**Nanoporous Materials for Drug/Gene Delivery**

In this presentation, we will report recent research progress in the synthesis and bio-applications of magnetic mesoporous materials. In our research, we used self-assembly method to prepare the composites of Fe3O4 nanocrystals and highly ordered periodic mesostructured silicas with various morphologies including nanospheres, hollow spheres and helical rods. Our studies reveal that these magnetic mesoporous materials have highly effective and selective separation features for different size bio-molecules and excellent delivery performances for drugs and DNA.

We have developed a general and facile template strategy for the fabrication of mesoporous nano-structured materials, the so-called hollow structured and yolk-shell structured materials with porous shells. We will summarize some research progresses in our group in the preparation of the organic-inorganic hybrid materials with controlled morphologies, surface chemistry, composition, particles sizes and pore sizes and their applications as delivery carriers for pH, enzyme sensitively controlled drug/biocide/gene delivery.

# PhD Opportunities in Adelaide, Australia

The School of Chemical Engineering at The University of Adelaide was established in 1947 and, with close to 30 full-time academic staff and around 70 PhD students, it is one of Australia’s oldest and most prestigious chemical engineering schools. The University of Adelaide itself is one of the oldest in Australia and a member of the Group of Eight Universities, with 5 Nobel Laureates – including the Braggs and Florey – and more than 100 Rhodes Scholars associated with it.

With research expertise spanning the fields of nanomaterials, bioengineering, energy and environmental engineering, the School of Chemical Engineering at The University of Adelaide has an international reputation, strong links with many overseas research groups, and leading research facilities. The School is currently seeking to recruit highly motivated PhD candidates under various funding schemes. Come and listen to leading staff of the School, Prof Shizhang Qiao, present on the research undertaken in the School and these opportunities, and ask questions.

**Speaker:** Prof. Shizhang Qiao received his PhD degree in chemical engineering from Hong Kong University of Science and Technology in 2000, and is currently a professor (Chair of Nanotechnology) at School of Chemical Engineering of the University of Adelaide, and an Honorary Professor at The University of Queensland, Australia. He is an Associate Editor of Journal of Materials Chemistry. His research expertise is in nanomaterials and nanoporous materials for drug/gene delivery and new energy technologies. He has co-authored more than 160 papers in refereed journals (5800 citations with h-index 40), including Nature, JACS, Angew. Chem., Adv. Mater., and has filed several patents on novel nanomaterials that are promising for drug/gene delivery, fuel cells, photocatalysis and lithium ion battery.

**纳米孔材料合成及在药物和基因传输方面的应用**

首先我们将介绍磁性介孔材料的合成及他们在生物分离及药物传输方面的应用。在我们的研究中，我们采用分子自组装的方法将磁性纳米颗粒（Fe3O4）和介孔硅材料结合起来，合成出具有各种形貌的有孔磁性纳米颗粒。研究表明，这些材料对不同尺寸的生物分子具有高效选择性吸附特性，也可以用作药物和基因传输的载体。

我们发展了模板法合成具有不同形貌的介孔纳米材料，如纳米球，中空球，核壳结构的纳米尺寸颗粒，研究它们在纳米反应器，杀虫剂，药物和基因载体方面的应用。我们将进一步介绍我们在有机/无机杂化孔材料合成方面的工作，通过控制材料的表面化学特性，组成，形貌，颗粒尺寸，孔尺寸等研究他们对pH值变化和特定生物酶的响应释放性能，进而研究其在药物和基因的可控和有效输送。

**澳洲阿德莱德大学攻读博士学位的机会**

 阿德莱德大学是澳大利亚历史最悠久的大学之一，曾培养了5名诺贝尔奖得主，其中包括Sir William Lawrence Bragg （1915年物理诺贝尔奖）和Sir Howard Florey（1945年生理医学诺贝尔奖），另外还有100多名罗德学者。澳大利亚阿德来莱德大学的化学工程系建于1947年，是澳大利亚成立最早和声望很高的化工系之一，目前化工系有30多名教授，讲师和研究人员，70多名博士研究生。阿德莱德大学是澳大利亚顶尖的八所大学（Group of 8）之一。

阿德来德大学化学工程系的研究方向主要涉及纳米材料，生物工程，清洁能源和环境工程，这些领域都处于国际前沿。目前阿德莱德大学化工系正在拓展研究队伍，欢迎更多的博士研究生加入。学生可通过申请大学国际奖学金或中国留学基金委的海外留学基金来阿德莱德大学攻读博士学位。愿意加入阿德莱德大学从事高端前沿科学研究的同学，欢迎参加乔世璋教授的报告，报告内容主要是关于他课题组及化工系目前的研究方向，以及介绍各种奖学金的申请途径，欢迎提问!

