

Hao Xu, Ph.D.

Curriculum Vitae

Georgia State University
Department of Chemistry
Petit Science Center 319
100 Piedmont Ave. SE
Atlanta, GA 30303

Tel: (404) 413-5553

Fax: (404) 413-5505
<http://sites.gsu.edu/hxu>
hxu@gsu.edu

Employment

Georgia State University

Department of Chemistry, College of Arts and Sciences, Atlanta, GA
Associate Professor of Chemistry with Tenure (2016–Present)
Assistant Professor of Chemistry (2010–2016)

Research Interests

Synthetic and mechanistic organic chemistry for applications in biomedical science. Discovery of new catalytic reactions directed towards synthetic chemistry.

Current Research Topics

Discovery of iron-catalyzed nitrogen atom transfer reactions for stereoselective olefin functionalization.

We are interested in discovering general and selective catalytic reactions that transform readily available feedstock to high value functional molecules through novel mechanistic pathways. One of our current research focuses is to develop iron-catalyzed nitrogen atom-transfer methods for stereoselective olefin functionalization, including olefin aminohydroxylation, aminofluorination, and diamination reactions. These transformations capitalize on the novel reactivity of iron catalysts and they can conveniently convert petro-chemicals to highly functionalized building blocks that are valuable to organic synthesis, material and biomedical sciences.

Education

Harvard University

Camille and Henry Dreyfus Postdoctoral Fellow with Professor Eric Jacobsen
Department of Chemistry and Chemical Biology, Cambridge, MA (August 2006–July 2010)
Research Topic: Green catalytic methods for complex-molecule synthesis.

The Scripps Research Institute

Ph.D. Studies in Synthetic Organic Chemistry with Professor K. C. Nicolaou
Department of Chemistry, La Jolla, CA (July 2001–July 2006)
Dissertation: The total synthesis of complex anticancer natural products: 1-O-methylateriflorone, gambogin and floresolide.

Peking University B.S. in Chemistry

Department of Chemistry, Beijing, People's Republic of China (September 1997–July 2001)

Awards and Honors

- Alfred P. Sloan Research Fellowship 2015
- Dean's Early Career Award (Georgia State University) 2015
- CAPA Biomatik Distinguished Junior Faculty Award 2015
- National Science Foundation CAREER Award (declined due to funding overlap) 2014
- Thieme Chemistry Journal Award 2014
- Camille and Henry Dreyfus Postdoctoral Fellowship 2006–2009
- Bristol–Myers Squibb Graduate Fellowship in Synthetic Organic Chemistry 2005–2006
- Lesly Starr Shelton Award for Excellence in Chemistry Graduate Studies 2005
- Skaggs Research Predoctoral Fellowship 2003–2006
- Wu–Si Award for Outstanding Junior Students in Peking University 1999–2000
- Peking University President Award for Outstanding Freshmen 1998–1999
- Finalist and Silver Medal in the National Chemistry Olympiad, China 1997
- Finalist and Bronze Medal in the National Physics Olympiad, China 1996

Current Research Support

NIH R01 GM 110382 Xu (PI) 05/01/2014–02/28/2019

National Institute of General Medical Sciences

Selective Nitrogen Atom Transfer for Applications in Biomedical Sciences: \$ 1,405,000

NIH R01 GM 110382-03S1 Xu (PI) 07/14/2016–02/28/2019

National Institute of General Medical Sciences

Selective Nitrogen Atom Transfer for Applications in Biomedical Sciences: \$ 99,177 (instrument supplement)

Sloan Research Fellowship Xu (PI) 09/15/2015–9/14/2017

Alfred P. Sloan Foundation: \$ 50,000

Complete Research Support

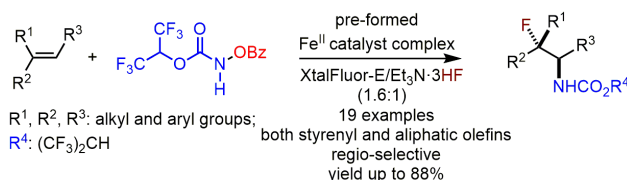
PRF #51571-DNI 1 Xu (PI) 09/01/2011–08/31/2014

American Chemical Society Petroleum Research Fund

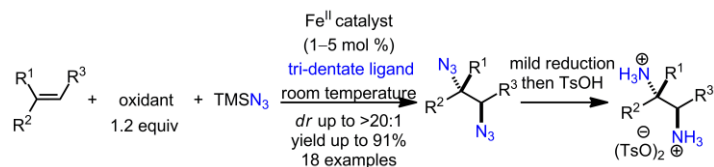
Catalytic Enantioselective Phenolic Oxidation by Cooperative Catalysis: \$ 100,000

