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Photocurrent enhancement of electrodeposited Cl doped cuprous oxide thin films on Ti substrates by annealing

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Cl-doped Cu₂O films were electrodeposited potentiostatically on Ti substrates. The conductivity of the films could be controlled by choosing the appropriate experimental conditions of which the Cl concentration, pH of the bath and the deposition potential were especially important. Cyclic Voltammetry (CV) was used to determine the optimal deposition potentials. Photocurrent measurements confirmed that the conductivity of these Cl doped Cu₂O films was n-type. The optimum conditions were observed for deposited n-type, highly photo response, thick, Cl-dope Cu₂O films with 0.05 M CuCl₂ concentration, bath pH 9.5, -275 mV deposition potential Vs SCE and 60 °C bath temperature. The photocurrent enhancement of as-deposited and annealed Cl doped Cu₂O films as photocathodes in photoelectrochemical (PEC) solar cells were studied. The results indicate that, under optimum conditions, the annealing of Cu₂O samples improves the output photocurrent performance compared to that of the unannealed samples by about 700%.

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