

Transport properties of sprayed In₂S₃ thick films

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Abstract:

In this work, we study the structural, morphological, optical and transport properties of indium sulfide thick films. The In₂S₃ films of about 1.6 μm thickness have been grown on glass substrate using spray pyrolysis technique. In this process were used indium chloride and thiourea as reagents.

X-ray diffraction studies show well crystallized films oriented towards (400) direction corresponding to cubic β-In₂S₃ phase. According to AFM image, the films were polycrystalline, formed by crystallites (250 nm) separated by grain boundaries (30 nm). Furthermore, crystallites are constituted by grains with 20-30 nm of large and the surface roughness is in order of 5 nm. Optical analysis reveals that the films have a best quality, depict a high transparency (more than 80%), for wavelengths greater than 600 nm and their band gap energy is in order of 2.62 eV. The impedance plane plot shows semicircle arcs and an electrical equivalent circuit has been proposed to explain the impedance results. One can conclude that our material can be used as transmissive windows in low-cost solar cells.