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Memory switching of chalcogenide glass

Se₈₅ Te₁₅ X₅ (x=In, Sn) films.

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Abstract :

Various factors as temperature, thickness and element addition effect on the electrical conductivity and switching phenomenon in Se₈₅ Te₁₅ X₅ (x=In, Sn) films was examined and discussed herein. Structural identification of the film compositions is confirmed by X-ray diffraction patterns (XRD), energy dispersive X-ray analysis (EDX) and differential thermal analysis (DTA). The obtained results of the temperature dependence of dc conductivity are explained in accordance with Mott and Davis model. The switching phenomenon obtained was of memory type. The mean value of the threshold voltage was found to be dependent on temperature, film thickness d and composition. Values of the threshold voltage activation energy $\bar{\epsilon}_{v_{th}}$ were obtained for the investigated compositions. The obtained results agree with the electrothermal model for the switching process. The addition of Sn to Se-Te system leads to a decrease in the studied parameters (T_g , ΔE_σ , \bar{V}_{th}) than that obtained for In addition which correlated with the nature of bonds between elements of the studied compositions.

Key words: chalcogenides, electrical conductivity, memory switching

1.Introduction

Chalcogenide glasses have various useful electrical properties. Many applications for these materials have been suggested and extend from the field of xerography to the very exciting field of threshold and memory switching [1]. Se-Te system are materials of commercial, scientific and

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