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Effect of metal and semiconducting nanoparticles on the fluorescence of Dy^{3+} doped lead and bismuth borate glasses SAISUDHA MALLUR, STEWART FERRELL, P.K. BABU, Western Illinois University — The rapid development of laser research has led to increased theoretical and experimental investigations of fluorescence of rare-earth ions in heavy metal oxide glasses. These glasses containing metallic and semiconducting nanoparticles are very promising systems because the nanoparticles may induce favorable changes in the rare earth ion's fluorescence properties. We prepared Dy^{3+} doped lead and bismuth borate glasses containing Ag, CdSe and ZnSe nanoparticles. Glasses are made through the normal melt quench method. $AgNO_3$ or powders of the semiconducting compounds are added as precursor materials. Glasses obtained through this process contain Ag atoms or molecules of the semiconducting compounds uniformly distributed within the glass system. These are then subjected to a controlled annealing near the glass transition temperature. During this annealing process, Ag atoms or CdSe/ZnSe molecules thermally diffuse and coalesce to form nanoparticles. The sizes of these nanoparticles can be varied by varying the annealing times as confirmed by the TEM. Fluorescence spectra of Dy^{3+} show noticeable changes as a function of annealing times. Variations in the fluorescence spectra are believed to arise from the strong interaction between Dy^{3+} ions and the nanoparticles.

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