

# LIVIU M. MIRICA

Washington University in St. Louis  
Department of Chemistry, Campus Box 1134  
One Brookings Drive, St. Louis, MO 63130-4899

Phone: (314) 935-3464  
Fax: (314) 935-4481  
Email: mirica@wustl.edu

---

## PROFESSIONAL POSITIONS

2008-present **Assistant Professor**, Department of Chemistry, Washington University in St. Louis

2005-2008 **NIH Postdoctoral Fellow**, University of California, Berkeley  
Advisor: *Professor Judith P. Klinman*

## EDUCATION

1999–2005 Ph.D., Chemistry (GPA 4.0), **Stanford University**, Stanford, CA  
Thesis title: “Mechanistic Investigations of Model Complexes Relevant to Copper-Containing Enzymes.” Graduate Advisor: *Professor T. Daniel P. Stack*

1996–1999 B.S., Chemistry (GPA 4.0), **California Institute of Technology**, Pasadena, CA  
Undergraduate Research Advisor: *Professor Harry B. Gray*

## AWARDS AND HONORS

- NIH–NRSA Postdoctoral Fellowship, 2007-2008
- Young Investigator Award, Division of Inorganic Chemistry, ACS, 2006
- Franklin Veatch Memorial Fellowship, Stanford University, 2004-2005
- Stanford Graduate Fellowship, Stanford University, 1999-2003
- Taube Prize, Stanford University, 1999
- Merck Index Award for Excellence in Chemistry, California Institute of Technology, 1999
- Carnation Merit Award, California Institute of Technology, 1997-1998
- Silver Medal, International Chemistry Olympiad, Beijing, China, 1995
- Gold Medal, International Chemistry Olympiad, Oslo, Norway, 1994

## AFFILIATIONS

- American Association for the Advancement of Science
- American Chemical Society
- The Society of Biological Inorganic Chemistry
- Elected Member, Sigma Xi (Scientific Research Society)
- Elected Member, Tau Beta Pi (Engineering Honors Society)

## RESEARCH INTERESTS

Design, synthesis, and characterization of polymetallic complexes as potential catalysts for water oxidation in the context of renewable energy catalysis. The targeted catalysts capable of water oxidation can potentially be used in tandem with photovoltaic cells to construct artificial photosynthetic centers.

Development of specific inhibitors of histone demethylases, a new class of enzymes that play an important role in regulating transcription and epigenetic inheritance. The developed inhibitors could be used as tools for studying the role of histone demethylases in cell function and development. Insights into the specificity of these enzymes will provide opportunities to advance therapeutics related to stem cell technology and cancer treatment.

Investigation of the interaction of transition metal ions with amyloid  $\beta$  (A $\beta$ ) peptides and their role in amyloid plaque formation in Alzheimer's Disease. Development of inhibitors of A $\beta$  peptide aggregation using a novel bifunctional strategy that could provide improved strategies for the prevention, diagnosis, and treatment of AD.

## PUBLICATIONS

15. Op't Holt B. T., Vance M. A., Mirica L. M., Heppner D. E., Stack T. D. P., Solomon E. I. "Reaction Coordinate of a Functional Model of Tyrosinase: Spectroscopic and Computational Characterization" *J. Am. Chem. Soc.*, **2009**, *131*, ASAP
14. Humphreys, K. J.; Mirica, L. M.; Wang Y.; Klinman, J. P. "Galactose Oxidase as a Model for Reactivity at a Copper Superoxide Center." *J. Am. Chem. Soc.*, **2009**, *131*, ASAP.
13. Mirica, L. M.; McCusker, K. P.; Munos, J. W.; Liu, H. W.; Klinman, J. P. "Probing the Nature of Reactive Fe/O<sub>2</sub> Intermediates in Non-Heme Iron Enzymes through <sup>18</sup>O Kinetic Isotope Effects." *J. Am. Chem. Soc.*, **2008**, *130*, 8122-8123.
12. Mirica, L. M.; Klinman, J. P. "The Nature of O<sub>2</sub> Activation by the Ethylene-Forming Enzyme ACC Oxidase." *Proc. Natl. Acad. Sci. U. S. A.*, **2008**, *105*, 1814-1819.
11. Welford, R. W. D.; Lam, A.; Mirica, L. M.; Klinman, J. P. "Partial Conversion of *Hansenula polymorpha* Amine Oxidase into a 'Plant' Amine Oxidase: Implications for Copper Chemistry and Mechanism." *Biochemistry*, **2007**, *46*, 10817-10827.
10. Thrower, J. T.; Mirica, L. M.; McCusker, K. P.; Klinman, J. P. "Mechanistic Investigations of 1-Aminocyclopropane 1-Carboxylic Acid Oxidase with Alternate Cyclic and Acyclic Substrates." *Biochemistry*, **2006**, *45*, 13108-13117.
9. Mirica, L. M.; Rudd, D. J.; Vance, M.; Solomon, E. I.; Hedman, B.; Hodgson, K. O.; Stack, T. D. P. "A  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxodicopper(II) Complex with a Secondary Diamine Ligand: A Functional Model of Tyrosinase." *J. Am. Chem. Soc.*, **2006**, *128*, 2654-2665.
8. Cole, A. P.; Mahadevan, V.; Mirica, L. M.; Ottenwaelde, X.; Stack, T. D. P. "Bis( $\mu$ -oxo)dicopper(III) Complexes of a Homologous Series of Simple Peralkylated 1,2-Diamines: Steric Modulation of Structure, Stability, and Reactivity." *Inorg. Chem.*, **2005**, *44*, 7345-7364.
7. Yoon, J.; Mirica, L. M.; Stack, T. D. P.; Solomon, E. I. "Variable-Temperature Variable-Field Magnetic Circular Dichroism Studies of Tris-Hydroxy and  $\mu_3$ -Oxo Bridged Trinuclear Cu(II) Complexes: Geometric and Electronic Structures of the Native Intermediate of Multicopper Oxidases." *J. Am. Chem. Soc.*, **2005**, *127*, 13680-13693.
6. Mirica, L. M.; Vance, M.; Rudd, D. J.; Hedman, B.; Hodgson, K. O.; Solomon, E. I.; Stack, T. D. P. "Tyrosinase Reactivity in a Model Complex: An Alternative Hydroxylation Mechanism." *Science*, **2005**, *308*, 1890-1892. Featured as a perspective in *Science*, **2005**, *308*, 1876-1877 and a science concentrate in *Chem. & Eng. News*, **2005**, *83*, 26, 38.

