Characterization and optical properties of erbium oxide doped ZnO-SLS glass for potential optical and optoelectronic materials

ABSTRACT

Erbium doped ZnO–SLS (soda lime silica) glass system have been prepared by the conventional melt quenching technique. The physical, structural and optical properties are explained by analysing the data obtained from Energy Dispersive X-ray Fluorescence (EDXRF), density (ρ), molar volume (V m), X-ray diffraction (XRD), fourier transform infra-red (FTIR) and UV-visible (UV-Vis) results. The measured physical parameters like density and molar volume are found to vary linearly and exponentially with increasing Er2O3 content, respectively. X-ray powder diffractrogram show broad peaks which conforms glassy nature of the sample. FTIR spectroscopy reveals the presence of SiO4, ZnO4 and Er–O vibration groups in the glass samples. The optical absorption spectra were measured in the wavelength range from 300 to 800 nm and the optical band gaps were determined. The optical absorption spectra of Er3+ ions in these glasses show three bands and are assigned to the transitions level. It was found that the optical band gap decreases from 3.083 to 3.037 eV with an increase in Er2O3 concentration.

Keyword: Glasses; Soda lime silica; Erbium oxide; Optical materials; Optical properties