Chemical Engineering Seminars – MT 2011

Special Seminar

Week 9, Tuesday December 6th 2011, 4:00PM-5:00PM

Lecture Room 1, Thom Building, Engineering Science

New Developments in Bio-inspired Nanomaterials for Drug and Gene Delivery Systems

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Abstract

The bio-inspired drug/gene delivery systems are potentially promising for chemo- and gene therapy of cancers. In my group, polymeric nanobiomaterials such as dendrimers and polymeric micelles have been developed promote the therapeutic and transfection efficiency of the drug/gene delivery systems. Peptide dendrimers are highly attractive for the drug/gene delivery due to their unique properties, such as spherical nanostructure, mono-distributed size and numerous peripheral functional groups. In addition to their biocompatible and biodegradable potential for drug/gene delivery, anti-tumor drugs can be immobilized or encapsulated, stimuli-sensitivity and targeting moieties have been introduced to multifunctionalize the dendrimers. The peripheral groups of the dendrimers have been substituted by alkyline amino acids to condense DNA for gene delivery. The drug and gene delivery potentials have been studied in vitro and in vivo.

Amphiphilic biodegradable polymers were design and synthesized. The amphiphiles were self-assembled micelles with different morphologies driven by hydrophobic interaction, stereocomplexation and π-π stacking. The relationships between the micelles and drug release behaviors, in vitro and in vivo anti-tumor activities have been investigated.

Background:

Professor Zhongwei Gu was awarded BSc in Polymer Chemistry in 1978 followed by MSc in 1981 at Peking university, China. He was academic visiting scholar funded by WHO at Research Triangle Institute, North Carolina, in 1984 to 1986. He was Senior visiting scholar in Department of Bioengineering, University of Utah, in 1991 to 1993.

Currently he is Professor of Polymer Chemistry at Sichuan University and director of National Engineering Research Centre for Biomaterials. His research interests ranged from Biomedical polymer materials, Biomaterials for molecular diagnosis & bio-separation, Self-assembled biomaterials, Nano-biomaterials, to Polymeric drugs and drug delivery systems. He has published 160 peer-reviewed papers, 8 book chapters and 80 conference papers.

Prof Gu is the chief scientist of the National Basic Research Program of China (National 973 Program), and Biomedical engineering and technological innovative program (the 985 project of the State Education Ministry), Vice Chairman & Secretary General of the Chinese Committee for Biomaterials (CCBM), and the International Fellow of the Biomaterials Science and Engineering (FBSE). Prof Gu is the visiting professor at a number of top Chinese universities, such as Zhejiang University; expert committee member of National Natural Science Foundation of China, National Development and Strategy on Science and Technology of China and National Drug Evaluation Committee, State Food & Drug Administration.