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Structural and Magnetic Characterizations of Gold and Silica Doubly Coated γ-Fe_2O_3 Nanoparticles GAN LIANG, Sam Houston State University, KEESEONG PARK, JOHN MARKERT, University of Texas at Austin, ZHI-PING LUO, Texas A&M University, MARK CROFT, Rutgers University, XIAOJUN JI, CHUN LI, University of Texas M.D. Anderson Cancer Center — An extensive structural and magnetic characterization has been carried out on the gold (Au) and silica (SiO_2) doubly coated γ-Fe_2O_3 nanoparticles. The phase of the uncoated and Au/SiO_2 coated nanoparticles were studied by powder x-ray diffraction (XRD) and x-tray absorption spectroscopy (XAS), which show that the iron oxide particles before and after coating have the phase of γ-Fe_2O_3. The transmission electron microscopy (TEM) results indicate that the average sizes of the γ-Fe_2O_3 cores, the Au/SiO_2 coated Fe_2O_3 nanoparticles, and the Au nanoparticles in the Au nanoshells are about 12 nm, 92 nm, and 7 nm, respectively. We have the following observations from the magnetization measurements: (i) both the uncoated and coated nanoparticles are superparamagnetic at room temperature (T), and the Au nanoparticles are diamagnetic at all temperatures, (ii) the blocking temperature is decreased by the Au/SiO_2 double coating, and (iii) the coercivity for both the uncoated and coated nanoparticles decreases almost linearly with $T^{1/2}$ with the latter decreasing faster than the former.

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