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Radiative Transition Probability and Stimulated Emission Cross Section of Sm^{3+} Ions in Lead Borate Glasses WILLIAM HEIDORN, SAISUDHA MALLUR, P.K. BABU, Western Illinois Univ — We prepared as series of lead borate glasses with the composition xPbO:(99.5 - x)B_2O_3:0.5Sm_2O_3 (x = 29.5 to 69.5 in steps of 10 mol%) by using the melt quench technique followed by 3 hours of annealing near the glass transition temperature. Optical absorption and fluorescence spectra of Sm^{3+} (RE) doped in lead borate glasses were analyzed using Judd-Ofelt theory. The compositional dependence of Judd-Ofelt intensity parameters, Ω_t (t = 2, 4, 6), were determined. Ω_2 was found to decrease with increasing PbO concentration indicating a decrease in the asymmetry of the crystal field at the RE site and Ω_6 was found to decrease with increasing PbO content indicating a change in the covalency of the RE-O bond. The intensity parameters were then used to calculate the radiative transition probability of the excited states. The stimulated emission cross section for the intense fluorescence transition (598 nm) calculated from the radiative transition probability shows a maximum value (4.5×10^{-22} cm^2) for the base glass containing 49.5 mol% PbO.

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