





# Document details - Influence of tin precursor concentration on physical properties of nebulized spray deposited tin disulfide thin films

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## Influence of tin precursor concentration on physical properties of nebulized spray deposited tin disulfide thin films(Article)([Open Access](#))

Anitha, N., Anitha, M., Raj Mohamed, J., Valanarasu, S., Amalraj, L.

<sup>a</sup>Research Department of Physics, V. H. N. S. N. College (Autonomous), Virudhunagar, India<sup>b</sup>PG and Research Department of Physics, H. H. The Raja's College, Pudukkottai, India<sup>c</sup>PG and Research Department of Physics, Arul Anandar College, Madurai, India

### Abstract

Tin disulfide thin films were prepared with different molarities of tin species ( $M_{Sn}$ ) at the optimized substrate temperature using the Nebulized Spray pyrolysis technique to obtain better crystallinity with mono phase thin films. The concentration of Tin IV chloride Penta hydrate precursor is varied from 0.05:0.4 to 0.25:0.4 ( $SnCl_4 \cdot 5H_2O$ : thiourea) to achieve correct stoichiometry and to tune the concentration of Tin ions in the  $SnS_2$  thin films. These films were well adherent, uniform, and shiny. Lower concentrations of Tin yields highly textured  $SnS_2$  thin films with (001) crystallite orientation. On increasing the concentration, the multi-phases ( $SnS$  and  $Sn_2S_3$ ) were found to be present along with  $SnS_2$  material. The platelet-like grains were observed from SEM analysis in these  $SnS_2$  films. Multiple interference effects were predominant in all these thin films in the wavelength region of 600–1100 nm. The direct optical band gap of tin disulfide thin films had decreased from 3.2 eV to 2.75 eV with an increase in  $M_{Sn}$  from 0.05 to 0.2 M, respectively, and further increased to 3.0 eV for 0.25 M concentration. Using Hall Effect measurement, the type of semiconductor is found to be of n-type. A minimum resistivity value of  $2.19 \times 10^{-3} \Omega \text{ cm}$  was obtained for the film grown at  $M_{Sn} = 0.2 \text{ M}$ . © 2018, © 2018 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group on behalf of The Korean Ceramic Society and The Ceramic Society of Japan.

### Author keywords

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### Indexed keywords

Engineering controlled terms:

Chlorine compounds Energy gap IV-VI semiconductors Layered semiconductors  
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Engineering uncontrolled terms

Crystallite orientation Hall effect measurement Multiple interferences  
Nebulized spray pyrolysis Precursor concentration Resistivity values Substrate temperature  
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Engineering main heading:

Tin compounds

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