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Optical and Physical Properties of Sodium Calcium Lead fluoro Borate Glasses Incorporated with Praseodymium Ion

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Abstract : In the present paper, the glass composition $20Na_2O$ -10CaO-$10PbF_2$ -$60B_2O_3$ doped with varied concentrations of Pr^{3+} have been prepared using muffle furnace by the conventional melt quenching technique and the impact of Praseodymium ions concentration on optical and physical properties of present glasses have been examined. The densities (ρ) of the glass samples were measured using Archimede's principle with toluene as an immersion liquid. Refractive indices (n) of samples were measured at 589.3 nm using an Abbe's refractometer with mono-bromonaphthalene as the contact liquid and few physical parameters of the glasses like, molar volume (V_m), molar refractivity (R_m), polarizabilities (α_m), concentration of rare earth ion (N_i) , polaron radius (r_p) , inter ionic distance (r_i), field strength(F), reflection loss (R_L%) and dielectric constant (ε), energy band gap and urbach energy are also calculated and tabulated. The Powder X-Ray diffraction analysis of the prepared samples confirms the amorphous nature of the samples. The optical absorption spectra of polished samples have been recorded at room temperature in the wavelength range 400nm -800nm using Perkin Elmer lambda-35 UV-Vis spectrometer. Direct and Indirect band gaps are calculated using Tauc's plot.

Keywords : Sodium Borate Glasses, Optical Band Gap, X Ray Diffraction, UV/Visible Spectroscopy.

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