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Effect of doping by different transition metal oxides on the elastic and structural properties of recycled borosilicate glasses

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Recycled borosilicate glass (RBSG) was used a composition in 80RBSG–20Na2O glass systems doped with different transition metal oxides (TMOs) (where TMOs = V2O5, Cr2O3, CuO, ZnO, ZrO2, Ag2O and CdO). The ultrasonic velocities (both longitudinal and shear) of glass systems were measured by using pulse echo technique. Measurements were carried out at 4 MHz frequency at room temperature. The densities of the glasses were performed by Archimedes'principle and used n-hexane as the immersion liquid. The elastic moduli, Poisson's ratio and micro-harness are found to be rather sensitive to the glass composition. The obtained results were showed that the properties of glasses were decreased when doped the amount of TMOs. The amount of TMOs have the effect on rigidity of the glass network structure. These results related to the number of non-bridging oxygens (NBOs) and supported by FTIR spectroscopy.

Keyword: Recycle borosilicate glasses; Elastic moduli; Pulse-echo technique

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