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Analysis of Stimulated Emission Cross-sections of Sm^{3+} Doped Lead Telluro-borate Glasses Containing Semiconducting CdSe Nanoparticles GRIJA THAPA, SAISUDHA MALLUR, P.K. BABU, Western Illinois University — A series of lead telluro-borate glasses, doped with trivalent Samarium (Sm^{3+}), and CdSe nanoparticles, has been prepared by conventional melt-quenching technique followed by controlled annealing to grow nanoparticles. The optical properties of the Sm^{3+} doped lead telluro-borate glasses have been studied for the following compositions: 29.5PbO:(67-x) B_2O_3: xTeO_2: 0.5Sm_2O_3: 3CdSe, where x = 10 and 20 mol%, and also as a function of the annealing time of the glasses (which determines the average size and distribution of the CdSe nanoparticles). From the optical absorption measurements, the intensity parameters which measure the asymmetry of the crystal field at the Sm^{3+} site and Sm-O covalency, are obtained. These are indicators of properties of the host glass, including optical basicity, rigidity and viscosity. Furthermore, the stimulated emission cross-section has been obtained by evaluating the radiative transition probability, the fluorescence bandwidth, peak position of the fluorescence band and the refractive index of the host glass. We find that the stimulated emission cross-section is comparatively large enough to suggest possible utilization of these materials for photovoltaic applications.

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