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Synthesis and Physical Properties of Sulfur Doped Iron Nanoparticles M. TARSEM SINGH, H. HAN, Y. QIANG, Physics Department, University of Idaho, Moscow, Idaho 83844, D. BAER, J. AMONETTE, P. NACHIMUTHU, C. WANG, M. ENGEHARD, PNNL, Richland, WA 99352, NANOPHYSICS LAB TEAM, PACIFIC NORTHWEST NATIONAL LABORATORY COLLABORATION — We have studied the physical properties of iron magnetic nanoparticles (MNPs) and sulfur doped iron MNPs. Both types of MNPs were synthesized under the same conditions using magnetron sputtering gas-aggregation nanocluster source. For sulfur doped particles, 5 sccm of hydrogen sulfide gas was used in the aggregation chamber where it reacts with iron and forms sulfur doped iron particles. XPS results show the presence of sulfate and sulfide peak. TEM images indicate that iron sulfide particles are bigger in size than pure iron particles. This result is consistent with the magnetization measurement as coercive field is higher for sulfur doped particles. Our aim is to study the physical behavior of sulfur doped iron particles and find out its exact crystal structure. This type of MNPs is mainly used to study the effects of sulfur on the corrosion and reactivity of iron nanoparticles in water remediation.

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