Past ΦΛΥ Distinguished Speakers

1989	Daryle H. Busch	University of Kansas
1990	Jeanette Grasselli	Ohio University
1991	Fred Basolo	Northwestern University
1992	Richard E. Smalley	Rice University
1993	D. Bruce Chase	DuPont
1994	John T. Yates, Jr.	University of Pittsburgh
1995	John L. Margrave	Rice University
1996	F. Fleming Crim	University of Wisconsin, Madison
1997	Galen D. Stucky	University of California, Santa Barbara
1998	Jerry L. Atwood	University of Missouri, Columbia
1999	Malcolm D. Ingram	University of Aberdeen, Scotland
2000	Kendall N. Houk	University of California, Los Angeles
2001	Robert J. Angelici	Iowa State University
2002	Alan G. Marshal	Florida State University
2003	Dennis Lichtenberger	University of Arizona
2004	Neal R. Armstrong	University of Arizona
2005	Susan M. Lunte	University of Kansas
2006	J. Michael Ramsey	University of North Carolina at Chapel Hill
2007	Karen Wooley	Washington University
2008	Robert Kennedy	University of Michigan
2009	Jonathan Sessler	University of Texas, Austin
2010	Norman J. Dovichi	University of Washington, Seattle
2011	Prashant V. Kamat	University of Notre Dame
2012	Reginald M. Penner	University of California, Urvine
2013	Vincent Rotello	University of Massachusetts, Amherst
2014	Greg Engel	University of Chicago
2015	Emily Weiss	Northwestern University
2016	Jacob Petrich	Iowa State University
2017	Kevin Plaxco	University of California, Santa Barbara
2018	John Wood	Baylor University

Information About ΦΛΥ

Objectives The aims and purposes of the Society are summarized in its constitution - the promotion of high scholarship and original investigation in all branches of pure and applied chemistry. The founders envisioned a society dedicated to these objectives which would serve the field of chemistry in much the same manner as Phi Beta Kappa does the humanities; Sigma Xi, scientific research; and Tau Beta Pi, engineering. Throughout its history, Phi Lambda Upsilon has been consistently devoted to its objectives as an Honor Society.

History Phi Lambda Upsilon was founded as an honorary chemical society in March 1899, at the University of Illinois. This was the first honor society dedicated to a single scientific discipline. A survey of our history reveals three distinct periods. Founding, growth and entrenchment of Alpha Chapter at the University of Illinois comprise the first period. The second period began in 1906 when Beta Chapter was established at the University of Wisconsin. Five more chapters were chartered prior to 29 June 1911, the date of the convention at Indianapolis at which the national society was organized and the second period reached its culmination. From 1911 to date, the Society has effected a gradual rise in the standards for membership. This period has also been characterized by the development of programs of activity within the chapters consistent with the honorary character of the Society. In the span of ninety-five years, Phi Lambda Upsilon has grown into an organization comprising sixty-seven chapters and more than 55,000 members.

2019 ΦΛΥ and Chemistry Award Recipients

Graduate Research Awards

ΦΛΥ Graduate Research Award
Lauren Chlebanowski

Ohno Award
Tuyen Duong Thanh Nguyen

Chemistry Alumni Award
Obdulia Covarrubias-Zambrano

Graduate Reserch Award
Herman Coceancigh

Mahboobe Jassas

Graduate Research Fellowships

Berschied and Derstadt Award
Nandini Sarkar

Meloan Award
Zeinab Harandizadeh

Reed Award
Gowri Udayangani

Noticxe Award
Anthony Fatino

Other Graduate Awards

Fateley-Hammaker Collaboration Award
Wasundara Hulangamuwa

Scott Fateley Memorial Award
Elizabeth Goentzel

Graduate Classroom Awards
Elizabeth Goentzel, and Olivia Hull

Undergraduate Research Award

Sonia Barrett, Danica Smith

Undergraduate Classroom Awards

Seniors -**Erin Meyers, Makena Utech**
Juniors- **Ethan Kallenberger, Abigail McCormick**
Sophomores- **Marcel Chlupsa, Douglas Farleigh**
Freshmen- **Josh Habiger, Carson Orr**

