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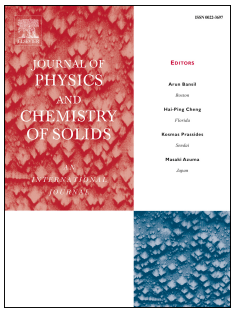

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The influence of film deposition temperature on the subsequent post-annealing and crystallization of sputtered Sb_2S_3 thin films

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Abstract:

Sputter-deposited Sb_2S_3 thin films were studied to understand the role of the initial film deposition temperature on the subsequent crystallization during the post-annealing in N_2-S ambient. The films were deposited with substrate temperatures in the range 200 to 350 ^oC. The as-deposited films were amorphous independent of the substrate temperature, however, after annealing at 300 ^oC all the films turned in to polycrystalline. It was observed that the thermal history (deposition temperature) of the films have a notable influence on the crystallization and grain growth due to post-annealing at 300 ^oC. The material properties of the annealed film such as: crystallite size, strain, grain size, refractive index, and film stoichiometry showed a dependence on the original film deposition temperature. Furthermore, AFM and SEM micrographs revealed a direct dependence of the morphological features such as grain growth, uniformity and compactness on the thermal history. Studies by variable-angle spectroscopic ellipsometry (VASE) provided some optical parameters including inter-band transitions in the Sb_2S_3 thin films. We present the