

## 学术报告

报告题目: Materials for Energy Conversion and Storage: Challenges and Opportunities

报告人: 澳大利亚昆士兰大学 逯高清教授 (G.Q. Max Lu)

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### 报告摘要

According to the REN21 (Renewables Global Status Report 2012 p. 17) total investment in renewable energy reached \$257 billion in 2011, up from \$211 billion in 2010. The top countries for investment in 2011 were China, Germany, and United States. In addressing the challenging issues of energy security and climate change, innovative materials are essential enablers. New materials underpin innovations for renewable energy, clean use of fossil energy, and greenhouse gas mitigation technologies.

Energy conversion devices such as fuel cells and solar cells, and energy storage systems such as Li-ion, Li-S batteries and supercapacitors will underpin the development and utilisation of renewable energy for sustainable transport and energy supply. Conversion efficiency, enhancement of energy storage capacity and power density are the key technological challenges that can be largely addressed through innovations in new electrodes and catalysts involved in such systems.

In this regard, many efforts in recent years have focused on nanomaterials, particularly nanostructured oxides and carbons. Oxides such as TiO<sub>2</sub> and ZnO are readily available and versatile catalyst and electrode materials for photocatalysis and solar energy utilisation. Nanocarbons such as carbon nanotubes, porous carbons and graphene are promising materials to improve the performances of these devices and systems.

This talk will review these advances particularly from the materials synthesis and surface chemistry perspectives. Examples of nanomaterials we have developed will be used to illustrate the importance of new synthesis method, surface functionalization and hybridization in enhancing energy conversion efficiency or storage capacity and durability.

## 报告人简介

Professor Max Lu has been Deputy Vice-Chancellor and Vice President (Research) of the University of Queensland since 2009. He was also the Foundation Director of the ARC Centre of Excellence for Functional Nanomaterials from 2003 to 2009. Professor Lu's research expertise is in the areas of materials chemistry and nanotechnology. He is known for his work on nanoparticles and nanoporous materials for clean energy and environmental technologies. With over 500 journal publications in high impact journals including *Nature*, *J. Am. Chem. Soc.*, *Angew. Chem.*, *Adv. Materials*, he is also co-inventor of 20 international patents. Professor Lu is an Institute for Scientific Information (ISI) Highly Cited Author in Materials Science with over 17500 citations (h-index of 63). He has received numerous prestigious awards nationally and internationally including the China International Science and Technology Cooperation Award, Orica Award, RK Murphy Medal, Le Fevre Prize, ExxonMobil Award, Chemeca Medal (2011), Top 100 Most Influential Engineers in Australia (2004, 2010, 2012) and Top 50 Most Influential Chinese in the World (2006). He is an elected Fellow of ATSE and Fellow of Institution of Chemical Engineers (ICHEME). He is editor and editorial board member of 12 major international journals including *Colloid and Interface Science* and *Carbon*.