Influence of Mg incorporation on structural, optical and thermal properties of ZnO nanoparticles synthesized by auto-combustion route

Mohd Meenhaz Ansari^{1*}, Akhtar Saleem Ansari¹, S Asad Ali¹ and SSZ Ashraf²

¹Centre of Excellence in Nanomaterials, Department of Applied Physics
 Zakir Hussain College of Engineering and Technology, Aligarh Muslim University, Aligarh-202002,
 India

²Department of Physics, Faculty of Science, AMU, Aligarh-202002, India

*Email: meenhazphysics@gmail.com

Nanoparticles of pure and Mg doped ZnO (Mg-ZnO) with compositional formula $Zn_{1-x}Mg_xO$ ($x=0, 1, 5$ and 10%) were synthesized using auto combustion route (Table 1) [1-9]. To investigate the structural properties, XRD pattern of all the samples were recorded (Figure 1) and calculations were made for crystal parameters. SEM and TEM images show the formation of spherical ZnO nanoparticles, and change of the morphology of the nanoparticles with the concentration of the magnesium. In order to investigate the doping effect of Mg on optical properties of ZnO nanoparticles, the UV-VIS absorption spectra and FTIR spectra (Figure 2) were obtained and the band gap of the samples calculated. To determine the crystalline conditions, DSC and TGA of Mg doped ZnO nanoparticles were carried out. The plot shows the weight loss of the nanoparticles due to evaporation of water or impurity.

References

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Figure 1: XRD spectra of Mg doped ZnO NPs

Table 1 : Representation of enhancement of energy band gap of Mg doped ZnO NPs with increasing Mg content

S.No.	Doping %	Energy band gap (eV)
1.	0%	3.18
2.	1%	3.26
3.	5%	3.31
4.	10%	3.36

Figure 2: FTIR spectra of Mg doped ZnO NPs