$ and $(84.5-y)\text{TeO}_2-10\text{Na}_2\text{O}-3\text{MgO}-2\text{Li}_2\text{CO}_3-0.5\text{Er}_2\text{O}_3-y\text{ZnO}$ where $x=0, 0.5, 1.0, 1.5, 2.0$ mol% and $y=0, 0.25, 0.50, 0.75$ and 1.0 mol%. From the study, the physical properties have been measured in terms of density and molar volume. The structural properties of the glasses were determined by using Fourier Transform Infrared (FTIR) and Raman spectroscopy. The amorphosity of the glass is confirmed through X-ray Diffraction (XRD). The glass density and molar volume of different Er_2O_3 concentration are found in the range of $(4.841-4.889) \text{ g/cm}^3$ and $(30.073-30.477) \text{ cm}^3/\text{mol}$ respectively. Meanwhile, the glass density and molar volume of different ZnO NPs concentration are found in the range $(4.857-4.802) \text{ g/cm}^3$ and $(29.951-30.171) \text{ cm}^3/\text{mol}$ respectively. From FTIR, the absorption band for series 1 and series 2 show peaks at range from $(400-500) \text{ cm}^{-1}$, $(600-640) \text{ cm}^{-1}$ and $(680-700) \text{ cm}^{-1}$. Meanwhile, the Raman spectroscopy band that indicate the structural arrangements of Te – units are shown at 460 cm^{-1} , 480 cm^{-1} , 510 cm^{-1} , 680 cm^{-1} and 780 cm^{-1} for series 1. Meanwhile, for series 2, it has been observed at 450 cm^{-1} , 500 cm^{-1} , 510 cm^{-1} , 680 cm^{-1} and 750 cm^{-1} .