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

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Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA

JANUARY 2020

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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)TeO_2-10Na_2O-3MgO-2 Li_2CO_3-xEr_2O_3 and (84.5-y)TeO_2-10 Na_2O -3MgO-2 Li_2CO_3-0.5 Er_2O_3-yZnO 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) g/cm^3 and (30.073-30.477) cm^3/mol respectively. Meanwhile, the glass density and molar volume of different ZnO NPs concentration are found in the range (4.857-4.802) g/cm^3 and (29.951-30.171) cm^3/mol respectively. From FTIR, the absorption band for series 1 and series 2 show peaks at range from (400-500) cm^{-1}, (600-640) cm^{-1} and (680-700) 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}.