

Growth and characterization of electrodeposited Cu₂O thin films

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Abstract: This work demonstrates the electrodeposition of cuprous oxide (Cu₂O) 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 Cu₂O 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 Cu₂O thin films are determined. All the films showed a p-type semiconductor character with a carrier density varying between $2.41 \times 10^{18} \text{ cm}^{-3}$ and $5.38 \times 10^{18} \text{ cm}^{-3}$. 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