

Abstract Submitted  
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**Polymer assisted synthesis of FeNi nanoparticles** S.K. KARNA, S.R. MISHRA, The University of Memphis, Memphis, TN, I. DUBENKO, N. ALI, Southern Illinois University, Carbondale, IL, E. GUNAPALA, K. MARASINGHE, University of North Dakota, Grandforks, ND — FeNi nanoparticles (NP) in the size range of 50 to 250 nm were synthesized via wet chemical method. The precursor, sulfate salts of iron and nickel were reduced in alkaline media and in the presence of either polymers PEG (200-20,000 MW) or PVP(10,000 to 55,000 MW). The synthesis process was studied to understand the role of polymers in the growth of NP. TEM and XRD studies show formation of highly crystalline and well dispersed FeNi NP in polymer matrix. A decrease in particle size with an increase in PVP MW and increase in particle size with increase in PEG MW was observed. Furthermore, increase in PVP concentration leads to increase in particle size while increase in PEG concentration did not affect the particle size. Low temperature ZFC magnetization studied show decrease in saturation magnetization value with the increase in polymer MW. It is concluded that the polymer mediated growth of FeNi NP involved 1) the formation of coordinative bonds between polymer and metal ions, 2) polymer-promoted nucleation, which produce small FeNi nanoparticles, and 3) steric shielding of the FeNi nanoparticles surfaces through chemical bonding to polymer which inhibited particle-particle contact and, thus the agglomeration of NP.

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