

Miriam A. Bowring

Assistant Professor
Department of Chemistry
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Education

University of California, Berkeley, CA 2008 – 2013

Ph.D. in chemistry

Research advisors: Profs. Robert G. Bergman and T. Don Tilley

Yale University, New Haven, CT 2002 – 2006

B.S. in chemistry, magna cum laude with distinction in chemistry

Research advisor: Prof. Robert H. Crabtree

Research Experience

Yale University, Department of Chemistry 2015 – 2016
and

University of Washington, Department of Chemistry 2013 – 2015
with Prof. James M. Mayer:

Studying multiple-site concerted proton coupled electron transfer faster than the diffusion limit through synthesis of unimolecular phenol-base-oxidant triads and variable temperature ultrafast laser spectroscopy.

University of California, Berkeley, Department of Chemistry 2008 – 2013

Lawrence Berkeley National Laboratory, Chemical Sciences Division

with Profs. Robert G. Bergman and T. Don Tilley, and undergraduate student Kathryn Liu:

Hydroarylation mechanism

Showed that hydroarylation of unactivated olefins effected by Pt(II) precatalysts proceeds through the in situ production of protic acid followed by a Friedel-Crafts mechanism.

Hydrocarbon rearrangement

Discovered a new catalytic hydrocarbon rearrangement. Designed, synthesized, and crystallographically characterized an improved Pt precatalyst for the rearrangement. Developed a proposed mechanism that includes catalytic C–C activation directed by C–H activation.

Platinum dication

Synthesized, isolated, and crystallographically characterized a dicationic Pt complex supported by weakly coordinating counterions. Demonstrated that the Pt dication carries out allylic C–H activation and other hydrocarbon activation reactions.

with Prof. Charles B. Harris and graduate student Adam D. Hill:

Synthesized Fe(diene)(CO)₃ complexes which were used to study how factors other than chemical exchange of the CO ligands can cause spectroscopic coalescence.

Yale University, Department of Chemistry

2005 – 2006

with Prof. Robert H. Crabtree and post-doctoral fellow Audrey Moores:

Screened a series of Ir catalysts for N-alkylation of amines with alcohols by alcohol dehydrogenation, imine formation, and imine hydrogenation. Identified promising catalysts using a model substrate for an intramolecular reaction.

Massachusetts Institute of Technology, Department of Chemistry

2005

with Prof. Gregory C. Fu and graduate student Jonathan E. Wilson:

Explored substrate scope for the asymmetric synthesis of functionalized cyclopentenes via [3+2] cycloadditions of allenes with enones using chiral phosphine catalysts. Identified and pursued synthetic application of the cycloaddition to an anticancer drug.

University of Pennsylvania, Department of Chemistry

2004

with Prof. Marisa C. Kozlowski and graduate students Erin M. O'Brien and Carol A. Mulrooney:

Contributed to the total synthesis of perylenequinone natural products. Developed catalytic conditions for the Wacker oxidation of a synthetic intermediate.

Teaching Experience

University of Washington, Department of Chemistry

- Guest Lecturer, Honors General Chemistry 2014
- Visiting Science Teacher to Roosevelt High School with NSF Center for Enabling New Technologies through Catalysis 2014
- Guest Lecturer, Inorganic Chemistry 2013

Seattle University, Department of Chemistry

Guest Lecturer, Organic Chemistry III 2014

University of California, Berkeley, Department of Chemistry

- Teaching Team Leader, Bay Area Scientists in Schools 2008 – 2013
Designed lessons for fifth grade students and led teams of scientists in presenting them monthly.

- Research Mentor, Research for Advanced Undergraduates 2010 – 2013
Research Mentor, Science Undergraduate Laboratory Internship
Supervised an undergraduate student in the research laboratory.
- Guest Lecturer, Introduction to Research and Study in the College of Chemistry 2012
- Graduate Student Instructor, Organometallics (Prof. T. Don Tilley) 2009, 2010
Prepared and graded all assignments and exams; gave several lectures; held weekly office hours.
- Research Mentor, Berkeley Lab Internships for Precollegiate Scholars 2009
Supervised a high school student in the research laboratory.
- Graduate Student Instructor, Organic Chemistry (Prof. Steven Pedersen) 2008
Supervised a laboratory section of 28 undergraduate students for four hours each week, and held weekly office hours. Graded exams, problem sets, and laboratory reports, and held brief lectures at the beginning of each laboratory period.

Chapel Hill-Chauncy Hall School, Waltham, MA

- Chemistry Teacher 2006 – 2008
Taught chemistry for high school students (10th grade through post-graduate), four sections each year. Designed the curriculum independently, including all lesson plans and laboratory exercises. Coached two sports and advised a student club.

