# Melissa L. Zastrow

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## EDUCATION

2008-2013 Ph.D. in Inorganic Chemistry, University of Michigan, Ann Arbor, MI
2004-2008 B.S. in Chemistry/Molecular and Cell Biology, University of Connecticut, Storrs, CT

## PROFESSIONAL EXPERIENCE

2017-present Assistant Professor, Department of Chemistry, University of Houston (UH)
2013-2017 Postdoctoral Associate and NIH Ruth L. Kirschstein National Research Service Award Postdoctoral Fellow, Department of Chemistry, Massachusetts Institute of Technology
*Research Advisor:* Stephen J. Lippard
2008-2013 Graduate Research and Teaching Assistant, Department of Chemistry, University of Michigan
*Research Advisor:* Vincent L. Pecoraro
2005-2008 Undergraduate Research Assistant, Department of Chemistry, University of Connecticut
*Research Advisors:* Isabelle Lagadic, Christian Brückner

## HONORS AND AWARDS

2023 Paul Saltman Memorial Award, Metals in Biology Gordon Research Conference
2023 National Science Foundation CAREER Award
2022 UH College of Natural Sciences and Mathematics John C. Butler Excellence in Teaching Award
2020 Maximizing Investigators' Research Award (MIRA), NIGMS-NIH
2015 Ruth L. Kirschstein National Research Service Award, NIBIB/NIGMS-NIH
2013 Rackham One Term Dissertation Fellowship, UM
2009 NIH Chemistry Biology Interface Training Program, UM
2008 University of Connecticut *magna cum laude*
2008 Outstanding Thesis Award (Department of Chemistry), UConn
2008 American Institute of Chemists (AIC) award
2007 Center for Environmental Kinetics Analysis (CEKA) NSF-REU Fellowship at The Pennsylvania State University in the Department of Biochemistry and Molecular Biology, *Research Advisor:* Ming Tien
2007 Catherine DeStefano Rossi Scholar (Department of Chemistry), UConn
2006 Connecticut Business and Industry Association (CBIA)/Pfizer Research Fellowship, UConn

**PUBLICATIONS** (Corresponding author: *; Co-first author: §; Undergraduate/K12: ‡)

18. G. C. Jensen, M. K. Janis, J. Jara,‡ N. Abbasi,‡ M. L. Zastrow* Zinc-Induced Fluorescence Turn-On in Native and Mutant Phycoerythrobilin-Binding Orange Fluorescent Proteins. *Biochemistry* **2023**, *in press.* https://doi.org/10.1021/acs.biochem.3c00183

17. M. K. Janis,§ W. Zou,§ M. L. Zastrow* A Single Site Mutation Tunes Fluorescence and Chromophorylation of an Orange Fluorescent Cyanobacteriochrome. *ChemBioChem* **2023**, *in press*. http://dx.doi.org/10.1002/cbic.202300358

16. U. Huynh, H. N. Nguyen, B. K. Trinh,‡ J. Elhaj,‡ M. L. Zastrow* A bioinformatic analysis of zinc transporters in intestinal *Lactobacillaceae*. *Metallomics* **2023**, *15*, mfad044. http://dx.doi.org/10.1093/mtomcs/mfad044

