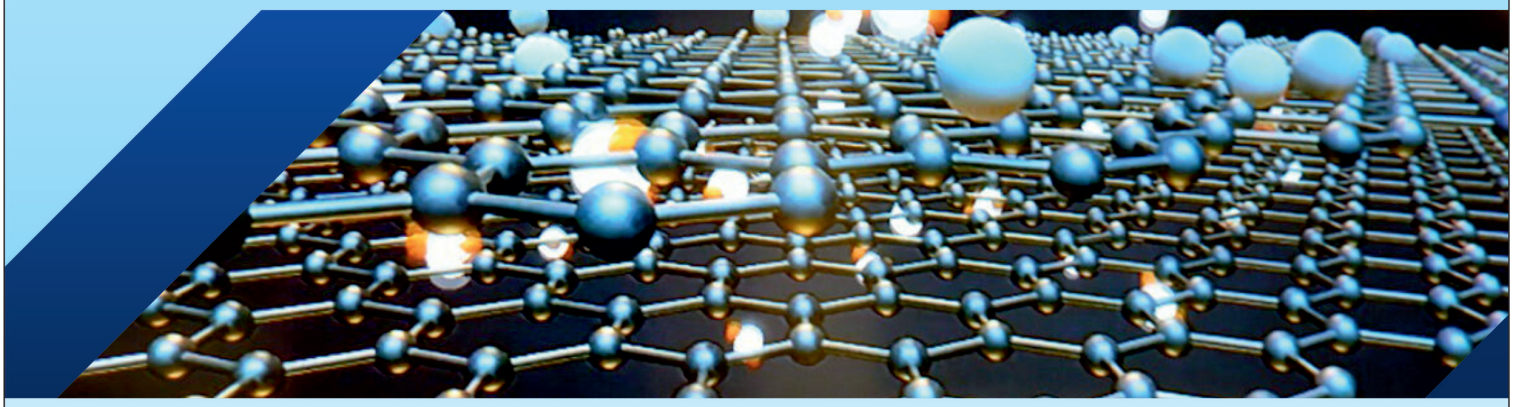
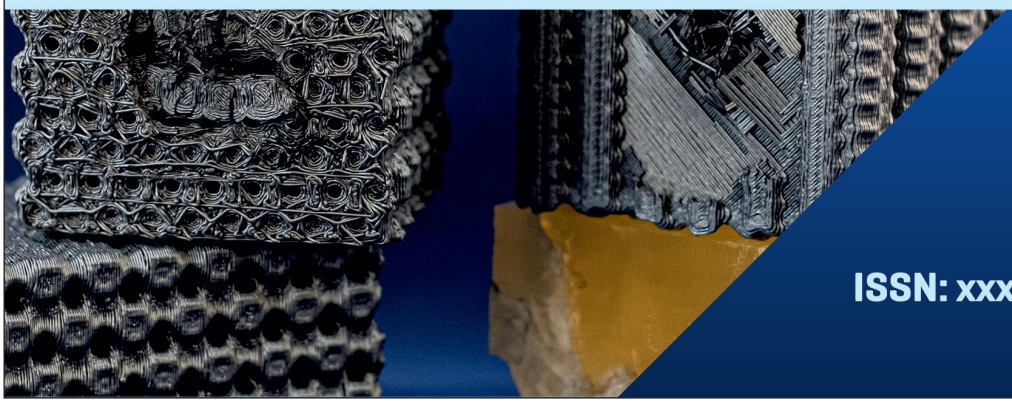
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ABSTRACT BOOK







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Structural and Optical Properties of RF Magnetron Sputtered In_2S_3 Thin Films

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Abstract. In this study, In_2S_3 thin films were prepared by RF magnetron sputtering method. The sputtered In_2S_3 thin films were characterized by XRD, UV-Vis and FTIR spectroscopy. It was found that the direct band gap of tetragonal In_2S_3 structure was 3.1 eV.

Keywords: Indium sulfide, In_2S_3, thin film, XRD, FTIR, UV-Vis
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In_2S_3 thin films were deposited under 10 mTorr working pressure and 4.3 sccm flow rate of Ar gas at 30 W RF power on soda lime glass (SLG) and silicon (Si) substrates by RF magnetron sputtering method at a base pressure of $7.6x10^{-6}$ Torr. The thicknesses of the grown films on SLG and Si substrates were found to be 35 nm and 60 nm by the profilometer measurement, respectively. XRD patterns indicated that the deposited films have tetragonal structure. In FTIR spectra (Fig.1a), the absorption peaks centered at 1371.1 cm^{-1} and 798 cm^{-1} were attributed to In-S vibration modes of In_2S_3. In addition, two strong absorption peaks at 1110 cm^{-1} and 615 cm^{-1} originating from Si substrate were also observed in the spectra. These results are compatible with previous studies [1]. The energy band gap values of the grown films were calculated by Tauc method and determined as ~3.1 eV (Fig.1b), which is consistent with the value obtained by Rasoolal [2]. From the UV-Vis spectroscopy analysis, it was seen that the films had an average transmission of 60% in 400-850 nm region (Fig.1c). Obtained results show that deposited In_2S_3 films can be used as tampon layer for CTS thin film solar cels with kesterite Cu_2SnS_3 absorber layer.

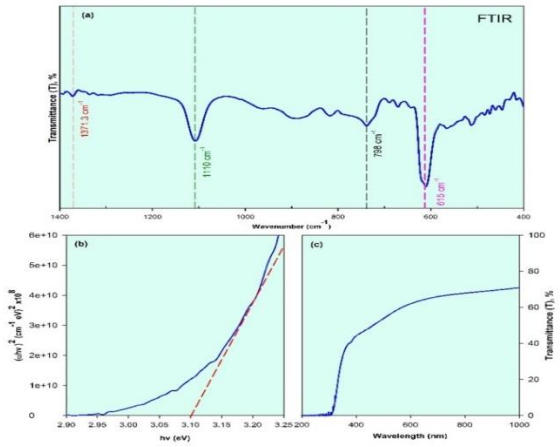


Figure 1. (a*) IR transmittance spectra of In_2S_3 film on Si substrate. (b) and (c) Tauc plot and optical transmittance in UV-Vis region of the films deposited on SLG substrate, respectively.*

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