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The study on the synthesis and deposition parameters of metal doped-ZnO thin films for applications in inverted organic solar cells

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This study focuses on aluminum doped-zinc oxide (AZO) nanoparticles which have been synthesized using the sol-gel method at room temperature. The gel was a resultant of a zinc acetate dehydrate precursor, absolute ethanol as a solvent, dimethylsulfoxide (DMSO) as a stabilizing ligand and tetramethylammonium hydroxide (TMAH, 25WT%) to initiate ZnO nanoparticle formation. The zinc acetate dehydrate mass was varied from 1g to 6g and the dopant concentration was varied from 1 to 5 mol%. The products were spin coated onto glass substrates at different spin rotations, from 500rpm to 2500rpm. AZO thin films, showed crystallite size in the range of 2 to 5nm with spherical shape and $2\theta = 34.34^\circ$ corresponding to (002) plane of Hexagonal wurtzite structure of ZnO. Spin coating does not produce uniformly deposited films so the defects are expected to change with the deposition speeds. AZO thin films showed higher transparency greater than 80% in the visible region while the electrical resistivity can be expected to be $10^{-3} \Omega\text{cm}$. The AZO thin films were further characterized for elemental composition using energy dispersive spectroscopy (EDS). Film thickness, refractive index and dielectric constants were determined using spectroscopic ellipsometer. Hall measurement system was used to measure the sheet resistance, carrier concentration and mobility of AZO thin films.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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