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Chemical Synthesis and Physical Characterization of Hexagonal Ni Nanoparticles JOHN KLODNICKI, BRIAN KELLY, KARL UNRUH, University of Delaware — Elemental Ni nanoparticles with a hexagonal close packed (HCP) crystal structure have been prepared by the reduction of nickel acetate in diethylene glycol (DEG) without the addition of any other reactants. No metallic Ni was formed at a reaction temperature of 195 °C. At a reaction temperature of 210 °C a two phase mixture of face centered cubic (FCC) and HCP Ni was obtained. With increasing temperature, the ratio of HCP to FCC Ni increased until at 245 °CC (i.e. the boiling temperature of DEG) the reaction product was entirely HCP. The structural and magnetic properties of the HCP Ni were characterized by scanning electron microscopy (SEM), x-ray diffraction (XRD), and vibrating sample magnetometry (VSM) measurements. The SEM measurements revealed the presence of approximately spherical particles about 500 nm in diameter, as well as a number of rod-like structures. Based on a Rietveld-type analysis of the HCP Ni, best fit lattice parameters of a=0.26473(6) and c=0.43348(10) nm were obtained. Room temperature VSM measurements revealed a small magnetic moment of about 2 emu/g.

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