A study of crystallization kinetics of some Ge-Se-In glasses

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Abstract:

Results of differential scanning calorimetric (DSC) under non-isothermal conditions on three compositions of Ge_xSe_92-xIn_8 (x = 10, 12.5 and 15 at%) are reported and discussed. It is seen that these glasses exhibit a double glass transition and single-stage crystallization on heating. The glass transition temperature (T_g), the onset crystallization temperature (T_c) and the peak temperature of the crystallization (T_p) were found to be dependent on the composition and the heating rates. The activation energy for glass transition (E_g) and for crystallization (E_c) are evaluated and their composition dependence is discussed. The crystallization phases resulting from the DSC have been identified using X-ray diffraction and scanning electron microscopy (SEM). The results indicated that the crystallization mechanism occurs in one, two and three dimensional growth according to Avrami exponents (n). The kinetic parameters determined have made it possible to discuss the glass-forming ability.

Keywords:

Indium selenides; Germanium selenides; Chalcogenide glasses; Scanning electron microscopy; XRD; Chemical composition; Activation energy; Growth mechanism; Heat treatments; Glass transition; Non isothermal condition; Differential scanning calorimetry; Kinetics; Crystallization

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