

## Synthesis and elastic behaviour of borate glass doped with high tellurite content

### ABSTRACT

A systematic series of quality binary glass system of  $(x)\text{TeO}_2-(1-x)\text{B}_2\text{O}_3$  with  $x = 60$  to  $80$  (wt. %) were successfully synthesized by the rapid quenching method. The densities of each glass samples were determined using Archimedes method with acetone as a floatation medium. The molar volume have been estimated and analyzed for borate glasses doped with tellurite. Ultrasonics methods have been used to study the elastic properties of  $\text{TeO}_2\text{B}_2\text{O}_3$  glasses where the sound wave velocities have been measured in each glass samples at a frequency of  $15$  MHz and at room temperature. The velocities, both longitudinal and transverse, increase linearly with increasing of  $\text{TeO}_2$  content in a borate glass network. Their elastic moduli such as longitudinal, Young's, bulk and shear modulus have been calculated as a function of  $\text{TeO}_2$  concentration. Poisson's ratio and Debye temperature were also found to increase nonlinearly with  $\text{TeO}_2$  concentration. The glass transition temperature were determined by the differential thermogravimetric analysis at heating rate of  $20$  K  $\text{min}^{-1}$ . However the glass transition temperature ( $T_g$ ) slowly decrease as more tellurite is added into the borate glass network. © 2006 Asian Network for Scientific Information.

**Keyword:** Borate; Elastic properties; Glass; Telurrite; Thermal behaviour