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Unconventional top down synthesis of FeNi core and C shell magnetic nanoparticles RAKESH CHAUDHARY, ALI R. KOYMEN, Department of Physics, The University of Texas at Arlington — Carbon encapsulated FeNi nanoparticles were prepared by a top down approach using plasma in organic solvents. FeNi core-Carbon shell morphology of nanoparticles have been observed using transmission electron microscopy (TEM). FeNi nanoparticles prepared in toluene are of diameter 3-820 nm and encapsulated by a 3-60 nm shell. FeNi nanoparticles prepared in ethanol are of diameter 15-820 nm and encapsulated by a 4-34 nm shell. Using x-ray diffraction (XRD) the core crystal structure of the nanoparticles showed an increase in lattice constant from a=3.575 Å to a=3.6 Å in both cases. The FeNi nanoparticles have face centered cubic (FCC) crystal structure. No oxide formation in these core-shell nanoparticles was observed using energy dispersive x-ray spectroscopy (EDX) and XRD. Synthesized nanoparticles using toluene and ethanol showed a saturation magnetization of ∼1 emu/g and ∼3 emu/g and moderate coercivity ∼40 Oe and ∼10 Oe respectively at room temperature. We explore the uncommon and new, top down synthesis route of bimetallic nanoparticles of FeNi phase using plasma. These carbon-encapsulated FeNi nanoparticles could have potential applications in biomedicine, especially hyperthermia.

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