

FT-Raman and X-ray Diffraction Spectra of CuInS₂ Films by the Spray Pyrolysis at Different Substrate Temperatures

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We report the structural and Raman properties of CuInS₂ (CIS) polycrystalline films deposited onto corning glass substrates by spray pyrolysis (SP) method. The films were grown at different substrate temperatures in the range, 225–275 °C. The X-ray diffraction (XRD) spectra showed that all of the films are of polycrystalline nature (Fig. 1a). The (112) peak intensity increases with the increase in substrate temperature and the film tends to have a preferential orientation. Texture coefficient (TC), grain size values and lattice constants were calculated. The elemental analysis and surface morphology of the deposited films were investigated by EDX and Scanning electron micrograph (SEM), respectively. The surface morphology is found to be smooth and dense from SEM images for both the films. The optical band gap of the film was found to be substrate temperature dependent [1]. The FT-Raman spectrum of the film is shown in Fig. 1b. It can be seen that there are four Raman peaks at 64.95 (E⁶), 114.07 (E⁴), 299.96(A₁) and 468.59 cm⁻¹ (CuS and/or Cu₂S). The films also present additional modes in the FT-Raman spectra, together with the ones that are chalcopyrite related. The results are agreement with the literature [2-5]. These results point to important photovoltaic applications of this material.

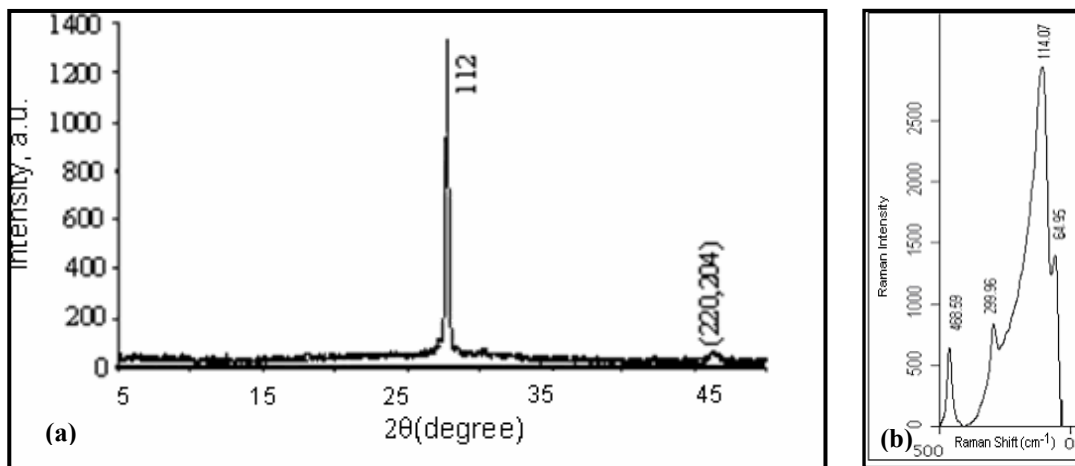


Fig. 1: XRD (a) and FT-Raman spectra (b) of CuInS₂ polycrystalline film at 275 °C substrate temperature.

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