

Abstract Submitted  
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**Preparation and Characterization of Magnetite ( $\text{Fe}_3\text{O}_4$ ) Nanoparticles** MATEA TREVINO, KARINE CHESNEL, BYU Physics, BETSY OLSEN, JARED HANCOCK, ROGER HARRISON, BYU Chemistry, JEFFREY FARRER, BYU Physics — Magnetite ( $\text{Fe}_3\text{O}_4$ ) nanoparticles exhibit a superparamagnetic behavior when small. Our goal is to fabricate such particles and characterize their structural and magnetic properties as function of particle size and synthesis route. I will show the different fabrication methods we have utilized: one inorganic salt mixing method, an inorganic solution method, and lastly an organic solution method. The last approach should allow us to achieve monolayers of nanoparticles. I will present X-ray diffraction (XRD) results as well as Vibrating Sample Magnetometry (VSM) results, including Field Cooling (FC) versus Zero Field Cooling (ZFC) measurements to find the blocking temperature, or when the magnetic moments are frozen; to complement the magnetometry measurements. We will also include images of nanoparticles deposited on a wafer, recorded by Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM).

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