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Growth and characterization of electrodeposited Cu_2O thin films

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Abstract: This work demonstrates the electrodeposition of cuprous oxide (Cu_2O) thin films onto a fluorine-doped tin oxide (FTO)-coated conducting glass substrates from Cu(II) sulfate solution with C6H8O7 chelating agent. During cyclic voltammetry experiences, the potential interval where the electrodeposition of Cu_2O is carried out was established. The thin films were obtained potentiostatically and were characterized through different techniques. From the Mott–Schottky measurements, the flat-band potential and the acceptor density for the Cu_2O thin films are determined. All the films showed a p-type semiconductor character with a carrier density varying between 2.41×10^{18} $cm^{?3}$ and 5.38×10^{18} $cm^{?3}$. This little difference is attributed to the increase of the stoichiometric defects in the films with the deposition potential. Atomic force microscopy analysis showed that the Cu2O thin films obtained at high potential are more homogenous in appearance and present lower crystallites size. X-ray

Keywords : Cu2O, electrodeposition, Mott–Schottky, optical properties, Thin films, XRD