“Maximizing Efficiencies of Photocatalytic Water Splitting by Engineering Interfaces in Multi-component Photocatalysts”

Wednesday
October 17, 2018
3:00 pm
Wu and Chen Auditorium
Levine Hall

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Abstract
Solar splitting of water to hydrogen and oxygen is a critical chemical transformation for which no commercially viable photocatalytic systems exist. Developing materials that could execute this reaction with high efficiencies would fundamentally change the environmental footprint of many segments of our economy, including chemical industry, manufacturing and energy sectors. The materials that have received the most attention for this application are hybrids that contain a semiconductor light absorber and an attached metal electrocatalyst that performs chemical transformations. In these systems, the semiconductor serves to provide the electromotive force (voltage) that is used by the electrocatalysts to drive the reaction. The main problems in the development of these hybrid photocatalysts are the chemical instability of the desired semiconductors (with the appropriate, relatively low band gap) under the relevant water splitting conditions, and the losses associated with the presence of the semiconductor/electrocatalyst junction. In this talk, I will analyze the critical problems associated with these multi-component photocatalysts. I will also show how by controlling the geometries of various components of these systems at atomistic level we can optimize their solar to hydrogen efficiencies.

Bio
Prof. Linic obtained his Ph.D. degree, specializing in surface and colloidal chemistry and heterogeneous catalysis, at the University of Delaware in 2003. He was a Max Planck postdoctoral fellow with Prof. Dr. Matthias Scheffler at the Fritz Haber Institute of Max Planck Society in Berlin (Germany), working on first principles studies of surface chemistry. He started his independent faculty career in 2004 at the Department of Chemical Engineering at the University of Michigan in Ann Arbor, where he is currently the Class of 1983 Faculty Scholar Professor of Chemical Engineering. Prof. Linic’s research has been recognized through multiple awards, including the 2017 Emmett Award by The North American Catalysis Society; the 2014 ACS (American Chemical Society) Catalysis Lectureship for the Advancement of Catalytic Science, awarded annually by the ACS Catalysis journal and Catalysis Science and Technology Division of ACS; the 2011 Nanoscale Science and Engineering Forum Young Investigator Award, awarded by the American Institute of Chemical Engineers; the 2009 ACS Unilever Award, awarded by the Colloids and Surface Science Division of ACS; the 2009 Camille Dreyfus Teacher-Scholar Award, awarded by the Dreyfus Foundation; the 2008 DuPont Young Professor Award; and a 2006 NSF Career Award. Prof. Linic has presented more than 150 invited and keynote lectures and published more than 60 peer reviewed articles in leading journals in the fields of catalysis and general science. He serves as the associate editor of the ACS Catalysis journal.

Fall 2018 CBE Seminar Series