

S1-2.7

Electrical Properties of Thermal Annealed in Vacuum Spray Deposited Al-Doped ZnO Thin Films

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Al-doped ZnO thin films have been prepared by spray pyrolysis, which facilitates the incorporation of a higher percentage of dopant atoms. The vacuum thermally annealed at 420°C temperature thin films have been characterized by X-ray diffraction (XRD), optical spectroscopy. Electrical conductivity and the Hall effect are investigated in the temperature interval (77-300) K. X-ray analysis results reveal that all the films are polycrystalline with a hexagonal wurtzite structure with a preferential orientation according to the direction (002) plane. Different characters of the temperature dependence of conductivity are observed in the Al-doped ZnO films vacuum thermally annealed at 420°C temperature. In all cases, the conductivity, mobility carriers and carriers' concentration of ZnO thin films obtained under Ar are higher than under O₂ atmosphere, unless they are not doped.