Design and synthesis nonprecious catalysts for energy applications

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An ability to transform catalytically inert nonprecious materials into high performance catalysts is critically important for large-scale clean energy generation. This presentation reports a suite of effective design and synthesis approaches that are capable of transforming cheap and earth abundant nonprecious materials into high performance catalysts for energy related applications such as solar energy conversion, renewable electricity-driven electro catalytic hydrogen production and carbon dioxide reduction. Oxygen Reduction Reaction (ORR) and Oxygen Evolution Reaction (OER) electro catalysts are important for fuel cells and metal-air batteries. Examples of design and synthesis nonprecious materials-based ORR and OER electro catalysts will also be presented. Biomass is the most abundant renewable carbon source on earth. The use of biomass for chemical production would greatly reduce the demand of fossil resource. It has been demonstrated that the high value-added chemicals can be produced by selective hydrogenation of biomass-derived compounds. A number of examples on design and synthesis of high performance selective hydrogenation catalysts will therefore be presented.

Biography: Huijun Zhao obtained his Ph.D. in chemistry (1994) from the University of Wollongong, Australia. He held research fellow/senior research fellow positions during 1994-1997 in the University of Wollongong and University of Western Sydney. He took a Lecturer position at Griffith University in 1997 and was subsequently promoted to Senior Lecturer (2001), As a Professor (2003), Chair Professor of Griffith Commercialization Laboratory (2005). He currently holds a professorial position in School of Environment and Science and is the direct of the centre for Clean Environment and Energy at Griffith University. He is also the Director of the Centre for Environmental and Energy Nanomaterials at the institute of solid state physics, Chinese Academy of Sciences. Prof. Zhao has won a number of awards such as, The R.H. Stokes Medal and University Research Leadership Award, and is the Fellow of the Royal Society of Chemistry (FRSC) and the Fellow of the Royal Australian Chemical Institute (FRACI). He has expertise in energy and environmental nanomaterials, water source control and management system, field-based sensing technologies and aquatic environmental quality assessment. Prof. Zhao has published over 400 refereed journal papers that attracted over 22,000 citations and earned him an H-index of 78. He has also gained 68 international patents within 8 world-wide patent families in functional nanomaterials & nanotechnology, photoelectrocatalysis and environmental monitoring systems.

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