Abstract Submitted for the CAL10 Meeting of The American Physical Society

Synthesis and Analysis of Rare-Earth Nanoparticles Gd and Nd¹ JOSE AMARAL, DULCE ROMERO, CARMIN LIANG, PEI-CHUN HO, Dept. of Physics, California State University, Fresno, SAEED ATTAR, Dept. of Chemistry, California State University, Fresno, DENNIS MARGOSAN, US Dept. of Agriculture, Agriculture Research Service, Parlier, CA — Magnetic nanoparticles can have enchanced magnetization and increase the density in a finite region when compared to their bulk material. This makes them ideal for applications in various fields such as biological markers in medical MRI technology and magnetic refrigeration. At Fresno State we are synthesizing and characterizing rare-earth nanoparticles Gd and Nd by the inverse micelle method. Starting by using DDAB as a surfactant, GdCl₃ and NdCl were added to form inverse micelle solutions. A liquid-liquid extraction process was used to extract the magnetic clusters. The energy-dispersive X-ray (EDX) results show that Gd clusters less than 1 micrometer were produced. Images from the scanning electron microscope (SEM) and light microscope show spherical Gd clusters with excess DDAB and other by-products, indicating a successful reduction of GdCl₃. Future research will be geared towards substituting hexane for toluene and methanol for water to reduce oxygen amounts and to form Nd nanoparticles.

¹This research is supported by the Fresno State CSM Start-up Fund.

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Date submitted: 20 Oct 2010 Electronic form version 1.4