15. U. Huynh, M. L. Zastrow* Metallobiology of *Lactobacillaceae* in the gut microbiome. *J. Inorg. Biochem.* **2023**, *238*, 112023. http://www.doi.org/10.1016/j.jinorgbio.2022.112023
14. W. Zou, H. N. Nguyen, M. L. Zastrow* Mutant Flavin-Based Fluorescent Protein Sensors for Detecting Intracellular Zinc and Copper in *Escherichia coli*. *ACS Sens.* **2022**, *7*, 3369-3378. http://www.doi.org/10.1021/acssensors.2c01376
13. H. Zhao, M. L. Zastrow* Transition Metals Induce Quenching of Monomeric Near-Infrared Fluorescent Proteins. *Biochemistry* **2022**, *61*, 494-504. http://www.doi.org/10.1021/acs.biochem.1c00705
12. U. Huynh, M. Qiao, J. King,‡ B. Trinh,‡ J. Valdez,‡ Marium Haq,‡ M. L. Zastrow* Differential Effects of Transition Metals on Growth and Metal Uptake for Two Distinct *Lactobacillus* Species. *Microbiol. Spectr.* **2022**, *10*, e01006-21. http://www.doi.org/10.1128/spectrum.01006-21
11. W. Zou, K. Le,‡ M. L. Zastrow* Live Cell Copper-Induced Fluorescence Quenching of the Flavin-Binding Fluorescent Protein CreiLOV. *ChemBioChem* **2020**, *21*, 1356-1363. http://www.doi.org/10.1002/cbic.201900669
10. M.L. Zastrow,§ Z. Huang,§ S. J. Lippard,* HaloTag-Based Hybrid Targetable and Ratiometric Sensors for Intracellular Zinc. *ACS Chem. Biol.*, **2020**, *15*, 396-406. http://www.doi.org/10.1021/acschembio.9b00872
9. L. Ruckthong, M. L. Zastrow, J. A. Stuckey,* V. L. Pecoraro,* A Crystallographic Examination of Predisposition Versus Preorganization in de Novo Designed Metalloproteins. *J. Am. Chem. Soc.* **2016**, *138*, 11979-11988. http://www.doi.org/10.1021/jacs.6b07165
8. M. L. Zastrow,§ R. J. Radford,§ W. Chyan, C. T. Anderson, D. Y. Zhang, A. Loas, T. Tzounopoulos, S. J. Lippard,* Reaction-Based Probes for Imaging Mobile Zinc in Live Cells and Tissues. *ACS Sens.* **2016**, *1*, 32-39. http://www.doi.org/10.1021/acssensors.5b00022
7. C. T. Anderson, R. J. Radford, M. L. Zastrow; D. Y. Zhang, U.-P. Apfel, S. J. Lippard,* T. Tzounopoulos,* Modulation of extrasynaptic NMDA receptors by synaptic and tonic zinc. *Proc. Natl. Acad. Sci. U.S.A.* **2015**, *112*, E2705-E2714. http://www.doi.org/10.1073/pnas.1503348112
6. P. Rivera-Fuentes, A. Wrobel, M. L. Zastrow; M. Khan, J. Georgiou, T. T. Luyben, J. C. Roder, K. Okamoto, S. J. Lippard,* A far-red emitting probe for unambiguous detection of mobile zinc in acidic vesicles and deep tissue. *Chem. Sci.* **2015**, *6*, 1944-1948. http://www.doi.org/10.1039/c4sc03388d
5. F. Yu, V. M. Cangelosi, M. L. Zastrow; M. Tegoni, J. S. Plegaria, A. G. Tebo, C. S. Mocny, L. Ruckthong, H. Qayyum, V. L. Pecoraro,* Protein Design: Toward Functional Metalloenzymes. *Chem. Rev.* **2014**, *114*, 3495-3578. http://www.doi.org/10.1021/cr400458x
4. M. L. Zastrow & V. L. Pecoraro,* Designing Hydrolytic Zinc Metalloenzymes. *Biochemistry* **2014**, *53*, 957-978. http://www.doi.org/10.1021/bi4016617
3. M. L. Zastrow & V. L. Pecoraro,* Designing functional metalloproteins: from structural to catalytic metal sites. *Coord. Chem. Rev.* **2013**, *257*, 2565-2588. http://www.doi.org/10.1016/j.ccr.2013.02.007
2. M. L. Zastrow & V. L. Pecoraro,* Influence of Active Site Location on Catalytic Activity in de Novo-Designed Zinc Metalloenzymes. *J. Am. Chem. Soc.* **2013**, *135*, 5895-5903. http://www.doi.org/10.1021/ja401537t
1. M. L. Zastrow, A. F. A. Peacock, J. A. Stuckey, V. L. Pecoraro,* Hydrolytic catalysis and structural stabilization in a designed metalloprotein. *Nature Chem.* **2012**, *4*, 118-123. http://www.doi.org/10.1038/nchem.1201 **Highlighted in RSC Chemistry World ("Artificial enzymes close in on nature," 27 Nov. 2011) and in ACS C&EN ("Making A Better Enzyme," Dec. 5, 2011, Vol. 89, p. 7, News of The Week).*

