

CBC SEMINAR ANNOUNCEMENT



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Interfacial Self-Assembly and Theranostic Applications of Inorganic-Organic Hybrid Nanomaterials

Nanotheranostic materials have been recently involved in the use of nanoparticles for simultaneous diagnostic and therapeutic purposes. New materials have been extensively developed towards drug delivery and tumor imaging. In the first part of the presentation, the synthesis, characterization, and properties of theranostics nanoparticles based on organic-inorganic hybrid nanoparticles will be described. The hybrid nanoparticle consists of a superparamagnetic iron oxide core and a series of coatings which are stimuli-responsive supramolecules or polymers. By the concept of nanovalve based on supramolecular gate-keepers, stimuli-responsive drug delivery nanosystem was synthesized by (i) modified solvothermal reaction; (ii) sol-gel reaction; and (iii) coupling reaction of supramolecules. In these systems, the "ON/OFF" switching of the gatekeeper supramolecules can be controlled by pH-sensitive intramolecular hydrogen bonding or electrostatic interaction (such as metal chelating). Biological evaluation of the nanoparticles renders them non-cytotoxic and can be uptaken by several cell types. The anti-tumor drug (doxorubicin) loading and release profiles which were studied by the UV/visible absorption spectroscopy, were demonstrated by using ultrasonic wave. Magnetic resonance imaging analysis of the particles reveals a high relaxivity, rendering them useful nanotheranostic agents.

The second part of the talk will focus on the synthesis, purification, characterization and sensing application of mono-amine functionalized gold nanoparticles (AuNPs). The crude mono-amine functionalized AuNPs were purified by magnetic separation via pH-switchable pseudorotaxane formation. Then, discretely mono-amine functionalized AuNPs could be simultaneously purified and detected by a real-time surface plasmon resonance (SPR) with organic solvent-compatible microfluidic device/instrumentation. The discretely functionalized AuNPs were further explored as a probe for DNA sensing which is complementarily with the sequence of the pathogenicity island of vancomycin-resistant *Enterococcus faecalis*.

Reference:

1. K. C.-F. Leung, S. H. Xuan, X. M. Zhu, D. W. Wang, C.-P. Chak, S.-F. Lee, W. K.-W. Ho, B. C.-T. Chung Chem. Soc. Rev., 2012, in press.
2. S. Xuan, F. Wang, J. M. Y. Lai, K. W.-Y. Sham, Y.-X. J. Wang, S.-F. Lee, J. C. Yu, C. H. K. Cheng, K. C.-F. Leung ACS Appl. Mater. Interfaces 2011, 3, 237.
3. C.-P. Chak, L.-H. Chau, S.-Y. Wu, H.-P. Ho, W. J. Li, P. M. Mendes, K. C.-F. Leung J. Mater. Chem. 2011, 21, 8317.
4. S. H. Xuan, F. Wang, X. L. Gong, S. K. Kong, J. C. Yu, K. C.-F. Leung Chem. Commun. 2011, 47, 2514.
5. C.-P. Chak, S. Xuan, P. M. Mendes, J. C. Yu, C. H. K. Cheng, K. C.-F. Leung ACS Nano 2009, 3, 2129.

Date: 9th February 2012 (Thursday)
Time: 11:00am – 12:30pm
Venue: NTU SPMS CBC Building Level 2,
Conference Room
Host: Asst Professor Zhao Yanli