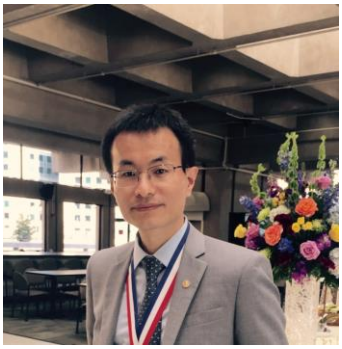
Queensland Micro- and Nanotechnology Centre

PUBLIC LECTURE



Speaker: **Professor Peidong Yang**

Department of Chemistry and Department of Materials Science Engineering, University of California, Berkeley; Materials Science Division, Lawrence Berkeley National Lab, Berkeley CA, USA
http://nanowires.berkeley.edu/

Date: Friday 15 December 2017

Time: 11:00 am – 12:00 pm

Venue: Sir Samuel Griffith Centre (N78) Room 1.19, Griffith University, Nathan Campus

Title: $CO_2 + H_2O$ + Sunlight = Chemical Fuels + O_2

Abstract

Solar-to-chemical (STC) production using a fully integrated system is an attractive goal, but to-date there has yet to be a system that can demonstrate the required efficiency, durability, or be manufactured at a reasonable cost. One can learn a great deal from the natural photosynthesis where the conversion of carbon dioxide and water to carbohydrates is routinely carried out at a highly coordinated system level. There are several key features worth mentioning in these systems: spatial and directional arrangement of the light-harvesting components, charge separation and transport, as well as the desired chemical conversion at catalytic sites in compartmentalized spaces. In order to design an efficient artificial photosynthetic materials system, at the level of the individual components: better catalysts need to be developed, new light-absorbing semiconductor materials will need to be discovered, architectures will need to be designed for effective capture and conversion of sunlight, and more importantly, processes need to be developed for the efficient coupling and integration of the components into a complete artificial photosynthetic system. In this talk, I will begin by discussing the challenges associated with fixing CO_2 through traditional chemical catalytic means, contrasted with the advantages and strategies that biology employs through enzymatic catalysts to produce more complex molecules at higher selectivity and efficiency. I then discuss a number of different photosynthetic biohybrid systems (PBS) architectures from the last few years, and the numerous strategies to interface biotic and abiotic components. Each demonstrates the advantages of PBSs in converting sunlight, H_2O and CO_2 into food, fuels, pharmaceuticals, and materials. Finally, I will outline the future of this field, opportunities for improvement, and its role in sustainable living here on Earth, and beyond.

Brief Biography

Peidong Yang is a Chemistry professor, S. K. and Angela Chan Distinguished Chair Professor in Energy at the University of California, Berkeley. He is known particularly for his work on semiconductor nanowires and their photonic and energy applications. He is one of the co-directors for the Kavli Energy Nanoscience Institute at Berkeley. Dr. Yang received his B.A. in Chemistry from the University of Science and Technology in China in 1993. He then received his Ph.D. in Chemistry from Harvard University in 1997, and did his postdoctoral fellowship at the University of California, Santa Barbara. Soon after, he began his Assistant Professorship at the University of California, Berkeley. He is the recipient of MacArthur Fellowship, E. O. Lawrence Award, ACS Nanoscience Award, MRS Medal, Baekeland Medal, Alfred P. Sloan research fellowship, the Arnold and Mabel Beckman Young Investigator Award, National Science Foundation Young Investigator Award, MRS Young Investigator Award, Julius Springer Prize for Applied Physics, ACS Pure Chemistry Award, and Alan T. Waterman Award. He is a member of both the National Academy of Sciences and the American Academy of Arts and Sciences.

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ALL WELCOME