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Abstract

Poster

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Faculty Mentor(s): P. K. Babu

Saisudha Mallur

Optical Band Gap and Refractive Index Variation in Lead-Bismuth Borate Glasses

Isabel Navas Rodriguez

We prepared a series of lead-bismuth borate glasses by varying the molar percentage of bismuth oxide. Glasses with the composition xBi2O3:(50-x)PbO:50B2O3 (x = 0, 10, 20, 30 and 40) were made by the traditional melt-quench technique. Stochiometric amounts of highly pure PbO, Bi2O3 and H3BO3 were melted in porcelain crucibles at around 950 oC. Homogenized melt was poured onto a thick brass plate for quenching. As-prepared glass samples were annealed to remove thermal strains. Glasses were then polished using a lapping machine to create well reflecting surfaces. Refractive index was measured using a Brewster Angle setup with a diode laser operating at 650 nm. Optical absorption measurements were carried out using a Cary-Varian 5G instrument. Optical energy gap was determined from the absorption edge. We find that the refractive index increases with increasing bismuth oxide percentage. The optical band gap decreases with increasing bismuth oxide percentage. Addition of bismuth oxide to lead borate glasses induces both structural and electronic property changes to the glass.