

DETERMINATION OF ELASTIC PROPERTIES OF HOLMIUM PHOSPHATE GLASSES VIA ULTRASONIC TECHNIQUE

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ABSTRACT

The elastic properties of holmium phosphate $x\text{Ho}_2\text{O}_3$ (1-x) P_2O_5 glasses with different compositions containing from 10 to 25 mole% Ho_2O_3 has been determined via ultrasonic technique as functions of temperature from 270 K to 303 K. By using ultrasonic measurement system, the velocities of ultrasonic propagate wave could be used to estimate the elastic properties of glasses. Hence, it could determine the elastic modulus C11 and C44, Young's modulus (E), bulk modulus (B) and Poisson ratio (δ). From the results, it shows that an addition of Ho_2O_3 into phosphate glass system produced the variation of wave velocities thus effected the elastic properties of glass sample. The mechanism of chain entanglement effects of PO_2 groups and the reduction of non-bridging oxygens by the modified rare earth cations seem to play significant roles to enhance the strength of our glasses as presented in our experimental observations of high values of elastic moduli.

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