Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Preparation and Characterization of Chemically Prepared Fe-Ag Nanocomposites THOMAS EKIERT, GERALD POIRIER, KARL UNRUH, University of Delaware — Fe-Ag nanocomposites have been prepared by a transmetallation reaction in which metallic Fe nanoparticles are used to reduce an aqueous solution of Ag^+ ions. As the reaction proceeds, the Fe nanoparticles fragment into smaller particles and are reduced in size and metallic Ag nanoparticles are formed. The evolution in the structure and composition of the reaction products has been studied as a function of the time and the solution temperature by scanning and transmission electron microscopy, energy dispersive x-ray spectroscopy, and x-ray diffraction measurements. These measurements indicate that nearly all of the available Ag^+ ions are reduced to metallic Ag within 5 minutes at solution temperatures between 5 $^\circ$C and 35 $^\circ$C. However, at higher solution temperatures the fragments of the Fe nanoparticles very quickly oxidize if the reaction is not carried out under anaerobic conditions. The magnetic properties of the Fe-Ag nanocomposites have also been studied by vibrating sample magnetometry. These measurements show a corresponding decrease in the saturation moment of those Fe-Ag nanocomposites not prepared under anaerobic conditions, with the majority of the change occurring within the first five minutes of exposure to the Ag^+ solution.

Karl Unruh
University of Delaware

Date submitted: 27 Nov 2007 Electronic form version 1.4