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Role of Sn in the Density of Defect States in a-$Se_{0.75}Te_{0.25}$ and a-$Se_{0.85}Te_{0.15}$ Thin Films

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Abstract: In this paper we report the effect of Sn incorporation in the density of defect states of two binary Se-Te glassy systems, comparing the properties of a-$Se_{0.75}Te_{0.25}$, a-$Se_{0.85}Te_{0.15}$ and a-$Se_{0.75}Te_{0.15}Sn_{0.10}$ glassy alloys. Properties of d.c. conductivity at high electric fields in vacuum were examined; and current-voltage (I-V) characteristics have been measured at various fixed temperatures. Ohmic behavior is observed at low electric fields; while at high electric fields (E \sim 10^4 V/cm), non-ohmic behavior is observed. An analysis of the experimental data confirms the presence of space charge limited conduction (SCLC) in the studied glassy materials. Density of defect states (DOS) near Fermi level is calculated by fitting data to SCLC theory. The peculiar role of the third element Tin, as an impurity in the pure binary $Se_{0.75}Te_{0.25}$ and $Se_{0.85}Te_{0.15}$ glassy alloys, is also discussed in terms of electro-negativity difference.

Key Words: Thin films, Chalcogenide glasses, SCLC, DOS.

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