Glass transition kinetics of the binary Si12.5Te87.5 alloy

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Abstract

Binary Si12.5Te87.5 glass was prepared using the melt-quench technique. Differential scanning calorimetry measurements of the obtained glass measured at different heating rates (10 a parts per thousand currency sign alpha a parts per thousand currency sign 70 K/min) have shown three, one endo- and two exothermic, peaks. The glass transition kinetics have been analyzed using the isoconversional (model-free) methods in addition to the model-fitting method. The analysis of the present data shows that the glass transition kinetics are not constant values but vary with the transformed extent (x) and hence with temperature of the specimen. Non-linear decrease of E with increase in the transformed extent could be attributed to a complicated mechanism. Based on the peak shape of n(alpha) relation, one concludes that two competing mechanisms are working together during transformation of the solid glass to supercooled liquid state. A good agreement between the experimental and the reconstructed (x-T) curves confirms the validity of the applied models.

Keywords

KeyWords Plus: MODEL-FREE KINETICS; ACTIVATION-ENERGY; CHALCOGENIDE GLASS; NONISOTHERMAL DECOMPOSITION; CRYSTALLIZATION KINETICS; ISOCONVERSIONAL METHODS; AMORPHOUS SIXTE1-X; THERMAL-ANALYSIS; HIGH-PRESSURE; TEMPERATURE

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