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Application of core shell iron-iron oxide and pure iron oxide magnetic nanoparticles in nuclear waste separation technology[1] M. KAUR T. SINGH, H. HAN, Y. QIANG, Physics Department, University of Idaho, Moscow, Idaho 83844, A. JOHNSON, A. PASZCZYNSKI, Environmental Biotechnology Institute, University of Idaho, Moscow, ID 83844, NANOPHYSICS LAB TEAM, FOOD RESEARCH CENTER TEAM — Based on a review of recent development of nuclear waste separation technology, we have developed a nanomagnetic separation method that uses specific actinide chelators conjugated with magnetic nanoparticles (MNPs). This separation method has two main advantages: 1) high efficiency in separating actinides and less amount of secondary waste generation comparing with conventional processes; and 2) the resulting complex of MNP- chelators-actinide is easily manipulated in solutions using magnetic field. The core shell MNPs of size about 15 nm were produced by a cluster source at 200 W. The core shell MNP has high magnetization ($\sim$150 emu/g) compared to commercial iron oxide nanoparticles ($\sim$40 emu/g). Due to high magnetic moment of core shell MNPs, it is easier and faster to separate actinides from nuclear waste solutions. The magnetic properties of all MNPs were studied and characterized using vibrating sample magnetometer before and after coating and attachment of the ligand.

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