Publications from Independent Research

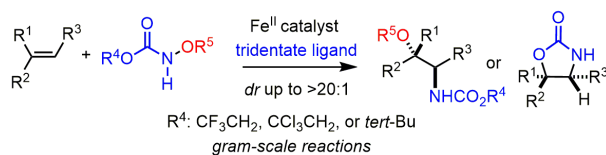
23. Lu, D.-F.; Zhu, C.-L.; Sears, J. D.; Xu, H.* "Iron(II)-Catalyzed Intermolecular Aminofluorination of Unfunctionalized Olefins Using Fluoride Ion" *J. Am. Chem. Soc.* **2016**, *138*, DOI: 10.1021/jacs.6b07221



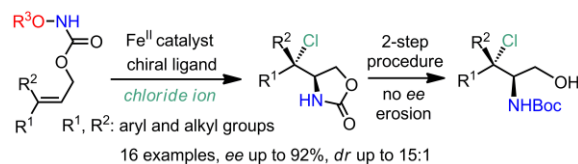
22. Yuan, Y.-A.; Lu, D.-F.; Chen, Y.-R.; Xu, H.* “Iron-Catalyzed Direct Diazidation for a Broad Range of Olefins” *Angew. Chem. Int. Ed.* 2016, 55, 534.



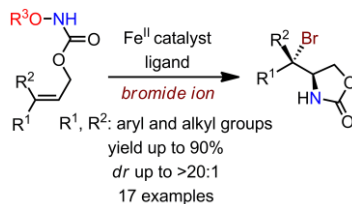
21. Zhu, C.-L.; Lu, D.-F.; Sears, J. D.; Jia, Z.-X.; Xu, H.* “Practical Synthetic Procedures of the Iron-Catalyzed Intermolecular Olefin Aminohydroxylation Using Functionalized Hydroxylamines” *Synthesis* 2016, 48, DOI: 10.1055/s-0035-1562515 (Invited Contribution for Practical Synthetic Procedure Series).



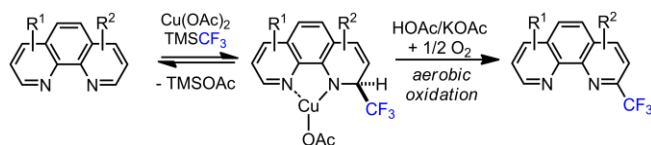
20. Zhu, C.-L.; Tian, J.-S.; Gu, Z.-Y.; Xing, G.-W.; Xu, H.* “Iron(II)-Catalyzed Asymmetric Intramolecular Olefin Aminochlorination with Chloride Ion” *Chem. Sci.* 2015, 6, 3044.



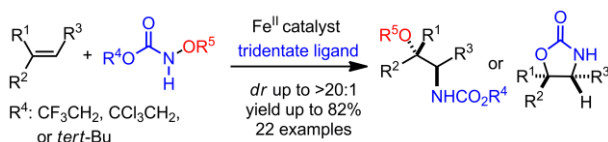
19. Tian, J.-S.; Zhu, C.-L.; Chen, Y.-R.; Xu, H.* “Iron-Catalyzed Diastereoselective Olefin Aminobromination with Bromide Ion” *Synthesis* 2015, 47, 1709 (Invited Contribution for Special Issue–Iron in Organic Synthesis).



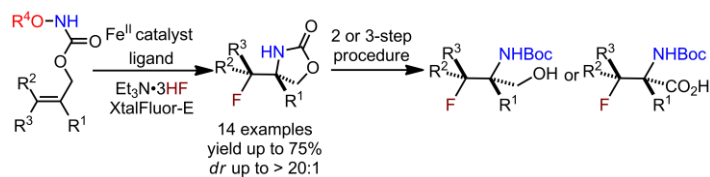
18. Zhu, C. L.; Zhang, Y. Q.; Yuan, Y. A.; Xu, H.* “Copper-Catalyzed Aerobic C–H Trifluoromethylation of Phenanthrolines.” *Synlett.* 2015, 26, 345 (Invited Cluster Report–Catalysis with Sustainable Metals).



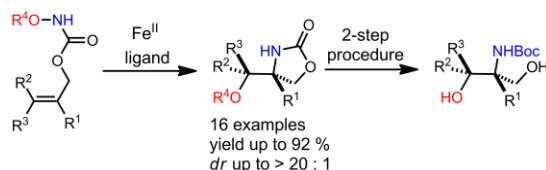
17. Lu, D. F.; Zhu, C. L.; Jia, Z. X.; Xu, H.* “Iron(II)-Catalyzed Intermolecular Amino-Oxygenation of Olefins through the N–O Bond Cleavage of Functionalized Hydroxylamines” *J. Am. Chem. Soc.* 2014, 136, 13186.



