



Silica coated up-conversion nanoparticles for bio-imaging

by Mr. Lipeng Qian

Date: 04th March 2009 (Wednesday)

Time: 12:00pm to 1:00pm

Venue: EA-02-11 (Executive Seminar Room)

Abstract

Near infrared (NIR)-to-visible up-conversion (UC) fluorescent nanoparticles have attracted significant interests due to potential applications as sensitive bio-probes. Unlike the ultraviolet (UV) excitation that causes a background signal from imaged tissues, the optical transparency of NIR in tissues results in improved signal-to-noise ratio in imaging. Among all up-conversion phosphors reported, $\text{NaYF}_4:\text{Yb, Er}$ is one of the most efficient NIR-to-visible up-conversion materials for lanthanide-doped phosphors. The bio-probes should have a high efficiency in fluorescence and water-dispersible. In order to have a high selectivity of bonding with targeted bio-molecules in imaging medium, the nanoparticles should remain dispersed in order to take advantage of their high surface area-to-volume ratio. Surface functionalization of up-conversion nanoparticles is therefore necessary. Amorphous silica, chemically and thermally inert in environment for bio-imaging, may be formed at room temperature as a surface coating on bio-probes. In this study, $\text{NaYF}_4:\text{Yb, Er}$ nanoparticles were synthesized. These UC nanoparticles were coated with a layer of silica by a reverse microemulsion method. The silica coated $\text{NaYF}_4:\text{Yb, Er}$ nanoparticles were further functionalized by an amine (NH_2 -) group using (3-Aminopropyl)-trimethoxysilan. The optical properties of uncoated, silica coated and amine functionalized/silica coated up-conversion nanoparticles were investigated.

Mr. Lipeng Qian Speaker

Mr. Lipeng Qian received his Master (2007) and bachelor (2005) degree of Materials Science and Engineering from Tianjin University. He is currently a Ph.D. candidate under the supervision of Prof. Chow Gan-Moog from Department of Materials Science and Engineering, NUS. His research focuses on surface modification of up-conversion nanoparticles.

Dr Xue Jun Min Host

All are Welcome!