Phi Lambda Upsilon Officers
Alpha Epsilon Chapter

Faculty Advisor - Dr. Christine Aikens

President	Anthony Fatino
Vice-President	Nandini Sarkar
Treasurer	Ayyappan Elangovan
Assist. Treasurer	Elizabeth Goentzel
Secretary	Levon LeBan II

PHI LAMBDA UPSILON

Distinguished Lecture Series

AIM-ing for Catalyst Synthesis with Single-atom Precision

Joseph T. Hupp, Ph.D.
Northwestern University

Thursday, April 11, 2019
King Hall 004 @ 1:30pm

Professor Joseph T. Hupp ΦΛΥ Distinguished Speaker

Joseph T. Hupp, Ph.D. is a Morrison Professor of Chemistry at Northwestern University. Dr. Hupp received his Ph.D. from Michigan State University and performed postdoctoral studies at the University of North Carolina. Directly afterwards, Dr. Hupp began his tenure as Professor of Chemistry at Northwestern University. Dr. Hupp has co-authored nearly 600 papers on inorganic complexes, such as Metal-Organic Frameworks (MOFs) for a range of applications. He also serves as the Chair of the Editorial Board for RSC's *Energy & Environmental Science*, and as a Senior Science Fellow for the Materials Science Division for Agonne National Lab. Dr. Hupp has received many awards and honors including the NSF Presidential Young Investigator Award, named a Fellow of the American Association for the Advancement of Science, and notably he was the H.H. King Lecturer at K-State in 2008.

Presentation Abstract

A grand challenge in the field of heterogeneous catalysis is to identify and fully characterize sites that are competent for catalysis of desired chemical transformations, ideally with high selectivity, high activity, and high stability. We have found that automated AIM (**A**LD-like chemistry **i**n **M**OFs, where ALD is atomic layer deposition) can be used for chemically clean vapor-phase installation of uniform arrays of identically structured, few-atom catalysts on the reactive nodes of suitably chosen metal-organic framework (MOF) materials. This methodology, along with a solution-phase analogue termed SIM, can yield metal-oxygen, metal-sulfur, or metal(0) clusters of predetermined size, shape, and chemical composition.

This lecture will sketch the approach to synthesis and characterization of MOF-supported arrays of well-defined clusters, and then illustrate, via one or two brief case studies, their application as catalysts for desirable, but challenging gas- and condensed-phase chemical transformations. Together with input from computational modeling, these kinds of experiments can be used to address fundamental questions in contemporary Catalysis Science that require atomically precise knowledge of the siting and composition of pre-catalysts, activated catalysts, co-catalysts, reactants and products, *i.e.* questions of chemical selectivity, chemical confinement, and modulation of activity via control over catalyst metal-atom nuclearity, and general questions regarding emergent complexity in catalytic systems.

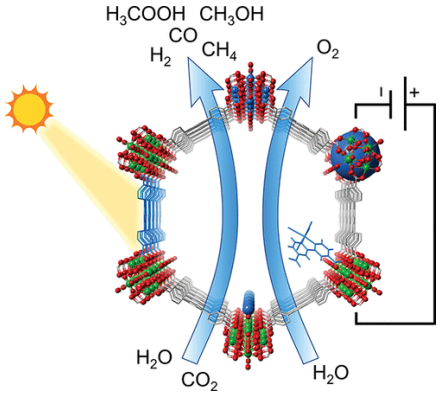
Contact Information

j-hupp@northwestern.edu

Research Focuses of the Hupp Group:

1. *Electro-/Photocatalytic Solar Fuel Generation*

Metal-organic frameworks (MOFs) are a class of porous crystalline materials constructed from metal-based nodes and organic linkers. Due to their ultrahigh specific surface area, porosity, and well-defined structures, well-isolated active sites can be installed in a wide range of MOFs. One of our focuses is the design of water-stable MOF thin films tethered with spatially separated catalytic sites for a range of electrocatalytic applications, including hydrogen generation, oxygen evolution, and CO2 reduction. With the inclusion of light-absorbing organic linkers, these materials can also be utilized as photocatalysts for direct solar-to-fuel conversion.

