University of Minnesota
Driven to Discover℠

Department of Chemistry

Student Seminar Series

9:45 a.m. Tuesday, April 7, 2015 • 331 Smith Hall

Professor

Andrew Borovik

Department of Chemistry
University of California, Irvine

Synthetic Chemistry as a Window into Biology

Website:
http://www.chem.uci.edu/~aborovik/Borovik_Homepage/Home/Home.html

Abstract

The function of catalysts are linked directly to the local environment in which they are housed. It is now apparent that the placement of compounds within different local environments produces changes in key properties that affect reactivity. It is thus possible to understand function, and dysfunction, of a catalytic species within the context of properties associated with their local environments, regardless of system type or length-scale. This presentation will describe architectural features within local environments that are instrumental in regulating function at a catalytic center. Enzymatic systems will be described to illustrate the complexity of molecular structures necessary to promote biological function, specifically the importance of non-covalent interactions. Synthetic compounds will be discussed to demonstrate attempts to emulate some of these architectural features, with emphasis on the challenges involved in designing molecular systems that incorporate non-covalent interactions within their local environments. Our approach will be illustrated with our latest developments in preparing and characterizing metal-oxo and hydroxo complexes with a variety of biological relevant metal ions and discussing their reactivity as it relates to enzymatic function.

Andrew "Andy" Borovik is a professor of chemistry at the University of California, Irvine. He grew up in Chicago, IL, and obtained his doctorate in chemistry from the University of North Carolina at Chapel Hill with Professor Thomas Sorrell. He went on to do post-doctoral studies with Professor Lawrence Que Jr. at the University of Minnesota and Professor Ken Raymond at University of California, Berkeley.

Professor Borovik is a leader in bioinorganic chemistry and a pioneer in understanding the role of secondary-coordination sphere and hydrogen-bonding interactions in biologically inspired synthetic systems featuring first-row transition metals. These results have led to important insights into the structure and function of metalloenzymes that activate small molecules, such as dioxygen. He has also made significant contributions to the study of heterobimetallic complexes related to the oxygen-evolving complex in Photosystem II and C-H bond functionalization reactions. His research has recently led him into the realm of developing artificial metalloenzymes as well as exploring materials chemistry.

In addition to his research, Professor Borovik has received distinguished awards for his teaching and mentorship of undergraduate and graduate students.

Host: Mayank Puri