

# Growth and characterization of electrodeposited Cu<sub>2</sub>O thin films

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**Abstract:** This work demonstrates the electrodeposition of cuprous oxide (Cu<sub>2</sub>O) thin films onto a fluorine-doped tin oxide (FTO)-coated conducting glass substrates from Cu(II) sulfate solution with C<sub>6</sub>H<sub>8</sub>O<sub>7</sub> chelating agent. During cyclic voltammetry experiences, the potential interval where the electrodeposition of Cu<sub>2</sub>O 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<sub>2</sub>O 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 Cu<sub>2</sub>O thin films obtained at high potential are more homogenous in appearance and present lower crystallites size. X-ray

**Keywords :** Cu<sub>2</sub>O, electrodeposition, Mott–Schottky, optical properties, Thin films, XRD