

## Development of Vertically Oriented Sb<sub>2</sub>S<sub>3</sub> Films by Close Spaced Sublimation

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**Abstract :** This work explores the Sb<sub>2</sub>S<sub>3</sub> thin-film deposition conditions by close spaced sublimation (CSS). Among the various film deposition techniques available for this material, in general, the CSS has the advantages such as fast deposition, large grains, and lower defect density in films. Different batches of films were deposited with substrate temperature in range 250 to 400 oC and the structural, morphological, optical, spectroscopic and opto-electronic properties were analyzed. In the studied temperature range, the films were pure without any oxide phases. The stoichiometry was close to ideal value for the film deposited at 350 oC. The films showed strong preference for the crystallographic planes with miller index terminating in "1" (hk1), which implies that the grain growth is either perpendicular or inclined to the substrate. This was supported by the SEM cross-section images showing long vertical or inclined ribbons. The photoluminescence showed a dependance on deposition temperature. However, contrary to the expectation it was observed that the photosensitivity has an inverse dependance on the deposition temperature. There is no reason to believe that it is due to the film degradation, but possibly due to the defects or barriers at the interface between the film and the current collecting electrodes, which needs further research.

**Keywords :** photosensitivity, Sb<sub>2</sub>S<sub>3</sub>, close spaced sublimation, vertical grain growth

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