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Fe/Au Core-Shell Nanoparticles for Biomedical Applications
AMANDEEP SRA, DIANDRA LESLIE-PELECKY, University of Texas at Dallas — The physical properties of nanoparticles, including size, composition and surface chemistry, greatly influence biological and pharmacological properties and, ultimately, their clinical applications. Superparamagnetic iron oxide nanoparticles are widely used for applications such as MRI contrast agents, drug delivery via magnetic targeting and hyperthermia due to their chemical stability and biocompatibility; however, enhancing the saturation magnetization (M_s) of nanoparticles would produce greater sensitivity. Our design strategy involves a bottom-up wet chemistry approach to the synthesis of Fe nanoparticles. Specific advantages of Fe are the high value of M_s (210 emu/g in bulk) coupled with low toxicity; however, Fe nanoparticles must be protected from oxidation, which causes a dramatic reduction in M_s. To circumvent oxidation, Fe nanoparticles are coated with a Au shell that prevents the oxidation of the magnetic core and also provides the nanoparticles with plasmonic properties for optical stimulation. Ligands of various functionalities can be introduced through the well established Au-thiol surface chemistry for different biomedical applications while maintaining the magnetic functionality of the Fe core. In this presentation, we will discuss the physical, chemical and magnetic properties of our Fe/Au nanoparticles and their resistance to oxidation.

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