

Structural Investigation of Na₂O-B₂O₃-SiO₂ Glasses Doped with NdF₃

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Abstract : Sodium borosilicate glasses doped with different content of NdF₃ mol % have been prepared by rapid quenching method. Ultrasonic velocities (both longitudinal and shear) measurements have been carried out at room temperature and at ultrasonic frequency of 4 MHz. Elastic moduli, Debye temperature, softening temperature and Poisson's ratio have been obtained as a function of NdF₃ modifier content. Results showed that the elastic moduli, Debye temperature, softening temperature and Poisson's ratio have very slight change with the change of NdF₃ mol % content. Based on FTIR spectroscopy and theoretical (Bond compression) model, quantitative analysis has been carried out in order to obtain more information about the structure of these glasses. The study indicated that the structure of these glasses is mainly composed of SiO₄ units with four bridging oxygens (Q₄), and with three bridging and one nonbridging oxygens (Q₃).

Keywords : borosilicate glasses, ultrasonic velocity, elastic moduli, FTIR spectroscopy, bond compression model

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