**INVITED PRESENTATIONS**

28. 13th International Copper Meeting, Copper 2024: Grand Hotel Vesuvio (Sorrento, Italy), September 15-20, 2024; "*Lactobacillaceae* and copper at the host pathogen interface"
27. University of Michigan, Ann Arbor, MI, March 26, 2024; "Illuminating metal ions in the gut microbiota"
26. Gordon Research Conference – Metals in Biology: Four Points Sheraton/Holiday Inn Express (Ventura, CA), January 21-26, 2024; Paul Saltman Memorial Award lecture, "Cofactor-based fluorescent proteins for illuminating metal ions in bacteria"
25. American Society for Microbiology (ASM) Microbe (Houston, TX), June 15-19, 2023; "Illuminating metal ions in the gut microbiota"
24. University of Colorado Boulder, Boulder, CO, April 7, 2023; "Illuminating metal ions in the gut microbiota"
23. Colorado State University, Fort Collins, CO, April 6, 2023; "Illuminating metal ions in the gut microbiota"
22. North Carolina State University, Raleigh, NC, December 1, 2022; "Illuminating metal ions in the gut microbiota"
21. Duke University, Durham, NC, November 29, 2022; "Illuminating metal ions in the gut microbiota"
20. University of Maryland Baltimore Country, Baltimore, MD, November 4, 2022; "Illuminating metal ions in the gut microbiota"
19. Johns Hopkins University, Baltimore, MD, November 3, 2022; "Illuminating metal ions in the gut microbiota"
18. University of Maryland, Baltimore, MD, November 2, 2022; "Illuminating metal ions in the gut microbiota"
17. The University of Texas at Dallas, Dallas, TX, October 28, 2022; "Illuminating metal ions in the gut microbiota"
16. The Ohio State University, Columbus, OH, October 6, 2022; "Illuminating metal ions in the gut microbiota"
15. Michigan State University, East Lansing, MI, October 5, 2022; "Illuminating metal ions in the gut microbiota"
14. Kent State University, Kent, OH, September 15, 2022; "Illuminating metal ions in the gut microbiota"
13. Case Western Reserve University, Cleveland, OH, September 14, 2022: "Illuminating metal ions in the gut microbiota"
12. University of Akron, Akron, OH, September 13, 2022; "Illuminating metal ions in the gut microbiota"
11. Workshop on Synthetic Organic Chemistry, Sponsored by Organic Syntheses, Inc, Steamboat, CO; August 16-19, 2022.
10. The University of Texas at Austin, Welch Summer Scholars Program Seminar Series, Virtual (recorded and posted on Welch Summer Scholar Program website), August 3, 2022; "Designing new oxygen-independent metal ion sensors using cofactor-based fluorescent proteins"
9. Spring 2022 American Chemical Society National Meeting and Exposition in San Diego (March 20-24, 2022), Advances in Metallodrugs and Metallodiagnostics, "Cofactor-based fluorescent proteins as platforms for new metal ion sensors"

8. 2021 American Chemical Society Southwest Regional Meeting in Austin, TX (October 30-November 3, 2021), Bioinorganic Symposium, "Cofactor-based fluorescent proteins as platforms for new metal ion sensors"
7. The University of Texas at Austin, Welch Summer Scholars Program Seminar Series, Virtual (recorded and posted on Welch Summer Scholar Program website), June 23, 2021; "Elucidating the biochemical roles of metal ions in the gut microbiota using *Lactobacilli* and fluorescent sensors"
6. University of Michigan, Department of Chemistry, Chem 508 – Special Topics in Bioinorganic Chemistry, Virtual (recorded and posted on Society of Biological Inorganic Chemistry website as part of a series of bioinorganic educational resources), February 2, 2021; "Illuminating metal ion trafficking in the gut microbiota"
5. 260th American Chemical Society National Meeting and Exposition in San Francisco (August 16-20, 2020), Advances in Metallodrugs and Metallodiagnostics, "Cofactor-based fluorescent proteins as platforms for new metal ion sensors" Session cancelled due to Covid-19.
4. University of Houston, Department of Biology and Biochemistry, Houston, TX, December 4, 2019; "Uncovering essential metal ion interactions in the gut microbiota"
3. Texas A&M Health Science Center Institute of Biosciences & Technology, Center for Infectious and Inflammatory Diseases, Houston, TX, November 25, 2019; "Uncovering essential metal ion interactions in the gut microbiota"
2. University of Houston, Center for Nuclear Receptors and Cell Signaling, Houston, TX, November 8, 2019; "Uncovering essential metal ion interactions in the gut microbiota"
1. Gordon Research Conference – Cell Biology of Metals: Rey Don Jaime Grand Hotel (Castelldefels, ES), July 14–19, 2019; "Uncovering Essential Metal Interactions in the Gut Microbiota: A Study on *Lactobacillus plantarum* and Zinc"

**FUNDING**

*Current*

1. **PI: M. Zastrow**, Uncovering metal homeostasis mechanisms of *Lactobacillaceae* bacteria in the gut microbiota, The Welch Foundation, 06/01/2023 – 05/31/2026
2. **PI: M. Zastrow**, CAREER: Elucidating the roles of extracellular metal ions in gut microbiota interactions, National Science Foundation, 02/01/2023 – 01/31/2028
3. **PI: M. Zastrow**, Elucidating Molecular-Level Roles of Essential Metals in Gut Bacteria with New Fluorescent Protein-Based Metal Ion Sensors, National Institutes of Health (R35 MIRA ESI), 08/012020 – 07/31/2025

*Completed*

4. **PI: M. Zastrow**, Fluorescent sensors for tracking zinc ion dynamics among intestinal bacteria, University of Houston High Priority Area Research SEED Grants, 06/012020 – 10/31/2021
5. **PI: M. Zastrow**, Designing an anaerobic bilin-based cofactor-binding fluorescent protein, University of Houston Grants to Enhance and Advance Research (GEAR), 06/01/2020 – 08/31/2021
6. **PI: M. Zastrow**, Cofactor-Based Fluorescent Proteins as Platforms for New Zinc Ion Sensors, The Welch Foundation, 06/01/2018 – 05/31/2021

**PROFESSIONAL AND EDUCATIONAL DEVELOPMENT ACTIVITES**

Workshop on Synthetic Organic Chemistry, Sponsored by Organic Syntheses, Inc, Steamboat, CO; August 16–19, 2022.

