

Preparation and Characterization of Sol-Gel Dip Coated Al: ZnO (AZO) Thin Film for Opto-electronic Application

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Aluminum doped zinc oxide (AZO) thin film was prepared by sol-gel dip coating method from methanol and monoethanolamine respectively, used as solvent and stabilizer agent. From the XRD study, it was confirmed that the aluminum was incorporated into the ZnO lattice. The prepared film have polycrystalline in nature and the film exhibit hexagonal wurzite structure with (002) direction. SEM and AFM studies showed well defined smooth and uniformed wrinkle shaped grains distributed regularly on to the entire glass substrate without any pinholes and cracks. From the optical study, the observed highest transmittance was about 82% in the visible range and the band gap is 3.15 eV. Room temperature PL spectra exhibited a strong UV emission peak located at 390 nm for the deposited film. The electrical properties of the AZO thin film was studied by Hall-Effect measurement and found that it has *n*-type conductivity with low resistivity (ρ) of about $9.06 \cdot 10^{-3} \Omega\text{cm}$.