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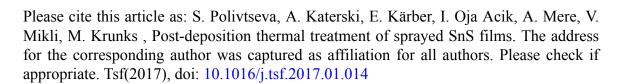
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ACCEPTED MANUSCRIPT

Post-deposition thermal treatment of sprayed SnS films

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Abstract

SnS films were grown by the chemical spray pyrolysis method using aqueous solutions

containing SnCl₂ and SC(NH₂)₂ at molar ratios of 1:1 and 1:8 in air at a substrate temperature of

200 °C. As-deposited films were thermally treated at 450 °C in nitrogen and vacuum

atmospheres. All samples were studied using X-ray diffractometry, Raman spectroscopy, energy-

dispersive X-ray analysis, and ultraviolet-visible spectroscopy. The as-grown films consisted of

cubic SnS as the only crystalline phase regardless of the molar ratio of the precursors in the spray

solution. Annealing of the 1:1 films (derived from the 1:1 solution) in vacuum yielded metallic

Sn, whereas annealing in N₂ produced films composed of a mixture of cubic SnS and SnO₂

phases, indicating the presence of oxygen-containing non-crystalline phases in the as-grown

films. Thermal treatment of the 1:8 films in nitrogen yielded films composed of Sn₂S₃, whereas

vacuum annealing produced films consisting of orthorhombic SnS with a bandgap energy of 1.4

eV.

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