

# Seminar

Monday 17 October 2011

11.00 am - Room 531

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***Magnetic nanocomposite materials with tunable magnetic resonance relaxation enhancements***

Stable suspensions of membrane-bound magnetic nanoparticles and nanoparticle assemblies are attracting increasing attention for biomedical applications, notably for improved medical diagnosis and targeted drug delivery. In current applications as magnetic resonance imaging (MRI) contrast agents, iron oxide nanoparticles are used to produce strong magnetic resonance relaxation enhancements, as the large magnetic moments of the particles enhance image contrast in tissues containing the agent. The ability to control particle and cluster size, architecture and surface composition is critical for biomedical application of the nanocomposite materials, as these properties largely determine biodistribution and the extent of contrast enhancement.

This talk will focus on the development and characterization of different classes of iron oxide-based magnetic nanocomposite materials with controlled size and tunable properties; these materials are comprised of nanoparticles and/or nanoparticle assemblies functionalized with fatty acids, polymers, phospholipids, and/or the subsequent addition of gold nanoparticles to form hierarchical core@shell-type assemblies. Fast field-cycling (FFC) NMR analysis has been used to characterize the magnetic nanocomposite suspensions and relaxation rate measurements have been used to evaluate the magnetic resonance relaxation enhancement of the suspensions to assess their potential for MRI contrast agent applications. The results of this investigation will be discussed, as well as how it has assisted in the development of new magnetic nanomaterials with controllable size and magnetic resonance properties.