

Characterization of Al doped ZnO nanopowders by hydrothermal method

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Wide bandgap (>3 eV) transparent oxides have been extensively used for photovoltaic devices and optical–electrical devices. Among these materials, Zinc Oxide (ZnO) is a promising candidate for novel device applications, such as transparent electronics and flexible displays. ZnO exhibits non-toxicity, high transparency, a wide range of conductivity from metallic to insulating, and high crystallinity. Its unique electrical and optical properties have made it popular in, laser diodes, transistors, transparent electronics and as a window material for display and dye sensitize solar cells. ZnO nanostructures are obtained by different methods. Among, the hydrothermal synthesis method is quite advantageous in that it does not require a vacuum system, operates at relatively low temperatures, and is cost-effective compared to other methods. This method has also been successfully used to prepare nanoscale ZnO:Al and other luminescent materials. In this study, the optimization studies on the structural, morphological and electrical properties of undoped and Al doped ZnO nanopowders by hydrothermal method were performed. The structural, morphological and optical properties of these nanopowders were investigated using X-ray diffractometer, scanning electron microscopy, and reflectance measurements. The optical band values of Al doped ZnO nanopowders were found via reflectance measurements using Kubelka-Munk function.