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**Influence of Al dopant on structural and magnetic properties of ZnO nanoparticles prepared by simple solution combustion method**

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**Abstract**

Al doped ZnO nanoparticles ( $Zn_{1-x}Al_xO$  where  $x=0, 0.005, 0.01, 0.02, 0.03$ ) were prepared by simple solution combustion method using stoichiometric composition of metal nitrates (Zinc nitrate and aluminum nitrate) as oxidizers and glycine as a fuel. The prepared samples were characterized by UV-Visible spectrophotometer, powder X-ray diffractometer (XRD), Scanning electron microscope (SEM) and energy dispersive analysis of X-rays (EDAX). UV-Visible spectral graphs of Al doped ZnO nanoparticles shows that the wavelength corresponding to maximum absorbance ( $\lambda_m$ ) for Al doped ZnO samples is shifted to higher wavelengths compared to the undoped ZnO. This is attributed to the presence of allowed states near the conduction band in the energy band gap of Al doped ZnO samples. XRD patterns of the prepared samples can be indexed to wurtzite structure (JCPDS 89-0510) and no addition peaks were present showing the formation of single phase  $Zn_{1-x}Al_xO$  nanoparticles. It was observed that, the broadening of the diffraction peaks increases with increase of Al doping, which confirms the decrease of the crystallinity of the material. The average particle size of the samples was calculated by Scherrer's formula and found to be in the range of 14-29 nm. SEM images shows the formation spherical shape particles with high porosity and composition analysis of the prepared samples was confirmed by EDAX. The magnetic properties of the  $Zn_{1-x}Al_xO$  ( $x = 0, 0.005, 0.01, 0.02, 0.03$ ) samples were measured using vibrating sample magnetometer (VSM) upto 10 kOe at room temperature

**Keywords:**

Al doped ZnO nanoparticles, Structural characterization, Magnetic properties.

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