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Influence of substrate temperature on the physical properties of SnS_2 thin films prepared using nebulized spray pyrolysis technique(Article)

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Abstract

Influence of substrate temperature on the physical properties of Tin disulfide (SnS_2) thin films is investigated. X-ray diffraction studies revealed that the SnS_2 thin films are preferentially oriented as (001) plane. SEM analysis showed that SnS_2 thin films had platelet-like grains. EDAX analysis clearly confirms the presence of expected elements of tin and sulfur in appropriate proportions. Multiple interference effects were predominant in all these thin films in wavelength region of 500–1100 nm. The direct optical band gap of tin disulfide thin films had decreased from 3.26 to 2.7 eV with the increase in substrate temperature. Photoluminescence studies expose that the intensity of NBE emission peaks differs according to the substrate temperature. A minimum resistivity value of 2.19×10^{1} Ω cm was obtained for the film grown at $T_s = 250$ °C. Hall Effect measurement exhibited that all the SnS_2 samples had n-type conductivity. Raman spectra exposed that SnS_2 films had a broad peak at 314 cm^{-1}.

Indexed keywords

Engineering controlled terms: Energy gap | IV-VI semiconductors | Physical properties | Semiconducting tin compounds | Spray pyrolysis | Sulfur compounds | Thin films

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