

Structural relaxation of PbO-WO₃-P₂O₅ glasses

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ABSTRACT

The structural relaxation of three compositional series of PbO-WO₃-P₂O₅ glasses with composition $(0.5 - x/2) \text{PbO} \cdot x\text{WO}_3 \cdot (0.5 - x/2) \text{P}_2\text{O}_5$, $x = 0, 0.1, 0.2, 0.3, 0.4, 0.5$; $0.5 \text{PbO} \cdot x\text{WO}_3 \cdot (0.5 - x) \text{P}_2\text{O}_5$, $x = 0, 0.1, 0.2, 0.3$; and $(0.5 - x) \text{PbO} \cdot x\text{WO}_3 \cdot 0.5 \text{P}_2\text{O}_5$, $x = 0, 0.1, 0.2, 0.3, 0.4, 0.5$ was studied by thermomechanical analysis [1, 2]. The relaxation was described using a mathematical model based on the stretched exponential relaxation function with relaxation time proportional to actual viscosity. The viscosity dependence on thermodynamic temperature and fictive temperature was expressed by Mazurin's approximation [3, 4, 5]. The relaxation parameters dependence on the glass composition was studied. It was found that the modulus is increasing with increasing amount of WO₃ in all glasses. On the contrary, the width of the spectrum of relaxation times is decreasing with increasing amount of WO₃ in all studied glasses.

Keywords: Phosphate glasses, Structural relaxation, Viscosity, Glass transition.

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