

Abstract Submitted
for the PSF17 Meeting of
The American Physical Society

Optical Properties of Dy³⁺ Doped Calcium Bismuth Borate and Barium Bismuth Borate Glasses ZACHARY FOREMAN, P.K. BABU, SAISUDHA MALLUR, Western Illinois University — The optical properties of dysprosium ions (Dy³⁺) in calcium and barium bismuth borate glasses were analyzed as a function of the glass composition with Bi₂O₃ content varying from 29.5 to 59.5mol%. These glasses were prepared using the melt-quench method. Refractive index was measured using a Brewster's angle set up. Absorption and fluorescence spectra were then recorded using a Cary 5g UV-VIS-NIR spectrometer and a CCD spectrometer, respectively. The absorption edge was analyzed for glasses with and without Dy³⁺ ions to calculate the optical band gap of the glasses. Absorption spectra of Dy³⁺ ions were then analyzed using the Judd-Ofelt theory. The intensity of an absorption band can be expressed in terms of the oscillator strength. Using the oscillator strength for each transition, we obtained the intensity parameters which represent changes in the asymmetry of the ligand field at the Dy³⁺ ion site (due to structural changes) and to changes in Dy-O covalency. Radiative transition probabilities, the radiative lifetime of the excited states and the branching ratios are then obtained from these intensity parameters. The compositional dependence of these parameters are discussed.

Zachary Foreman
Western Illinois University

Date submitted: 23 Oct 2017

Electronic form version 1.4