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Crystallization Behavior of Chemically Prepared Nanoparticles of Amorphous Fe-B* ERIK PEARSON, ADRIAN GOREA, THOMAS EKIERT, KARL UNRUH, University of Delaware — The crystallization behavior of amorphous Fe-B nanoparticles prepared by reducing an aqueous solution of Fe^{+2} ions with $NaBH_4$ has been studied by differential scanning calorimetry (DSC), vibrating sample magnetometry (VSM), and x-ray diffraction (XRD) measurements. At a heating rate of 10 $^\circ$C/min the DSC measurements show a sharp and well defined exothermic peak at a temperature of about 475 $^\circ$C and a Kissinger analysis of the shift in the position of this peak as a function of the heating rate yields an activation energy of about 3.6 eV/at. The VSM measurements also exhibit a sharp increase in the magnetization at a temperature 475 $^\circ$C (at a heating rate of 10 $^\circ$C/min). X-ray diffraction measurements on samples heated to temperatures slightly above 475 $^\circ$C verify that the observed DSC and VSM signals correspond to the transformation from the as-prepared amorphous structure to a crystalline structure. * This work has been supported by AFRL DARPA METAMATERIALS contract no. F33615-01-2-2166, ARO DEPSCOR grant no. W911NF-04-1-0264, and the Undergraduate Research Program at the University of Delaware.

Karl Unruh
University of Delaware

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