Honors and Awards

- NIH Ruth Kirschstein National Research Service Award Individual Postdoctoral Fellowship (2014)
- Student Mentoring and Research Teams grant, University of California, Berkeley (2013)
- American Chemical Society Division of Inorganic Chemistry Travel Award (2013)
- Distinguished Education Partner, Community Resources for Science (2012)
- Outstanding Volunteer Award, Community Resources for Science (2012)
- David and Meriko Watanabe Travel Grant, University of California, Berkeley Department of Chemistry (2012)
- Graduate Division Conference Travel Grant, University of California, Berkeley (2010)
- Honorable Mention, Ford Foundation Predoctoral Fellowship (2009)
- Phi Beta Kappa (2006)
- NSF-REU Fellowship at the Massachusetts Institute of Technology Center for Materials Science and Engineering (2005)
- NSF-REU Fellowship at the University of Pennsylvania Laboratory for Research on the Structure of Matter (2004)
- American Chemical Society (Philadelphia Section) Award for Excellence in Chemistry (2002)

Service

Yale University, New Haven, CT

Volunteer women's ultimate frisbee coach 2015-present

University of Washington, Seattle, WA

Volunteer outreach teacher with NSF Center for Enabling New Technologies through Catalysis 2014

University of California, Berkeley, CA

- Founding Student Chair, Chemical Sciences Division Catalysis Group, Lawrence Berkeley National Laboratory 2012-2013
- Department of Chemistry volunteer 2008-2013
 - Hosted prospective undergraduate students.
 - Acted as peer advisor for first-year graduate students.
 - Served on student-hosted inorganic seminar committee.
 - Judged undergraduate poster session.
 - Spoke on Choosing a Research Group panel (through Iota Sigma Pi, National Honor Society of Women in Chemistry).
 - Helped develop green chemistry curriculum (through Berkeley Center for Green Chemistry).
 - Hosted disadvantaged high school students (through Experience Berkeley).
 - Wrote online content for community outreach (through Science@Cal).
- Bay Area Scientists in Schools classroom volunteer, team leader 2008-2013
- Bay Area Scientists in Schools Steering Committee member 2009-2013
- Community Resources for Science Advisory Board member 2010-2013
- Chancellor's Advisory Committee on LGBT Community member 2011-2013

Publications

Bowring, M. A.; Bradshaw, L. R.; Pollock, T.; Schlenker, C. W.; Gamelin, D. R.; Mayer, J. M. Nearly Barrierless Multiple-Site Concerted Proton Electron Transfer. Manuscript in preparation.

Bowring, M. A.; Bergman, R. G.; Tilley, T. D. Isolation of a Dicationic Platinum Complex with Two Accessible Coordination Sites. *Organometallics*, **2013**, *32* (19), 5266–5268.

Bowring, M. A.; Bergman, R. G.; Tilley, T. D. Pt-Catalyzed C–C Activation Induced by C–H Activation. *Journal of the American Chemical Society*, **2013**, *135* (35), 13121–13128.

Hill, A. D.; Zoerb, M. C.; Nguyen, S. C.; Lomont, J. P.; **Bowring, M. A.**; Harris, C. B. Determining Equilibrium Fluctuations Using Temperature-Dependent 2D-IR. *Journal of Physical Chemistry B*, **2013**, *117* (49), 15346-15355.

Bowring, M. A.; Bergman, R. G.; Tilley, T. D. Disambiguation of Metal and Brønsted Acid Catalyzed Pathways for Hydroarylation with Platinum(II) Catalysts. *Organometallics*, **2011**, *30*, 1295-1298.

Presentations

Bowring, M. A.; Bradshaw, L. R.; Gamelin, D. R.; Mayer, J. M. Fast Unimolecular Multiple-site CPET over a Large Temperature Range. 250th American Chemical Society National Meeting, Boston, MA, August 2015.

Bowring, M. A.; Bradshaw, L. R.; Gamelin, D. R.; Mayer, J. M. Unimolecular Model to Probe Multiple-Site Concerted Proton Electron Transfer. 248th Organometallic Chemistry Gordon Conference, Newport, RI, July 2015. (poster)

Bowring, M. A.; Bradshaw, L. R.; Gamelin, D. R.; Mayer, J. M. Unimolecular Model to Probe Multiple-Site Concerted Proton Electron Transfer. International Conference of Computational Methods in Sciences and Engineering 2015, Symposium on Photophysics of Electron and Proton Transfer; Proton Coupled Electron Transfer in Organic Dyes and Biological Systems, Athens, Greece, March 2015.

Bowring, M. A. Breaking C–C and C–H Bonds Using Platinum. Chemistry Department Seminar, Reed College, Portland, OR, February 2015.

Bowring, M. A. Breaking C–C and C–H Bonds Using Platinum. Natural Science Seminar Series, Seattle University, Seattle, WA, October 2014.

Bowring, M. A.; Bradshaw, L. R.; Gamelin, D. R.; Mayer, J. M. Unimolecular Model to Probe Multiple-Site Concerted Proton Electron Transfer. 248th American Chemical Society National Meeting, San Francisco, CA, August 2014. (poster)

Bowring, M. A.; Bradshaw, L. R.; Gamelin, D. R.; Mayer, J. M. Unimolecular Model to Probe Multiple-Site Concerted Proton Electron Transfer. Second International Conference on Proton-Coupled Electron Transfer, Skokloster, Sweden, June 2014.

Bowring, M. A. Catalytic C–H and C–C Bond Activation by Platinum(II) Complexes. Inorganic Division Seminar, University of Washington, Seattle, WA, January 2014.

Bowring, M. A.; Bergman, R. G.; Tilley, T. D. Pt-Catalyzed C–C Activation Induced by C–H Activation. 245th American Chemical Society National Meeting, New Orleans, LA, April 2013.

Bowring, M. A.; Bergman, R. G.; Tilley, T. D. A Catalytic Hydrocarbon Rearrangement via C–H and C–C Activation. Organometallic Chemistry Gordon Conference, Newport, RI, July 2012. (poster)

Bowring, M. A.; Bergman, R. G.; Tilley, T. D. Mechanism of Hydroarylation with Platinum Catalysts. Organometallic Chemistry Gordon Conference, Newport, RI, July 2010. (poster)