

Effect of annealing atmosphere on the morphology of copper oxide thin films deposited on TiO₂ substrates prepared by sol-gel process

Abstract

Copper oxide films were prepared via sol-gel like spin coating starting from methanolic solutions of cupric chloride onto the TiO₂ substrates. Films were obtained by spin coating under room conditions (temperature, 25-30 °C) and were subsequently annealed at different temperatures (200-400 °C) in oxidizing (air) and inert (N₂) atmospheres. X-ray diffraction (XRD) patterns showed crystalline phases, which were observed as a function of the annealing conditions. The film composition resulted single or multi-phasic depending on both temperature and atmosphere. The grain size of film was measured using scanning electron microscopy (SEM) and the surface roughness of thin films was characterized by atomic force microscopy (AFM). The grain size of which was annealed in air at 300 °C was 30.39 nm with the surface roughness of 96.16 nm. The effects of annealing atmosphere on the structure and morphology of copper oxide thin films are reported.

Keywords; Annealing, Copper Oxide, Sol-Gel, Substrates, Thin Film, TiO₂