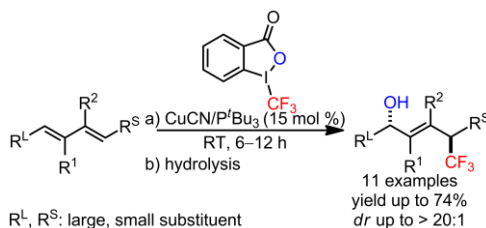
16. Lu, D. F.; Liu, G. S.; Zhu, C. L.; Yuan, B.; Xu, H.* "Iron(II)-Catalyzed Intramolecular Olefin Aminofluorination." *Org. Lett.* 2014, 16, 2912.



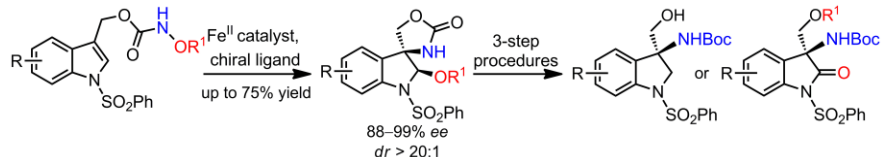
15. Liu, G. S.; Zhang, Y. Q.; Yuan, Y. A.; Xu, H.* "Iron(II)-Catalyzed Intramolecular Aminohydroxylation of Olefin with Functionalized Hydroxylamines." *J. Am. Chem. Soc.* 2013, 135, 3343.



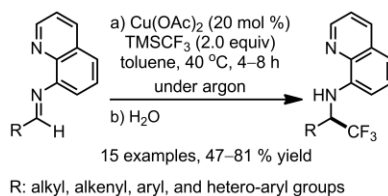
14. Lu, D. F.; Zhu, C. L.; Xu, H.* "Copper(I)-Catalyzed Diastereoselective Hydroxytrifluoromethylation of Dienes Accelerated by Phosphine Ligands" *Chem. Sci.* 2013, 4, 2478.



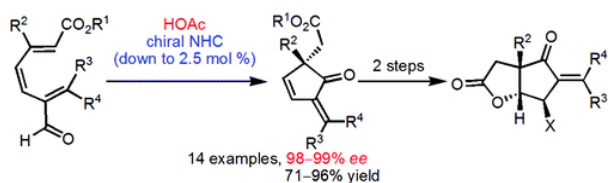
13. Zhang, Y. Q.; Yuan, Y. A.; Liu, G. S.; Xu, H.* "Iron(II)-Catalyzed Asymmetric Intramolecular Aminohydroxylation of Indoles." *Org. Lett.* 2013, 15, 3910.



12. Zhang, Y. Q.; Liu, J. D.; Xu, H.* "Copper(II)-Catalyzed Trifluoromethylation of N-Aryl Imines." *Org. Biomol. Chem.* 2013, 11, 6242.



11. Liu, G. S.; Wilkerson, P. D.; Toth, C. A.; Xu, H.* "Highly Enantioselective Cyclizations of Conjugated Trienes with Low Catalyst Loadings: A Robust Chiral NHC Enabled by Acetic Acid Cocatalyst." *Org. Lett.* 2012, 14, 858.



