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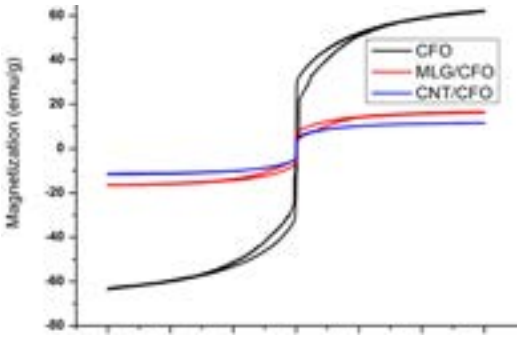
Himanshu Verma
Nicholls State University, USA

An overview of the structure and magnetism of inverse spinel ferrite with hexagonal carbonic materials prepared by chemical synthesis

Graphene and carbon nantoubes (CNTs) are allotropes of carbon. Graphene generally has single atom thickness and 2-d sheet hexagonal shape like structure. By wrapping these hexagonal sheets with certain cut, geometry of carbon nanotubes are produced. With zero band gap and high carrier mobility graphene has emerged as a suitable candidate for applications in device engineering. The hybrid structures of functionalized CNTs have shown their potential in future nano-elctronic devices. Here we report the structural and magnetic properties of graphene and CNTs mixed with nanoparticles of inverse spinel ferrite prepared by a 1-step ultra-sonication method. The nanosize inverse spinel ferrites show ferrimagnetic behavior which has the potential to induce ferromagnetism in these diamagnetic carbonic nanoparticles. The nanoparticles of inverse spinel ferrites show moderate magnetization and high coercivity which is not found in bulk samples of spinel ferrites. X-Ray diffraction spectroscopy (XRD), Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Transmission Electron Microscopy (TEM), Scanning Tunneling Electron Microcopy (STEM), Raman spectroscopy were used to investigate structural properties, whereas Magnetic Force Microscopy (MFM) and Vibrating Sample Magnetometer (VSM) were used to explore magnetic properties. Details of synthesis, results, structural and magnetic analysis will be presented.



Biography

Himanshu Verma received his MS in Physics from Michigan Tech and PhD in Applied Physics from University of South Florida. He underwent post-doctoral training at Morgan State University in Baltimore working on a joint collaboration project funded by US Army Research Lab. He has gained expertise over the years in experimental condensed matter, in various deposition and characterization methods. His recent research has been focused on magnetic properties of transition metal oxides and their nanocomposites. He is currently an Assistant Professor of Physics at Nicholls State University in Louisiana.

Himanshu.Verma@nicholls.edu