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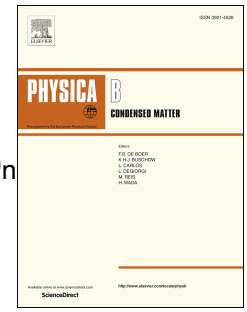

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Effect of SnS addition on the morphological and optical properties of $(SnS)_m(Sb_2S_3)_n$ nano-rods elaborated by glancing angle deposition

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Abstract

$(SnS)_m(Sb_2S_3)_n$ thin films were prepared by thermal evaporation using the glancing angle deposition technique (GLAD). The incident angle between the particle flux and the normal to the substrate was fixed at 80°. The Raman and XRD characterization revealed the amorphous character of the films due to the columnar structure as shown by the SEM characterization and AFM analysis. A strong change of the surface morphology of the films was observed and it depends on the composition. Optical properties were extracted from transmittance *T* and reflectance *R* spectra. $(SnS)_m(Sb_2S_3)_n$ thin films exhibit high absorption coefficients (10^4 - 2×10^5 cm^{-1}) in the visible range and the higher values were obtained for $Sn_3Sb_2S_6$ and it has the highest photocurrent values. The direct band gap ($E_{g\ dir}$) was in the range 2.11 – 1.67 eV. The refractive indices are calculated from optical transmittance spectra of the films. The $Sn_3Sb_2S_6$ sample exhibits a lower refractive index. All the dispersion curves of refractive index match well with the Cauchy dispersion formula and they were analyzed using Wemple-DiDomenico model. The Bruggeman effective medium approximation EMA was used to calculate the packing density of different compositions, and $SnSb_4S_7$ sample has the highest