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Magnesium ferrite/polyvinyl alcohol (PVA) 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 infra-red 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 applied electric field at room temperature but become constant at higher frequency values. The lower values of dielectric constant of terbium incorporated magnesium ferrite polymer composites ($MgFe_2O_4/PVA$) are because of hindrance in electron exchange mechanism created by lockup among iron and terbium ions. The resistivity values of all the composites were found from $2.5 \times 10^9 \Omega cm$ to $18.8 \times 10^9 \Omega cm$ 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'. Dr. Gulfam Nasar 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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