

## Temperature Dependent Optical and Electrical Properties of Heavy Metal Oxide Glasses

Orhan Kıbrıslı, Nuşik Gedikoğlu, Miray Çelikbilek Ersundu, Ali Erçin Ersundu

Yildiz Technical University, Department of Metallurgical and Materials Engineering, Faculty of Chemical and Metallurgical Engineering, Istanbul, 34220, Turkey

Tellurite and antimonite based heavy metal oxide (HMO) glasses are considered as promising amorphous semiconducting materials due to their medium optical band gap energy values that are comparable with conventional semiconductors. Therefore, these glasses are studied for different potential applications in non-linear optical devices such as ultra-fast switches, power limiters and broad band optical amplifiers. It is well known that the addition of transition metal oxides to HMO glasses improves non-linear optical properties, enhances electrical conductivity, increases refractive index and expands the transmission range up to the middle infrared region of the electromagnetic spectrum. In the present work,  $\text{MoO}_3$  and  $\text{WO}_3$  were included in  $\text{TeO}_2$  and  $\text{Sb}_2\text{O}_3$  glass network in different concentrations since these transition metal oxides have the potential to improve optical and electrical properties of glasses and enhance their optical sensitivity and non-linear optical features due to their different oxidation states in the glass network. Accordingly, a series of glasses were synthesized in the  $\text{WO}_3\text{-MoO}_3\text{-TeO}_2$  and  $\text{WO}_3\text{-MoO}_3\text{-Sb}_2\text{O}_3$  ternary systems using conventional melt-quenching technique. Optical and electrical properties of these glasses were investigated as a function of temperature using in-situ UV-Vis spectroscopy and electrical conductivity measurement setup.

The authors of this study gratefully acknowledge The Scientific & Technological Research Council of Turkey (TUBITAK) for the financial support under the project numbered 116M210.

**Keywords**— Heavy metal oxide glasses;  $\text{TeO}_2$ ;  $\text{Sb}_2\text{O}_3$ ; optical properties; electrical properties