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Synthesis and Characterization of Rare Earth Nanoparticles in a non-aqueous environment[1] E.I. PAREDES AULESTIA, R.H. FUKUDA, M.M. CASTRO DE LA TORRE, P.-C. HO, Physics, California State University Fresno, S. ATTAR, M. GOLDEN, Chemistry, California State University Fresno, D. MARGOSAN, USDA-ARS — Magnetic nanoparticles have several potential applications, such as in biomedicine and for magnetic information storage due to their reduced size and magnetization properties. We synthesize gadolinium and neodymium nanoparticles by applying the reverse micelle method. This method consists of using a surfactant with a large nonpolar-solvent-to-polar-solvent ratio to form spherical cages around a reactant. Most studies related to the reverse micelle method use water as the polar solvent, but the use of water is not suitable for our project since both Gd and Nd are highly reactive in water. Instead, we employ methanol as our polar solvent. Hexane and heptane are tested as nonpolar solvents. DDAB and AOT are used as surfactant molecules. A solution containing a reducing agent is then added to produce the desired Nd and Gd nanoparticles. Our samples are analyzed using light microscopy, SEM (Scanning Electron Microscopy) and EDX (Energy Dispersive X-ray). We found heptane, methanol and AOT produce Neodymium particles with diameters less than 5 micrometers. Heptane, methanol and DDAB yield Gadolinium particles with diameters less than 1 micrometer. The synthesis procedure is currently being revised, in order to produce cleaner samples and particles of smaller size.

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