

Physical properties of cuprous oxide thin films grown on n-Si substrate by sol-gel spin coating

Abstract

Cu₂O films were grown on n-Si substrates via the sol-gel spin-coating method. The films were annealed under 5% H₂ + 95% N₂ atmosphere at 350°C, 450°C and 550°C. Diffractogram obtained by the grazing angle x-ray diffractometry showed that the crystallinity of the films increased with increasing annealing temperature. Scanning electron microscopy micrographs revealed that the Cu₂O films contain grains of irregular size indicating that the film growth followed the Volmer-Weber growth mode. The micrographs showed the size evolved from irregular shapes with average size of 100 nm at 350°C into rectangular shapes with average size of 200 nm at 550°C. Optical reflectance for 450°C and 550°C film increased gradually at wavelength 480 nm. Higher reflectance for the 450 °C film might be due to better coverage of the film. It also showed that optical absorption occurred at wavelength below 480 nm.

Keywords — Crystallinity, cuprous oxide, sol-gel, Volmer-Weber growth