Abstract Submitted
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Magnetic order and fluctuation of Fe3O4 nanoparticles YANPING CAI, KARINE CHESNEL, MATEA TREVINO, ANDREW WESTOVER, Department of Physics and Astronomy, Brigham Young University, ROGER HARRISON, Department of Chemistry and Biochemistry, Brigham Young University, ALEXANDER REID, ANDREAS SCHERZ, SSRL, SLAC — Magnetite (Fe_3O_4) nanoparticles tend to self-assemble when they are deposited on a substrate. Our goal is to understand the magnetic order and magnetic interactions between the particles, when they are self-assembled. After bulk structural and magnetic characterizations, we have been studying our Fe_3O_4 nanoparticles by using X-ray Magnetic Circular Dichroism (XMCD) as well as X-ray Resonant Magnetic Scattering (XRMS) at synchrotron radiation facilities. Both techniques utilize the interaction between magnetic spins in the material and polarized light. The XMCD can identify the L_2 and L_3 edges and gives information about the average magnetization in the material. We set our X-ray energy at the L3 edge and collect the XRMS scattering pattern. The XRMS scattering pattern shows information about the magnetic order and magnetic fluctuations in the nanoparticles assembly. By studying the profile of the XRMS patterns, we try to extract the magnetic signal from the charge signal, and learn about the magnetic order between the nanoparticles. We also utilize the coherence of the X-ray light and apply a correlation spectroscopy technique to learn about magnetic fluctuations.

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