

Abstract

This thesis reports effect of doping on structural, optical and morphological properties of ZnO nanoparticles. Pure, doped (Co or Ni) and co-doped (Co & Ni) ZnO were prepared by sol-gel method. The prepared samples were explored by X-Ray Diffraction (XRD), Scanning Electron Spectroscopy (SEM), Energy Dispersive X-ray Spectroscopy (EDX), Fourier Transmission Infra-red (FTIR) and Ultraviolet-Visible spectroscopy (UV-Vis). XRD data revealed the single phase, hexagonal wurtzite structure for pure and Cobalt doped samples along with a secondary phase namely NiO for Ni doped samples. The crystallite size was compared using Scherer formula and Williamson-Hall plots. SEM revealed remarkable changes in morphology as the concentration of dopant changes. EDX analysis indicated that the chemical composition of Zn, Co, Ni and O was relatively in good agreement with the starting stoichiometry. FTIR spectra represent the vibration bands of Zn-O from $885-686\text{cm}^{-1}$. UV-Vis spectroscopy revealed the absorption in the visible region with a band gap of pure ZnO of 3.25eV varies significantly from 2.85eV to 3.50eV as a function of doping concentration.