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The Effect of Doping Cu_2O on Elastic and Structural Properties of Thermoluminescent Glass 90RWG – $10Na_2O$ –xCu_2O

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The purpose of this work was to study the elastic and structural properties of recycle window glass thermoluminescent dosimeter using ultrasonic technique and FTIR spectroscopy. The thermoluminescent glass system 90RWG –$10Na_2O$ –$x Cu_2O$ (where x = 0.001, 0.01, 0.1 and 1.0 mol %) were prepared using the melt quenching technique consisting of 5 hr of 1250°C melting and 2 hr of 500°C annealing. Densities of glass sample with varied Cu_2O dopant were measured. The longitudinal and shear velocities were measured using pulse echo technique at 4 MHz frequency at room temperature. Densities and the ultrasonic velocities of thermoluminescent glass were used for calculation of elastic properties such as longitudinal modulus, shear modulus, bulk modulus, Young's modulus and Poisson's ratio. FTIR spectroscopy was measured in wave number range 400−4000 cm^{-1} to study structure of the glass samples. The result shows that the longitudinal and shear velocities of thermoluminescent glass increase with the increasing Cu_2O. The density are not in significant correlation with Cu_2O concentration in glass system. The change in elastic properties of the thermoluminescent glass depends on the concentration of Cu_2O and can be confirmed by FTIR spectroscopy results.

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