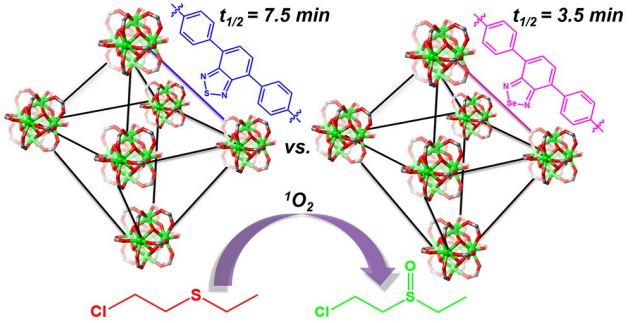


Recent Articles: ACS Energy Letters **2017**, 2 (10), 2394-2401., *ACS Appl Mater Interfaces* **2016,** *8* (32), 20675-81., *ACS Catalysis* **2015**, 5 (11), 6302-6309., *Nat Commun* **2015**, 6, 8304.

2. *Chemical Warfare Agent Detoxification*

With an international ban and several treaties calling for worldwide CWA elimination, there is continued need for materials which allow for safe handling and detoxification of these weapons. Nerve agents (e.g. VX and GD) and mustard agents (e.g. HD) are the most prevalent CWAs due to their effectiveness and ease of synthesis.

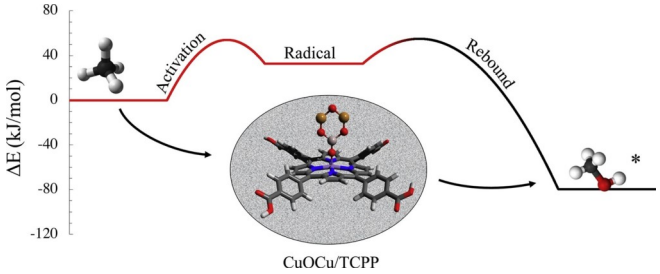
In the Hupp group, we capitalize on both structural components of MOFs to effectively combat simulants of these chemicals simultaneously. Once a promising material is found our collaborators test our materials against real CWAs. Our targets include 1) using the MOF's metal oxide-like nodes to hydrolyze nerve agents, and 2) using the MOF's linkers or guest molecules to selectively oxidize mustard agents. By understanding and optimizing each of these processes separately, we hope to achieve a superior and robust catalyst for CWA detoxification.



Recent Articles: Chemistry of Materials **2017**, 29 (7), 2672-2675., *ACS Appl Mater Interfaces* **2017**, 9 (29), 24555-24560., *ACS Appl Mater Interfaces* **2017**, 9 (23), 19535-19540.

3. Charge Carrier/Energy Transfer Within MOFs

Structural ambiguity of active sites represents a major hurdle for rational catalyst design in heterogeneous catalysis. Using metal–organic frameworks, or MOFs, as the catalyst supports offers a potential solution to this challenge due to their well-defined structures and high crystallinity. Central to our efforts is the use of a zirconium-based MOF featuring a 1,3,6,8-(p-benzoate)pyrene ligand, named NU-1000. Using atomic layer deposition or solvothermal deposition, a wide variety of metal-oxide or -sulfide clusters have been anchored uniformly to the MOF support in large quantity. These clusters can facilitate many shale-gas upgrade processes, including alkane oxidative dehydrogenation, alkene dimerization/oligomerization and selective alkane oxidation to alcohol. Collaborating with other scientists within the Inorganometallic Catalyst Design Center (ICDC) (a Department of Energy-sponsored Energy Frontier Research Center), we aim to elucidate the structure of the active sites of these MOF-supported catalysts using techniques such as synchrotron X-ray absorption and diffraction, microscopic imaging, and computational modeling.



Recent Articles: ACS Appl Mater Interfaces **2018**, 10 (17), 15073-15078., *ChemCatChem* **2018**, 10 (8), 1772-1777., *Chem Int Ed Engl* **2018,** *57* (4), 909-913.