

## EFFECT OF NI-DOPING ON STRUCTURAL AND MAGNETIC PROPERTIES OF ZnO NANOPARTICLES

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### ABSTRACT

In the present study,  $Zn_{1-x}Ni_xO$  ( $x=0.01, 0.03, 0.05$  and  $0.07$ ) diluted magnetic semiconductor (DMS) nanoparticles have been synthesized using modified sol-gel method. The structural and magnetic properties of the Ni-doped ZnO samples annealed at  $600^\circ\text{C}$  have been characterized by X-ray diffractometer (XRD), Scanning electron microscope (SEM) and Vibrating sample magnetometer (VSM). The average crystalline size was calculated using Debye-Scherrer's formula. The particle size was found to be in the range of 36 to 42 nm. X-ray diffraction patterns revealed that the crystal structure of samples corresponds to hexagonal wurtzite ZnO phase along with an additional diffraction peaks linked to NiO and metallic Ni. SEM micro-image confirmed the presence of spherical  $Zn_{1-x}Ni_xO$  nanoparticles. VSM measurement shows the hysteresis loop at room temperature which confirms the ferromagnetic property of the samples. The origin of ferromagnetism in the samples could be due to the exchange interaction between  $Ni^{2+}$  ions.

**KEYWORDS:**  $Zn_{1-x}Ni_xO$  Nanoparticles, Ni-Doping, Diluted Magnetic Semiconductor, Magnetic Properties, Spintronics