NSF-CHE Early Career Investigator Workshop, Alexandria, VA; May 19-21, 2019.

ACS Cottrell Scholars Collaborative New Faculty Workshop, Washington, D.C.; August 3-5, 2017.
NIH Annual Mentoring Workshop for New Faculty in Organic and Biological Chemistry, Kansas City, MO; June 6-8, 2017.

## MENTORSHIP

### *Current members*

*Research Associate (1):* Gary Jensen (Spring 2020–present)

*Postdoctoral Associate (1):* Uyen Huynh (Spring 2018–present)

*Graduate Students (3):* Makena Janis (Fall 2019–present), Hazel Nguyen (Fall 2020–present), Ogonna David (Fall 2021–present)

*Undergraduate Students (1):* Molly Rhodes (Fall 2021–present), Quynh Huong Ngoc Nguyen (Fall 2023–present)

### *Previous members*

*Graduate Students (3):* Wenping Zou (Ph.D. 2022, now postdoc at UT Austin), Haowen Zhao (M.S. 2022), Muxin Qiao (M.S. 2022)

*Undergraduate Students (11):* Juventino Valdez (Fall 2017–Spring 2020, now DDS student at UTHealth), Carlos Iniguez (Fall 2017–Spring 2018, now Ph.D. student at OSU), Jonathan Pickett (Fall 2017–Spring 2018, now Ph.D. student at BCM), Brittany Trinh (Spring 2018–Fall 2018, PURS recipient, now Ph.D. student at UW-Madison), Khoa Le (Summer 2018–Spring 2020, SURF recipient, now Ph.D. student at CalTech), Marium Haq (Summer 2018–Spring 2019, now Ph.D. student at U. Oregon), John King (Spring 2019–Fall 2019, SURF recipient, now MChE student at UH), Leon Le (Spring 2019–Fall 2019), Joanna Elhaj (Summer 2020–Spring 2021, SURF and PURS recipient), Nasir Abbasi (Fall 2020–Spring 2022), Jazzmin Jara (Fall 2020–Spring 2022)

*High School Students (8):* Amy Vo (Welch Summer Scholar, Summer 2018, Christopher Shi (Welch Summer Scholar, Summer 2019), Timothy Osazuwa (ACS SEED II, Summer 2019), Jose Alvarado (ACS SEED I, Summer 2019), Bryce Chun (Welch Summer Scholar, Summer 2022), Jasmine Chou (Summer 2022), Wendy Geng (Welch Summer Scholar, Summer 2023), Dimitri Licona (Summer 2023)

## COURSES TAUGHT

CHEM 2233/3333: Inorganic Chemistry I, undergraduate-level, Fall 2017, Spring 2019, Spring 2020, Spring 2021, Spring 2023, Fall 2023
CHEM 1332/1312: Fundamentals of Chemistry 2, undergraduate-level, Fall 2018, Fall 2019, Fall 2021

## PROFESSIONAL ACTIVITIES

### *Community and outreach activities*

Proposal reviewer for National Science Foundation (2023–present)

Alumni Career Panelist for the Chemistry Biology Interface Training Program Annual Symposium at the University of Michigan (Fall 2023)

Proposal reviewer for National Institutes of Health (2023–present)

Judge for the University of Houston College of Pharmacy Department of Pharmacological and Pharmaceutical Sciences (PPS) Research Symposium (2019, 2021, 2022)

Biochemistry & Microbiology Judge for the *Science Engineering Fair of Houston* (Spring 2019, Spring 2020, Spring 2021).

Session Presider for 2021 American Chemical Society Southwest Regional Meeting in Austin, TX (October 30-November 3, 2021), Bioinorganic Symposium

Manuscript reviewer: *Journal of the American Chemical Society*, *Inorganic Chemistry*, *Inorganic Chemistry*, *ACS Sensors*, *Metallomics*, among others

Memberships: American Chemical Society (ACS), International Society for Zinc Biology (ISZB), Society of Biological Inorganic Chemistry (SBIC), American Society of Microbiology (ASM)

***University of Houston service***

Member of Graduate Committee (Fall 2021 – present)

Member of Graduate Admissions/Recruitment Committee (Fall 2018 – present)

Member of two Faculty Search Committees

Member of Graduate Student Research Awards Committee (Spring 2020 – present)

Seminar Coordinator (Summer 2020 – Spring 2022)