

Glass formation and elastic behavior of bismuth borate glass system

ABSTRACT

Bismuth borate glass is of great interest in optoelectronic devices due to its low melting temperature (600–800 °C), extensive glass formation range, high refractive index ranging from 1.9 to 2.3, high physical and chemical stability, and nonlinear optical property. A systematic bismuth borate glass series in the systems of $(\text{Bi}_2\text{O}_3)_x (\text{B}_2\text{O}_3)_{1-x}$ have been successfully prepared by melt quenching technique over a wide range of composition ($x = 35\text{--}70$ mol%). Their elastic properties have been measured from their densities as well as longitudinal (VL) and shear ultrasonic wave velocities (Vs) which have been determined at room temperature by the MBS8000 Ultrasonic Data Acquisition system at a frequency of 5 MHz. The variation of ultrasonic wave velocities and elastic modulus such as longitudinal, Young's, bulk and shear modulus, Poisson's ratio, and micro hardness are discussed with respect of the Bi_2O_3 content.

Keyword: Bismuth borate; Elastic modulus; Ultrasonic wave velocities