

Effect of Annealing on Electrodeposited ZnTe Thin Films in Non-Aqueous Medium

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Abstract : Zinc Telluride (ZnTe) is a binary II-VI direct band gap semiconducting material. This semiconducting material has several applications in sensors, photo-electrochemical devices and photovoltaic solar cell. In this study, Zinc telluride (ZnTe) thin films were deposited on nickel substrate by electrodeposition technique using potentiostat/galvanostat at -0.85 V using AR grade of Zinc Chloride (ZnCl₂), Tellurium Tetrachloride (TeCl₄) in non-aqueous bath. The developed films were physically stable and showed good adhesion. The as deposited ZnTe films were annealed at 400°C in air. The solid state properties and optical properties of the as deposited and annealed films were carried out by XRD, EDS, SEM, AFM, UV-Visible spectrophotometer, and photoluminescence spectrophotometer. The diffraction peak observed at $2\theta = 49.58^\circ$ with (111) plane indicate the crystalline nature of ZnTe film. Annealing improves the crystalline nature of the film. Compositional analysis reveals the presence of Zn and Te with tellurium rich ZnTe film. SEM photograph at 10000X shows that grains of film are spherical in nature and densely distributed over the surface. The average roughness of the film is measured by atomic force microscopy and it is nearly equal to 60 nm. The direct wide band gap of 2.12 eV is observed by UV-Vis spectroscopy. Luminescence peak of the ZnTe films are also observed in as deposited and annealed case.

Keywords : annealing, electrodeposition, optical properties, thin film, XRD, ZnTe

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