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Synthesis of core-shell iron nanoparticles via a new (novel) approach RAKESH P. CHAUDHARY, ALI R. KOYMEN, University of Texas at Arlington — Carbon-encapsulated iron (Fe) nanoparticles were synthesized by a newly developed method in toluene. Transmission Electron Microscopy (TEM) and High Resolution Transmission Electron Microscopy (HRTEM) of the as prepared sample reveal that core-shell nanostructures have been formed with Fe as core and graphitic carbon as shell. Fe nanoparticles with diameter 11nm to 102 nm are encapsulated by 6–8 nm thick graphitic carbon layers. There was no iron carbide formation observed between the Fe core and the graphitic shell. The Fe nanoparticles have body centered cubic (bcc) crystal structure. The magnetic hysteresis loop of the as synthesized powder at room temperature showed a saturation magnetization of 9 Am^2 kg^{-1}. After thermal treatment crystalline order of the samples improved and hence saturation magnetization increased to 24 Am^2kg^{-1}. We foresee that the carbon-encapsulated Fe nanoparticles are biologically friendly and could have potential applications in Magnetic Resonance Imaging (MRI) and Photothermal cancer therapy.

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