Synthesis and characterization of Co doped ZnO Nanostructures

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**Abstract**. We have synthesized undoped and Co-doped ZnO by co-precipitation method resulting in ZnO (Zn*1-x*Li*x*O; *x*=0, 0.03, 0.05, 0.08) nanostructures (NSs). To examine the structural and optical properties, oxygen vacancies and local disorder, X-ray diffraction (XRD), scanning electron microscopy (SEM), diffuse reflectance spectroscopy (DRS), photoluminescence spectroscopy (PL) techniques were utilized. XRD confirms wurtzite structure for both undoped and Co-doped ZnO NSs samples. The undoped ZnO NSs show granular structures, while Co doped ZnO NSs showed flake-like structures as elucidated by SEM. The flake dimension increases with increasing the Co content in the ZnO NSs, whereas the thickness of the flakes seems to be independent of the Li concentration. A reduction in particle size with Co doping was observed deduced from XRD. A blue shift in the optical band gap was obtained for Li-doped ZnO NSs indicating and increase in the band gap decreases with the incorporation of Co in ZnO NSs. The oxygen vacancies in Co-doped ZnO NSs were observed by PL spectra. The prepared ZnO NSs can be utilized in structures-based sensors and solar cells for sensor devices and also have possible applications in the light emitting devices.

References: Parasmani Rajput, Manvendra Kumar, Rucha S. Joshi et al., Structural, optical and vacancies investigations of Li-doped ZnO. J Nanopart Res 24, 161 (2022)