The Effect of Electrolyte Temperature on the Electrodeposition of Cuprous Oxide Films

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Cuprous oxide (Cu₂O) thin films were deposited on indium tin oxide (ITO) coated glass by electrochemical deposition at different electrolyte temperature. The electrodeposition process was found to be a reductive irreversible process with a major phase, Cu₂O, and appreciable amount of CuO. With the increasing temperature, the microstructure varied from fine grains, amorphous-like, to coarse pyramids, well-crystallized, which were identified as the texture development transforming from (200) to (111). Not only was the increasing temperature of electrodeposition found to induce the optical red-shift of band gap from 2.19 to 2.68 eV but it inhibited electrical transmittance with resistivity from 11.28 to 0.24 Ω-cm.

Keywords: electrodeposition, irreversible, phase transformation, band gap, and resistivity

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