

# The 117<sup>th</sup> MANA Special Seminar



**Biomedical nanomagnetism: a spin on new possibilities**

Chair: Dr. Yoshio Bando (MANA COO)

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Two of the principal challenges in biomedical nanoscience and personalized medicine are: a) the detection of disease at the earliest possible time prior to its ability to cause damage (diagnostics and imaging) and b) delivering treatment at the right place, at the right time whilst minimizing unnecessary exposure (targeted therapy with a triggered release). The former is dominated by optical methods, emerging “life on a chip” systems and the versatile magnetic resonance imaging technology. The latter remains an ongoing challenge. In this context, we have been developing multifunction platforms for therapy, diagnostics and imaging based on functionalized, biocompatible, nanomagnetic molecular probes. Our work encompasses innovations in synthesis and functionalization, controlled self-assembly, advanced characterization, a wide-range of magnetic measurements and modeling to tailor their behavior for high moment or high frequency applications and carrying out cytotoxicity and biocompatibility studies. Currently, in vitro (magnetic separation and diagnostic relaxometry), in vivo (hyperthermia treatment of cancer, triggered drug delivery) and imaging (contrast enhancement in MRI and the development of a novel magnetic particle imaging microscope) applications are all being pursued. This first part of the lecture will include an overview of nanotechnology, size-dependent magnetic behavior and the emerging field of biomedical nanomagnetism. This will be followed by a comprehensive discussion of our current work in these areas highlighting the fundamental principles behind our research in the context of emerging technological and clinical opportunities.

**Venue: Seminar Room #431, MANA Bldg.**

**Date: Dec 15<sup>th</sup> Tuesday Time: 11:00-11:50**

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