

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 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 TeO_2 concentration. Poisson's ratio and Debye temperature were also found to increase nonlinearly with TeO_2 concentration. The glass transition temperature were determined by the differential thermogravimetric analysis at heating rate of 20 K 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