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Enhancing rare earth ion luminescence using semiconducting nanoparticles P K BABU, SAISUDHA MALLUR, Western Illinois University — Glasses doped with rare earth (RE) ions are interesting optical systems due to their potential applications in solid state lasers, optical telecommunication, non-linear optical materials, electro-optic devices and, photovoltaics. They provide chemically stable and optically favorable environment for the lasing action of RE ions. Enhancing the fluorescence properties of RE ions is highly desired to make them suitable for these applications. For example, a large stimulated emission cross section (σ_p) is essential for an efficient laser transition. Among several factors that can influence σ_p, the most important one is the immediate chemical environment of the RE ions. Therefore, to improve the efficiency of fluorescence transitions, one must produce favorable changes to the chemical environment of RE ions either by varying the base glass composition and/or doping the glass with metal/semiconducting nanoparticles (NPs). In this work, we show that when CdSe and ZnSe NPs are present in Sm-doped borate glasses, σ_p of Sm^{3+} ions is considerably enhanced. Details about creating and controlling the growth of NPs inside a glass matrix will also be presented.

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