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Abstract

Live Poster Session

Major: Physics

Faculty Mentor: PK Babu

Fluorescence Spectra of Sm3+ in Bismuth Borate glasses

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Bismuth Borate glasses are ideal host materials for observing the fluorescence of rare earth ions. We studied the fluorescence emission of Sm3+ ions in bismuth borate glasses with varying glass composition. The samples were prepared by combining bismuth oxide, boric acid, and samarium oxide in a stoichiometric ratio of xBi2O3:(100-x)B2O3:0.5Sm2O3(x =29.5, 39.5, 49.5 and 59.5 mol%) . The samples were melted in a Carbolite CWF 1300 furnace at 950 oC, quenched on a brass ring placed between two brass plates, and annealed in a Carbolite MTF 12/38/250 furnace at 350 oC. The samples were then flattened and polished on a SwapTopTM 8” Flat Lap machine. The fluorescence spectrum for the polished glass samples was obtained by exciting the glass with a 405 nm laser using the LEO1 multifunctional grating spectrometer. The data collected was analyzed using the Origin software to plot the fluorescence spectrum as well as the area ratio of two peaks, width of an intense peak at 600 nm, and position of the intense peak versus the mol % of bismuth oxide in the glass samples. The observed trends in the data show the area ratio of 645nm/568 nm peaks achieves a maximum value around 39.5% bismuth oxide. This indicates a high asymmetric environment around Sm3+ ions at this composition. The width of the peaks varies little by sample and remains close to constant. The overall variation of the fluorescence parameters of Sm3+ can be attributed to the changes in its electronic environment with varying glass composition.