5. Mirica, L. M.; Stack, T. D. P. “A Tris( $\mu$ -hydroxy)tricopper(II) Complex as a Model of the Native Intermediate in Laccase and Its Relationship to a Binuclear Analogue.” *Inorg. Chem.*, **2005**, *44*, 2131-2133.
4. Pratt, R. C.; Mirica, L. M.; Stack, T. D. P. “Snapshots of a Metamorphosing Cu(II) Ground State in a Galactose Oxidase-Inspired Complex.” *Inorg. Chem.*, **2004**, *43*, 8030-8039.
3. Yoon, J.; Mirica, L. M.; Stack, T. D. P.; Solomon, E. I. “Spectroscopic Demonstration of a Large Antisymmetric Exchange Contribution to the Spin-Frustrated Ground State of a  $D_3$  Symmetric Hydroxy-Bridged Trinuclear Cu(II) Complex: Ground-to-Excited State Superexchange Pathways.” *J. Am. Chem. Soc.*, **2004**, *126*, 12586-12595.
2. Mirica, L. M.; Ottenwaelder, X.; Stack, T. D. P. “Structure and Spectroscopy of Copper–Dioxygen Complexes.” *Chem. Rev.*, **2004**, *104*, 1013-1046.
1. Mirica, L. M.; Vance, M.; Rudd, D. J.; Hedman, B.; Hodgson, K. O.; Solomon, E. I.; Stack, T. D. P. “A Stabilized  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxicopper(II) Complex with a Secondary Diamine Ligand and Its Tyrosinase-like Reactivity.” *J. Am. Chem. Soc.* **2002**, *124*, 9332-9333.

## PRESENTATIONS and CONFERENCES

12. “Renewable Energy Catalysis: The Study of Water Oxidation by Bimetallic Complexes.” Poster presentation, *Renewable Energy: Solar Fuels Gordon Research Conference*, Ventura, February 2009.
11. “The Nature of  $O_2$  Activation by the Ethylene-Forming Enzyme ACC Oxidase.” Poster presentation, *Metals in Biology Gordon Research Conference*, Ventura, January 2008.
10. “Mechanistic Studies of the Ethylene-forming Enzyme ACC Oxidase.” Invited Oral Presentation, *13th International Conference on Biological Inorganic Chemistry*, Vienna, Austria, July 2007.
9. “Tyrosinase Reactivity in a Model Complex: An Alternative Hydroxylation Mechanism.” Invited Lecture, Young Investigator Symposium, *232<sup>nd</sup> National Meeting of the American Chemical Society*, San Francisco, September 2006.
8. “Mechanistic Studies of the Ethylene-forming Enzyme ACC Oxidase.” Poster presentation, *Metals in Biology Gordon Research Conference*, Ventura, January 2006.
7. “Interconversion of  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxicopper(II) and Bis( $\mu$ -oxo)dicopper(III) Complexes: A Theoretical Study.” Poster presentation, *12th International Conference on Biological Inorganic Chemistry*, Ann Arbor, Michigan, August 2005.
6. “Phenolate Hydroxylation Reactivity of a  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxicopper(II) Complex: Peroxide O–O Bond Cleavage Precedes C–O Bond Formation” Invited Lecture, *Gordon Graduate Research Seminar: Bioinorganic Chemistry*, Ventura, January 2005.
5. “Investigation of Tyrosinase-like Reactivity for a Cu/ $O_2$  complex: Insights into the Phenol Hydroxylation Mechanism.” Oral presentation, *227<sup>th</sup> National Meeting of the American Chemical Society*, Anaheim, March 2004.
4. “Theoretical Investigation of the Interconversion of Side-on Peroxo and Bis- $\mu$ -oxo Dicopper Complexes.” Poster presentation, *227<sup>th</sup> National Meeting of the American Chemical Society*, Anaheim, March 2004.

3. “Detection and Characterization of Intermediates during the Hydroxylation of Phenols by a  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxicopper(II) Complex.” Poster presentation, *Gordon Graduate Research Seminar: Bioinorganic Chemistry*, Ventura, January 2004.
2. “Synthesis, Characterization, and Reactivity of a New  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxicopper(II) Complex.” Oral presentation, *224<sup>th</sup> National Meeting of the American Chemical Society*, Boston, August 2002.
1. “Phenol Hydroxylation Reactivity of a  $\mu$ - $\eta^2$ : $\eta^2$ -Peroxicopper(II) Complex.” Poster presentation, *The 4<sup>th</sup> Stanford Graduate Fellowship Symposium*, Stanford University, April 2001.

## PEER REVIEWS

- Reviewer for *Journal of the American Chemical Society* (2) and *Inorganic Chemistry* (5).
- Grant proposal reviewer for the Research Corporation and the National Science Foundation.