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Effect of Substrate Temperature on Structural, Electrical and Optical Properties of Sprayed Tin Selenide Thin Films Applicable for Photovoltaic Measurements(Article)

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Abstract

Thin films of Tin selenide (SnSe) have been prepared on glass substrates at different temperatures in the range of 250 C375 C insteps of 25 C for optimization were discussed. The deposited tin selenide thin films were characterized using X-ray diffractionanalysis (XRD), Elemental dispersive X-ray analysis (EDAX), Scanning electron microscopy (SEM), Optical absorption,Photoluminescence (PL), Raman spectroscopy and electrical measurements. From XRD analysis a single-phase tin selenide thinfilm having orthorhombic crystalline structure with crystallite size of 17 nm to 62 nm were investigated. The surface morphologyrevealed the presence of uniformly distributed spherical grains of SnSe thin films without pores and voids. Optical absorptionspectrum revealed a direct band gap of 1.15 eV and having very high absorption coefficient (104/cm) was calculated. The Ramanscattering analysis confirmed the presence of B3g and Ag vibrational modes of SnSe thin films. PL studies revealed a strongluminescence peak near-band-edge (NBE) emission at 785 nm due to recombination of bound excitons. Photoconductivitycharacteristics of SnSe thin films were due to the existence of continuous distribution of localized states in the band gap data. Thustin selenide thin films were used as an absorber layer in the photovoltaic application.

Author keywords

Hall Effect | Optical properties | Photoluminescence | Surface Morphology | Tin Selenide | X-ray diffraction

Indexed keywords

Engineering controlled terms: Crystallite size | Energy dispersive X ray analysis | Energy gap | Hall effect | Layered semiconductors | Light absorption | Morphology | Optical properties | Photoluminescence | Photovoltaic effects | Scanning electron microscopy | Selenium compounds | Semiconductor quantum wells | Substrates | Surface morphology | Thin films | Tin compounds | X ray diffraction analysis

Engineering uncontrolled terms: Electrical and optical properties | Electrical measurement | Glass substrates | Optimisations | Photovoltaic measurements | Raman spectroscopy measurements | Single phasis | Substrates temperature | Thin-films | X- ray diffractions

Engineering main heading: X ray diffraction