

Magnesium ferrite/ polyvinyl alcohol nanocomposites: Fabrication and characterization

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Terbium doped magnesium spinel ferrites ($Mg_{1-x}Tb_xFe_2O_4$) and PVA/ $Mg_{1-x}Tb_xFe_2O_4$ composites having composition $x=0.12, 0.14, 0.16, 0.18$ were synthesized using micro-emulsion method and *in-situ* polymerization technique respectively. The structural properties were demonstrated using X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR). XRD analysis

confirmed the fabrication of small concentration of Terbium into the spinel lattice whereas FTIR exposed the developed interactions between ferrite nanoparticles with polyvinyl alcohol matrix. The peaks obtained in both the above characterization techniques quite matched with those as reported in the literature and confirmed the formation of resulting nanocomposites.

The dielectric and resistivity analyses were performed by determining dielectric parameters and current-voltage measurements. The values of dielectric constant, dielectric loss and $\tan \delta$ were inversely proportional to the frequency under an applied electric field at room temperature but become constant at higher frequency

values. The lower values of the dielectric constant of terbium incorporated magnesium ferrite polymer composites ($MgFe_2O_4/PVA$) are because of a hindrance in electron exchange mechanism created by lockup among iron and terbium ions. The resistivity values of all the composites were found from $2.5 \times 10^9 \Omega \text{cm}$ to $18.8 \times 10^9 \Omega \text{cm}$ which showed a non-linear behavior

Biography

Gulfam Nasar currently works at BUIITEMS, Quetta Pakistan as Assistant Professor. His research interests are mainly Material Chemistry, Polymer Chemistry and Nanotechnology. His current project is on 'polymer-ferrites nanocomposites'. He is a member of editorial boards of a number of research journals. He has presented his work in many international conferences around the world. He has published more than 20 publications in internationally reputed journals.

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