

# TCSUH SPECIAL SEMINAR

## Prof. Dunwei Wang

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Chemistry Department Chair, Boston College

Friday, February 14, 2020

Room 102, Houston Science Center, 11:00 a.m. – 12:00 p.m.

### Photocatalysis for Large Scale Solar Energy Harvesting and Storage

**ABSTRACT:** As we enter Anthropocene, it has become clearer than ever that a sustainable future will be one built on renewable energy resources. A critical challenge in realizing such a goal is to harvest and store renewable energy efficiently and inexpensively on a terawatt scale. Of the options that have been examined, using the energy to directly synthesize fuels stands out. When the renewable energy source is solar, the process is often referred to as artificial photosynthesis, highlighting the similarities with natural photosynthesis. Within this context, we have focused on understanding the detailed processes that are important to artificial photosynthesis. More specifically, a main thrust of our research has been water oxidation by photochemical reactions on the surface of inorganic materials. We strived to understand the detailed physical and chemical processes at the solid/liquid interface, with the goal of enabling facile electron extraction from water for the eventual proton reduction for hydrogen generation or the carbon dioxide reduction for the production of complex organic compounds. It was discovered that the light harvesting and catalytic components in an integrated system exerts profound influences on each other in a complex fashion. Detailed studies generated new insights into the water oxidation reactions at the molecular level, some of which was readily transferred to other reactions such as methane transformation. These efforts also inspired us to study oxygen catalysis in aprotic systems for applications with more immediate implications, such as metal air batteries.

**BIO:** Dunwei Wang is Professor and Margaret A. and Thomas A. '53 Vanderslice Chair in Chemistry. He is also the elected department chair. His group studies sciences on energy conversion and storage. Ongoing projects include solar water splitting, hydrocarbon transformation by atomically dispersed catalysts, and advanced batteries, which are funded by NSF, DOE, ACS and Mass Clean Energy Center. He graduated from the University of Science and Technology of China with a Bachelor of Science in 2000 and Stanford University with a Ph.D. in 2005. He then carried out postdoctoral research at California Institute of Technology until 2007, when he started his independent career at Boston College. Among the honors Wang has received are 2006 Prize for Young Chemists by IUPAC, 2011 CAREER Award by the NSF, 2011 Catalyst Award by Massachusetts Clean Energy Center, 2012 Sloan Fellowship and 2016 JSPS Fellowship.

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