**乔世璋教授简介**

 乔世璋教授在天津大学化工系获得学士和硕士学位，香港科技大学获得博士学位。曾在澳大利亚昆士兰大学先后任博士后、研究员、高级研究员及副教授。现为澳大利亚阿德莱德大学化工学院纳米技术首席教授，昆士兰大学荣誉教授, Journal of Materials Chemistry A编辑。

乔世璋教授在硅、碳、金属氧化物多孔材料、纳米颗粒合成及其在药物输送，催化、燃料电池、锂电池等研究领域取得了令人瞩目的成绩。作为通讯联系人，在《自然》、《美国化学会志》、《德国应用化学》、《先进材料》等期刊发表了超过一百六十篇论文，引用超过5800次(h-index:40)，拥有3项国际专利。近五年，其研究获得了澳大利亚研究理事会等五百多万澳元的资助，他先后被授予昆士兰大学研究最高奖(Foundation Research Excellence Award)，澳大利亚研究理事会研究员奖和昆士兰大学中青年研究员奖，美国化学会能源分会Emerging Researcher Award。2010年获得中国国家海外及港澳合作基金。乔世璋教授现在领导着一个由三名博士后和七名博士生组成的研究团队，与美国、加拿大、新加坡、澳大利亚、中国等国家的科学家建立了广泛的研究合作。

乔世璋教授近期代表作：

1) Two-Step Boron and Nitrogen Doping in Graphene for an Enhanced Synergistic Catalysis, ***Angew. Chem. Int. Ed.***, 2013, 52, 3110-3116.

2) pH-Responsive Nutraceutical-Mesoporous Silica Nanoconjugates with Enhanced Colloidal Stability, ***Angew. Chem. Int. Ed.***, 2013, 52, 2318-2322.

3) N-doped Graphene Natively Rotted on Hierarchical Ordered Porous Carbon for Enhanced Oxygen Reduction, ***Advanced Materials***, 2013, DOI: 10.1002/adma.201302569.

4) Developing Functionalized Dendrimer-like Silica Nanoparticles with Hierarchical Pores as Advanced Delivery Nanocarriers, ***Advanced Materials***, 2013, DOI: 10.1002/adma.201302189.

5) Facile Oxygen Reduction on Three-Dimensionally Ordered Macroporous graphitic-C3N4/Carbon Composite Electrocatalyst, ***Angew. Chem. Int. Ed.***, 2012, 51, 3892–3896.

6) Sulfur and Nitrogen Dual-doped Mesoporous Graphene Electrocatalyst for Oxygen Reduction with Synergistically Enhanced Performances***, Angew. Chem. Int. Ed.***, 2012, 51, 11496-11500.

7) Enzyme-Responsive Contolled Release of Covalently Bound Prodrug from Functional Mesoporous Silica Nanospheres, ***Angew. Chem. Int. Ed.***, 2012, 51, 12486-12489.

8) Nanoporous Graphitic-C3N4@Carbon Metal-free Electrocatalysts for Highly Efficient Oxygen Reduction, ***Journal of the American Chemical Society***,  2011, 133, 20116-20119.

9) Extension of Stöber Method for the Preparation of Monodisperse Resorcinol Formaldehyde Resin Polymer and Carbon Spheres, ***Angew. Chem. Int. Ed.***, 2011, 50, 5947-51.

10) Monodisperse Yolk-Shell Nanoparticles with a Hierarchical Porous Structure for Delivery Vehicles and Nanoreactors, ***Angew. Chem. Int. Ed.***, 2010, 49, 4981-4985.

11) Mesoporous Co3O4  and Au/Co3O4 Catalysts for Low-temperature Oxidation of Trace Ethylene, ***Journal of the American Chemical Society***, 2010, 132, 2608-2613.

12) Mesoporous LiFePO4/C Nanocomposite Cathode Materials for High Power Lithium Ion Batteries with Superior Performance, ***Advanced Materials***, 2010, 22, 4944-4948.

13) Solvothermal Synthesis and Photoreactivity of Anatase TiO2 Nanosheets with Dominant {001} Facets, **Journal of the American Chemical Society**, 2009, 131, 4078-4083.

14) Anatase TiO2 Single Crystals with a Large Percentage of Reactive Facets, ***Nature***, 2008, 453(7195), 638-641.

15) Magnetic Hollow Spheres of Periodic Mesoporous Organosilica and Fe3O4 Nanocrystals: Fabrication and Structure Control, ***Advanced Materials***, 2008, 20, 805-809.

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