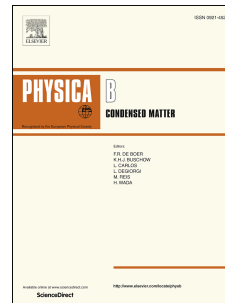


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Influence of reaction time on the structural, optical and electrical performance of copper antimony sulfide nanoparticles using solvothermal method

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Abstract

The less toxic and cost effective ternary Cu-Sb-S nanoparticles and thin films were synthesized and deposited using solvothermal and drop casting method. The reactions were carried out at different timings as 12 to 48 h, in steps of 12 h using ethylene glycol as solvent and polyvinylpyrrolidone (PVP) as surfactant. Systematic analysis revealed that due to the influence of different reaction time, significant and unique changes were occurring on the crystal structure, optical and electrical properties of the material. The synthesized nanopowders and deposited films were characterized by means of X-ray diffraction, Raman analysis, field emission scanning electron microscope with energy dispersive spectrometer, UV-Vis –NIR diffuse reflectance spectroscopy and hall measurement. XRD results showed that as the time increases crystallinity improves and phase transformation from chalcostibite to tetrahedrite occurs. Optical and electrical performance revealed that nanoparticles were in the range of 1.21-1.49 eV. Hall measurements showed that deposited $\text{Cu}_{12}\text{Sb}_4\text{S}_{13}$ and CuSbS_2 films exhibited p-type conductivity

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