STUDY OF THERMAL INDUCED PHASE TRANSFORMATION IN AMORPHOUS ISe_x SYSTEM

M. B. EL - Den, A. R. Tabolin, and M. K. El-Mously*

Physics Department, Faculty of Science, Ain Shams University, Cairo, Egypt.

* Peterspurg University, Peterspurg - Rassia

Thermal induced phase transformation for system ISe_χ (χ = 20, 40, 60) has been studied using DTA at rate 5°C / min. The characteristic T_g, T_c, and T_m has been determined to illustrate the effect of iodine on the crystallization process of amorphous Se. The kinetic parameters of the crystallization processes have been calculated. The compositional dependence of the crystallization activation energy decreases by the addition of I (2.6 at. %) followed by gradual increases with further addition of iodine.

Experimental Technique :

Pure Se (99.999 %) and I (99.99%) were used to prepare alloys of Se with different iodine contents by direct fusion of the elements in pyrex ampules evacuated to 10^{-4} cm Hg. Synthesis of the samples were carried out at 280 ± 5°C for five hours, during which the ampoules were shaken several times to ensure complete homogenization of the samples. After synthesis, the molten materials were quenched in air. DTA curves were carried out for each composition at rate 5°C / min.

Introduction :

The nature and kinetics of the relaxation processes occuring in amorphous materials in the vicinity of the glass transition has attracted a great deal of attention [1]. In particular, interest has been focused on Se and Se compounds because of the relatively large relaxation effects observed in these materials [2-5]. The atomic structure of selenium depends very strongly on its thermal history. In equilibrium, Se is a mixture of two molecular species : n atom chains and eight atom rings. The ratio of these two species and the value of n are sensitive to the temperature [6], to the presence of impurities and to different other physical parameters, e.g. external pressure or incidence of light.