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