-The effect of silver incorporation on the properties of co-evaporated arsenic telluride thin films

M.M.Hafiz, A.H.Moharram and A.A.Abu-Sehly

Abstract:

Electrical resistivity and optical absorption of amorphous As$_2$Te$_3$:Ag co-evaporated films are investigated as a function of the Ag content up to 25 at%. The film resistivity decreased from $2.1 \times 10^4$ to $2.6 \times 10^2$ $\Omega$ cm and the activation energy for conduction decreased from 0.45 to 0.36 eV with increasing the film Ag content. The dependence of the optical absorption coefficient on the photon energy is ascribed by the relation $(\alpha hv) = B(hv - E_0)^2$. The optical gap $E_0$ of the as-prepared films decreases with increasing Ag content. The tail width of the localized states at the band gap was calculated and it increases with increasing the Ag content. The effect of the thermal annealing on the optical absorption was investigated. The changes were attributed to the thermally induced transformations in the chalcogenide films.

Keywords:

Optical properties; Electrical properties; Electron microscopy; Amorphous materials; Chalcogen; Semiconductors

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