Abstract Submitted
for the 4CF12 Meeting of
The American Physical Society

Characterization of NiPt, FePt, and NiFePt nanoparticles GREG SUTHERLAND, DARREN WOOD, AMY JACKSON, Brigham Young University, ANDREW WARREN, KEVIN COFFEY, University of Central Florida, RICHARD VANFLEET, Brigham Young University — Many metal alloys can form in chemically ordered structures, often resulting in significant changes in properties. The ordered structures are preferred at low temperatures and will go through an order-disorder phase transition at a critical temperature. The formation and stability of these ordered structures in alloy nanoparticles is not well understood but may give insight into the role size plays in phase transitions. To this end we are studying FePt, NiPt, and FeNiPt alloy nanoparticles. We will focus this presentation on the characterization of these nanoparticles in a Transmission Electron Microscope (TEM) for composition, size, and structure. These nanoparticles are made by co-sputtering the constituents and annealing at different temperatures in various gas mixtures. The nanoparticle samples are prepared for TEM viewing by wedge polishing. We find FePt to be "well behaved" meaning this alloy forms particles, retains the as deposited composition, and chemically orders as expected. However, the order-disorder temperature is too high for the desired further studies. NiPt, which has a lower order-disorder temperature, is not "well behaved" in that the nanoparticle compositions are not good matches to the as deposited conditions and no chemical ordering has been achieved even under conditions that should be sufficient based on bulk processing. We will discuss these results and possible implications.

Greg Sutherland
Brigham Young University

Date submitted: 20 Sep 2012 Electronic form version 1.4