CHARACTERIZATION OF SOL GEL SYNTHESIZED UNDOPED AND COPPER (II)-DOPED ZINC OXIDE THIN FILMS

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Thin films of undoped and copper (II) -doped ZnO have been synthesized on amorphous and conducting glass substrates using spin coating technique. The molar ratio of Cu^{2+} to Zn^{2+} in the initial mixture was varied up to 5%. Speed of spin coating system and initial precursor solution were varied to optimize the properties of samples. The morphological and optical properties of the thin films as a function of Cu^{2+} content have been investigated using atomic force microscopy and UV-Visible spectrophotometry, respectively. Film thickness varies in a random manner depending on the amount of ZnO or copper (II) - doped ZnO spread on the substrate. The calculated energy gap values of doped ZnO film samples decrease with the molar percentage of Cu^{2+} in ZnO.

The photocell was prepared using doped or undoped ZnO film, platinum electrode and KI/I_2 liquid electrolyte. (I–V) characteristics of the cells were measured under the dark condition and illumination of 1000 mW cm^{-2} (AM 1.5) simulated sunlight. I-V curves of the thin films indicate that photo current increases with the doping molar percentage of Cu^{2+} by implying that the efficiency in electron-hole formation increases with the decrease of band gap. However, a significant efficiency of 0.13% could be obtained only in 5% of Cu^{2+} doping while other doping molar percentages result an average efficiency of 0.07%. All results indicated significant influence on optical and electrical properties of ZnO under trace amounts of copper doping.