CHARACTERIZATION OF CUPROUS OXIDE THIN FILMS ON n-Si SUBSTRATE PREPARED BY SOL-GEL SPIN COATING

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ABSTRACT
Cuprous oxide films were successfully grown onto a n-Si substrate with (100) orientation via sol-gel spin-coating method at room temperature in air followed by annealing in 5% H2 + 95% N2 atmosphere. The annealed temperatures were varied between 350-550 °C. The crystallinity and morphology of the oxide thin films were studied by grazing angle X-ray diffractometer (GAXRD) and scanning electron microscopy (SEM), respectively. GAXRD indicated that the crystallinity of the films increased with higher annealing temperature. SEM images revealed that the Cu2O films form irregular grain size instead of smooth film which indicated the film growth followed Volmer-Weber growth mode. The size and shape of cuprous oxide grains also changed with temperature. Irregular shape with average size of 100 nm can be seen at annealed temperature 350 °C which evolved into rectangular shape with average size of 200 nm at annealed temperature 550 °C. Optical reflectance revealed similar pattern for each film at wavelengths below 480 nm. It is believed that the absorption is due to energy gap of Cu2O. The maximum reflectance for each film also varies which may be due to different coverage and size of the grains.


REFERENCES