

## Thermal stability, structural and optical properties of rice husk silica borotellurite glasses containing MnO<sub>2</sub>

### ABSTRACT

The quaternary glass system  $\{[(\text{TeO}_2)_{0.7}(\text{B}_2\text{O}_3)_{0.3}]_{0.8}[\text{SiO}_2]_{0.2}\}_{1-x}\{\text{MnO}_2\}_x$  where  $x = 0.00, 0.01, 0.02, 0.03, 0.04$  and  $0.05$  molar fraction was prepared by melt quenching technique. The amorphous nature of the glass is confirmed by X-ray diffraction patterns and Scanning Electron Microscopy (SEM). The prepared glass samples had also been characterized by Differential Scanning Calorimetry (DSC). The glass transition ( $T_g$ ), onset glass transition ( $T_o$ ), crystallization ( $T_c$ ) and melting temperature ( $T_m$ ) values were measured from DSC thermogram. Results from DSC indicate good thermal stability and low value of fragility ( $F$ ) of the prepared glass samples. Thermal stability ( $T_s$ ), Hurby parameter ( $K_{gl}$ ), fragility ( $F$ ) and activation energy ( $E_a$ ) were calculated for every glass composition. It is observed that the optical band gap decreases with the concentration of MnO<sub>2</sub>. On the other hand, the refractive index ( $n$ ) is observed to increase as the concentration of MnO<sub>2</sub> increases. Fourier Transform Infrared (FTIR) spectroscopy has been done to identify the functional group in glass sample.

**Keyword:** FTIR; UV-Vis; Optical band gap; Refractive index; Differential scanning calorimetry