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Effect of Host Glass on the Stimulated Emission Cross-section of Dy^{3+} ions in bismuth borate glasses HIO GIAP OOI, P. K. BABU, SAISUDHA MALLUR, Western Illinois University — Optical properties of Dy^{3+} ions in bismuth borate glasses were analyzed using Judd-Ofelt theory as a function of the glass composition with Bi_2O_3 content varying from 29.5 to 59.5mol%. The intensity of an absorption band can be expressed in terms of the oscillator strength. Absorption coefficient at each wavelength was obtained from the optical absorption spectrum of a glass sample and number density of rare-earth ions was calculated from the measurement of the glass density. These two parameters were then used to calculate the oscillator strength of each transition using Judd-Ofelt theory. Using the oscillator strength for each transition, we obtained the intensity parameters which represent changes in the asymmetry of the ligand field at the rare-earth (RE) site (due to structural changes) and to changes in RE-O covalency. Radiative transition probabilities, the radiative lifetime of the excited states and the branching ratios are then obtained from these intensity parameters. The compositional dependence of stimulated emission cross-section (σ_p), is then evaluated using radiative transition probability, refractive index of the host glass, effective fluorescence linewidth, and position of the band. The $\sigma_p$values of the 574 nm band of Dy^{3+} for bismuth borate glasses are found to be in the range 2.7 x 10^{-21} cm^2 – 3.8 x 10^{-21} cm^2 which is slightly higher than those obtained for other oxide glasses.

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