

**Subject:** Joint CNM/MSD Colloquium, Thurs, 10/5, 11am, 212, A157  
**From:** Janice Coble <coble@anl.gov>  
**Date:** Mon, 25 Sep 2006 15:58:15 -0500  
**To:** msd@anl.gov

**SPEAKER:** DR. GLENN A. HELD  
IBM, Yorktown

**TITLE:** "Biofunctionalization and Detection of  
Magnetic Nanoparticles"

**DATE:** Thursday, October 5 2006

**TIME:** 11:00 a.m.

**PLACE:** Building 212, Room A157

**HOST:** G. Brian Stephenson

Refreshments will be available at 10:45 a.m.

**Abstract:** Methods of synthesizing monodisperse, strongly magnetic ferrite nanoparticles have been well documented. However, encapsulation of these particles within an overlayer of biologically active molecules has remained problematic. Such bio-functionalized magnetic nanoparticles would provide the crucial component in ultra-sensitive magnetic detection of both proteins and nucleic acids. In addition, such particles could be used to bind and transport proteins and, following introduction into a living organism, they could provide a means of monitoring and influencing cellular processes. In this talk, I will present a method for bio-functionalizing manganese ferrite nanoparticles. Following biofunctionalization with DNA or biotin, these particles can be site selectively bound to appropriately patterned silicon oxide substrates. Imaging these substrates with scanning squid microscopy provides evidence that these particles retain their magnetic properties. Finally, a novel method of detecting the hybridization of these magnetic nanoparticles to a substrate at room temperature using a biosensor comprised of a protein patterned magnetic tunnel junction situated in orthogonal magnetic fields will be discussed.