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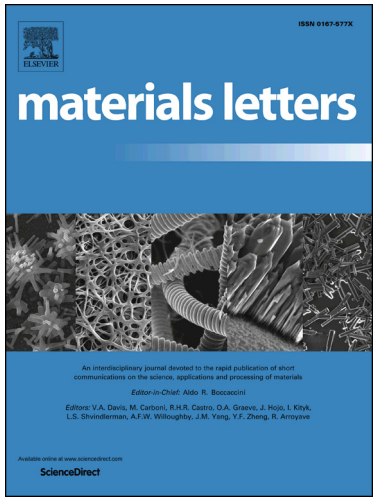

Chemical spray deposition technique of antimony (Sb) doped polycrystalline $MnIn_2S_4$ thin films: Preparation and Characterization

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Chemical spray deposition technique of antimony (Sb) doped polycrystalline $MnIn_2S_4$ thin films: Preparation and Characterization.

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ABSTRACT

The Sb- doped Manganese Indium Sulphide ($MnIn_2S_4$) films were deposited on glass substrates using spray pyrolysis technique. The thin films which were grown at various substrate temperatures ranging from 250-400°C with a constant spray time (5mins).The structural, morphological, optical and electrical properties of the thin films were investigated through different techniques such as X-ray diffraction (XRD), Field emission scanning electron microscopy (FE-SEM), Electron diffraction spectroscopy (EDS), and UV-Vis spectroscopy. The XRD studies reveal that the Sb-doped $MnIn_2S_4$ films were polycrystalline in nature with a cubic spinal structure having (220) plane as the preferred orientation. The EDS spectrum predicts the presence of Mn, In, Sb and S in the film grown at a substrate temperature of 250°C.The FE-SEM photographs indicate the modification in the surface morphology of the films with an increase of substrate temperatures. From the optical studies, it is noted that, the band gap energy increases (1.85 - 2.75 eV) with an increase of substrate temperature (250-400°C).These results reveal that the Sb- doped $MnIn_2S_4$ thin film prepared by spray pyrolysis technique is a promising candidate for photovoltaic applications.

Keywords: Sb-doped $MnIn_2S_4$ thin films; Polycrystalline; Spray pyrolysis; Structural properties; Optical properties.

1.Introduction

The development of contemporary, sophisticated technologies which increase the quality of human life closely related to the semiconducting material. Thin films of semiconducting materials are applicable in the field of microelectronics, communication technologies, and energy generation and conservation strategies [1].