Publications during Postdoctoral, Ph.D. and Undergraduate Research

10. Xu, H.; Zuend, S. J.; Woll, M. G.; Tao, Y.; Jacobsen, E. N. "Asymmetric Cooperative Catalysis of Strong Brønsted Acid-Promoted Reactions using Chiral Ureas." *Science* **2010**, 327, 986.
9. Xu, H.; Zhang, H.; Jacobsen, E. N. "Enantioselective Catalytic Povarov Reactions to Access Stereochemically Rich Tetrahydroquinolines. Asymmetric Catalysis of Strong Brønsted Acid-Promoted Reactions Using Chiral Ureas." *Nat. Protoc.* **2014**, 9, 1860.
8. Gerard, B.; O'Shea, M. W.; Donckele, E.; Kesavan, S.; Akella, L. B.; Xu, H.; Jacobsen, E. N.; Marcaurelle, L. A. "Application of a Catalytic Asymmetric Povarov Reaction using Chiral Ureas to the Synthesis of a Tetrahydroquinoline Library." *ACS Comb. Sci.* **2012**, 14, 621.
7. Hayden, A. E.; Xu, H.; Nicolaou, K. C.; Houk, K. N. "Origins of Selectivity in Pericyclic Reaction Cascades for the Synthesis of Gambogin and Lateriflorone." *Org. Lett.* **2006**, 8, 2989.
6. Nicolaou, K. C.; Xu, H. "Total Synthesis of Floresolide B and $\Delta^{6,7}$ -Z-floresolide B." *Chem. Comm.* **2006**, 600.
5. Nicolaou, K. C.; Xu, H.; Wartmann, M. "Biomimetic Total Synthesis of Gambogin and Rate Acceleration of Pericyclic Reactions in Aqueous Media." *Angew. Chem. Int. Ed.* **2005**, 44, 756.
4. Nicolaou, K. C.; Sasmal, P. K.; Xu, H. "Biomimetically Inspired Total Synthesis and Structure Activity Relationships of 1-O-Methylateriflorone. 6π Electrocyclizations in Organic Synthesis." *J. Am. Chem. Soc.* **2004**, 126, 5493.
3. Nicolaou, K. C.; Sasmal, P. K.; Xu, H.; Namoto, K.; Ritzén, A. "Total Synthesis of 1-O-Methylateriflorone." *Angew. Chem. Int. Ed.* **2003**, 42, 4225.
2. Yao, W.; Liao, M.; Zhang, X.; Xu, H.; Wang, J. "The Study of $Rh_2(OAc)_4$ or $BF_3 \cdot OEt_2$ -Mediated Reaction of Thiolacetic Acid with α -Diazocarbonyl Compounds." *Eur. J. Org. Chem.* **2003**, 1784.
1. Liu, X.; Xu, H.; Fang, Y.; Cui, Y.; Xu, P. "NMR Study of 6-Aryl-3-cinchopheny-1,2,4-triazolo[3,4-b]1,3,4-thiadiazoles." *Magn. Reson. Chem.* **2001**, 39, 411.

Invited Seminars

University of Florida, Department of Chemistry, March 31, 2016.

Florida State University, Department of Chemistry and Biochemistry, March 24, 2016.

Vanderbilt University, Department of Chemistry, March 20, 2016.

The Ohio State University, Department of Chemistry and Biochemistry, March 2, 2016.

PacificChem 2015, "Chemical Glycosylation: Methods and Mechanisms", Invited Seminar, December 19, 2015.

PacificChem 2015, "Cognizance of Endangered Elements for Organic Synthesis", Invited Seminar, December 15, 2015.

Cornell University, Department of Chemistry and Chemical Biology, October 22, 2015.

University of Rochester, Department of Chemistry, October 16, 2015.
Emory University, Department of Chemistry, October 7, 2015.
University of Georgia, Department of Chemistry, September 10, 2015.
250th American Chemical Society National Meeting, Young Academic Investigator's Symposium, August 16–20, 2015.
The Scripps Research Institute, Department of Chemistry, May 1, 2015.
University of California, Irvine, Department of Chemistry, April 29, 2015.
University of California, Santa Barbara, Department of Chemistry and Biochemistry, April 27, 2015.
University of California, Los Angeles, Department of Chemistry and Biochemistry, April 23, 2015.
University of Southern California, Department of Chemistry, April 22, 2015.
Bristol–Myers Squibb, New Brunswick, April 8, 2015.
University of Pennsylvania, Department of Chemistry, April 6, 2015.
University of Michigan, Department of Chemistry, March 19, 2015.
Princeton University, Bristol–Myers Squibb Lecture in Organic Synthesis, Department of Chemistry, March 12, 2015.
University of Delaware, Department of Chemistry and Biochemistry, March 10, 2015.
University of Texas, Austin, Department of Chemistry, December 12, 2014.
Amgen Cambridge, December 9, 2014.
Brandeis University, Department of Chemistry, December 8, 2014.
Boston College, Department of Chemistry, December 4, 2014.
Texas A&M University, Department of Chemistry, November 20, 2014.
UT Southwestern Medical Center at Dallas, Department of Biochemistry, November 18, 2014.
The University at Buffalo, Department of Chemistry, November 10, 2014.
North Carolina State University, Department of Chemistry, November 5, 2014.
Duke University, Department of Chemistry, November 4, 2014.
University of Pittsburgh, Department of Chemistry, October 30, 2014.
Purdue University, Department of Chemistry, October 21, 2014.
The Ohio State University, Department of Chemistry and Biochemistry, October 7, 2014.
Wayne State University, Department of Chemistry, September 23, 2014.
Michigan State University, Department of Chemistry, September 22, 2014.
Toledo University, Department of Chemistry, September 21, 2014.
Washington University in St. Louis, Department of Chemistry, September 18, 2014.
West Virginia University, Department of Chemistry, September 3, 2014.
Shanghai Institute of Organic Chemistry, August 16, 2013.
Nagoya University, Department of Applied Chemistry, “Green Material Conversion Lecture”, Nagoya, Japan, July 31, 2013.