

Structural Studies of ZnO: Al Thin Film Synthesized by Low Cost Spray Pyrolysis for Optoelectronic Applications

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Abstract

Undoped and Aluminum-doped ZnO thin films are prepared by ultrasonic spray pyrolysis at 400 °C on glass substrates were investigated. The dopant solution is taken at the atomic percentage of 1 to 5. By using X-Ray Diffraction (XRD) and Atomic Force Microscopy (AFM), the crystallographic properties and surface morphology of the films were characterized. The X-ray diffraction results show that the pure ZnO thin films have polycrystalline nature and possess a typical hexagonal wurtzite structure. Compared to pure ZnO thin film, the grain size in the Al-doped thin film is increased. They are well crystallized and the grain size is ($e = 0.13 \mu\text{m}$) for Al-doped ZnO and ($e = 0.1 \mu\text{m}$) for undoped ZnO. Compared to the previous reports, grain size of the ZnO thin film also increases with the increasing annealing temperature.

Keywords: Optoelectronic Devices, Spray Pyrolysis, Thin Film