2012-2013 POCC Lecture Series

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Prof. Corey Stephenson
Boston University

Photoredox catalysis:
Enabling chemical synthesis with visible light

Carolyn Hoff Lynch Lecture Hall
Chemistry Building, University of Pennsylvania

The Philadelphia Organic Chemists' Club

POCClub.org

Corey Stephenson was born in Collingwood, Ontario, Canada, in 1974. He received a BSc degree in Applied Chemistry in 1998 from the University of Waterloo inluding internships in research labs at Apotex Inc., the Merck Frosst Centre for Therapeutic Research and Astra Research Centre Montreal. Upon graduation in 1998, he began graduate studies under the direction of Professor Peter Wipf at the University of Pittsburgh followed by postdoctoral research beginning in 2005 in the laboratory of Professor Erick M. Carreira at the ETH Zürich, Switzerland. He joined the faculty at Boston University as an assistant professor of chemistry in 2007.

Research in the Stephenson group focuses on the development of new concepts in catalysis which enable the efficient, chemoselective construction of carbon-carbon bonds with applications in the synthesis of natural products and materials science. In particular, his group endeavors to develop environmentally conscious chemical methods which enable the activation of chemical bonds under mild reaction conditions focusing in three areas: (1) the development of new methods based upon visible light initiated electron transfer reactions; (2) applications of these methods to complex natural product synthesis and materials science; and (3) technology-enabled reaction discovery and photocatalysis using mesoflow and microfluidics chemistry.

Abstract: Visible light sensitization is an attractive means to initiate organic reactions due to the lack of visible light absorbance by organic compounds reducing side reactions often associated with photochemical reactions conducted with high energy UV light. In particular, the use of photocatalysts such as Ru(bpy)3Cl2 with an appropriate quencher permits the selective functionalization of many organic molecules. These processes offer improved chemoselectivity over current approaches while enabling the reduction of stoichiometric waste byproducts and toxic or hazardous reagents. Our synthetic and mechanistic investigations into generalizing the utility of visible light photoredox catalysis as a means of accessing organic reactive intermediates (free radicals, radical anions, and radical cations) along with their application in total synthesis and technology-enabled synthesis will be presented.