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The effect of semiconducting CdSe and ZnSe nanoparticles on the fluorescence of Sm^{3+} in lead borate glasses SAISUDHA MALLUR, STEPHEN FATOKUN, P.K. BABU, Western Illinois Univ — We studied the fluorescence spectra of Sm^{3+} doped lead borate glasses containing zinc selenide (ZnSe) and cadmium selenide (CdSe) nanoparticles with the following compositions (x PbO: 96.5-x B_2O_3:0.5 Sm_2O_3:3ZnSe/CdSe, x=36.5 and 56.5 mol%). These glass samples are prepared using the melt-quenching technique. Each sample is annealed just below the glass transition temperature at 400°C for 3 hrs and 6 hrs. We have chosen PbO-B_2O_3 glasses to incorporate Sm^{3+} ions because they have large glass forming region, high refractive index, and good physical and thermal stability. Fluorescence spectra of these samples are obtained with the excitation wavelength at 477 nm. Four fluorescence transitions are observed at 563 nm, 598 nm, 646 nm and 708 nm. The transition at 646 nm is found to be a hypersensitive transition that strongly depends on the covalency of the Sm-O bond and the asymmetry of the crystal field at Sm site. The 646 nm/598 nm fluorescence intensity ratio has been studied for different annealing times and PbO concentration for both ZnSe and CdSe samples. The presence of CdSe nanoparticles is seen to produce the greatest influence on the fluorescence intensity ratio. This could be due to the size of the CdSe nanoparticles and covalency of the Sm-O bond.

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