FLUORESCENCE OF Pb^{2+} IONS IN LEAD BORATE GLASSES CONTAINING SILVER NANOPARTICLES.

Saisudha B. Mallur* Akinloluwa Olumoroti, P.K. Babu, Department of Physics, Western Illinois University, Macomb, IL-61455, SB-Mallur@wiu.edu

Lead borate glasses with silver nanoparticles were prepared and Pb^{2+} fluorescence measurements were carried out to study the effect of adding Ag nanoparticles into the base glass. Silver nitrate was used as a precursor to produce Ag nanoparticles. Ag nanoparticles are formed by thermochemical reduction of Ag^{+} to Ag^{0} whose sizes can be controlled by varying the annealing temperature and duration. Transmission electron microscope (TEM) images confirm the formation of Ag nanoparticles and the variation of their sizes with the duration of annealing. Optical absorption experiments show that a well-defined surface plasmon resonance (SPR) peak can be observed only for samples that were annealed for 36 hrs. Fluorescence spectra of all these samples were obtained using different excitation wavelengths. The presence of silver nanoparticles created new emission centers for Pb^{2+} ions by altering the chemical environment of the lead ions. These new emission centers at 450 nm and 520 nm represent lead dimers and lead aggregates, respectively. With increasing annealing time, more lead aggregates were formed as evidenced by the increase in the intensity of the 520 nm peak.