Study of Structural, Optical and Thermal properties of Bismuth Zinc Cadmium Borate Glasses

B. Sreenivas1, B. Ajay Kumar2, and P. Hima Bindu\*, 3

1Department of Physics, SR&BGNR Government Arts & Science College(A), Khammam, Telangana, India.

2Department of Freshman Engineering, CMR Institute of Technology (A), Kandlakoya, Hyderabad, India.

3Department of Physics, University College of Science, Osmania University, Hyderabad, India.

\*hb.pitta@osmania.ac.in

**Abstract**:

Bismuth borate glasses with composition (80-x)B2O3-xBi2O3-10CdO-10ZnO (where x is in mol %, ranging from 5 to 20 in steps of 5) have been prepared using conventional melt quenching technique. The physical parameters like molar volume, oxygen packing density have been evaluated from the measured values of density. It is found that density, molar volume increases whereas oxygen packing density decreases with increase of bismuth content. The optical absorption studies revealed that the cutoff wavelength and Urbach energy (∆E) increases, while optical band gap energy (Eopt) decreases with increase of Bi2O3 content. The Eopt values of these glasses are found to be in the range 2.145 to 1.066eV. DTA study of glasses reveals the glass transition temperature (Tg), glass melting temperature (TM) and the crystallization temperature (Tx) is increased with addition of Bi2O3, and the thermal stability of the glasses is also studied leading to various further studies and applications.

Key words: Borate Glasses, Spectroscopy, Bandgap, DTA