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Fabrication of antimony doped tin disulfide thin films by an inexpensive, modified spray pyrolysis technique using nebulizer(Article)

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Abstract

The SnS_2 and antimony (Sb) doped SnS_2 thin films were effectively synthesized on glass substrates for different antimony doping concentrations (2, 4, 6, 8 at. %) using nebulized spray pyrolysis technique. The XRD analysis showed that all the films are polycrystalline having hexagonal structure with (001) preferential orientation. It was seen from the SEM photographs that the doping causes remarkable changes in the surface morphology. EDAX analysis clearly confirms presence of expected elements tin, sulfur and antimony in the final product, in appropriate proportions. Optical study exhibits that the band gap value of SnS_2 film decreases gradually with the increase in Sb doping concentration, reaching minimum band gap value of 2.55 eV at 6 at.% and starts increasing thereafter. Photoluminescence spectra depicted that the intensity of the emission peaks significantly varied with doping concentrations. The electrical study shows that the minimum resistivity value of 11 Ω cm with notable higher values of carrier concentration and mobility is achieved for 6 at.% of SnS_2: Sb film. The Raman spectra exposed that SnS_2 films had a broad peak at 314 cm^{-1}. © 2018 Elsevier Ltd

Author keywords

Electrical and optical studies | Nebulized spray pyrolysis | Optoelectronic devices | Sb doping | SnS_2 thin films

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