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Jeffrey D. Martell

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EDUCATION AND EXPERIENCE

2019–present University of Wisconsin–Madison — Madison, WI
Assistant Professor in Department of Chemistry

2015–2019 University of California, Berkeley — Berkeley, CA
Miller Institute for Basic Research in Science Postdoctoral Fellow
Host: Professor Jeffrey R. Long

2009–2015 Massachusetts Institute of Technology — Cambridge, MA
Ph.D. in Biological Chemistry. GPA: 5.0/5.0
Advisor: Professor Alice Y. Ting

2005–2009 Northwestern University — Evanston, IL
B.A *Summa Cum Laude* in Chemistry and Mathematics. GPA: 3.946/4.000
Advisor: Professor Richard B. Silverman

DISTINCTIONS

2022 Office of Naval Research Young Investigator Award
2022 UW-Madison Graduate Student Faculty Liaison Committee Mentor Award
2021 Hartwell Foundation Individual Biomedical Research Award
2020 UW-Madison University Housing Honored Instructor
2019 Dream Chemistry Award Finalist
2015 Miller Research Fellowship at UC Berkeley
2013 Selected to 63rd Meeting of Nobel Laureates in Lindau, Germany
2012 MIT Department of Chemistry Award for Outstanding Teaching
2011 National Defense Science and Engineering Graduate (NDSEG) Fellowship
2010 Hertz Fellowship Finalist
2009 NSF Graduate Research Fellowship
2009 MIT Edward Clark Walsh Presidential Graduate Fellowship
2009 Oesper-Basolo Outstanding Citizenship Award, Northwestern Department of Chemistry
2008 Phi Beta Kappa Honor Society
2008 Oliver Marcy Scholarship, Northwestern University Weinberg College of Arts and Sciences

PUBLICATIONS AT UW–MADISON

26. Fang, S.; Yin, H.; Delfosse, E.S.; **Martell, J.D.** *Submitted*.

25. Cribari, M.A.; Unger, M.J.; Unarta, I.C.; Ogorek, A.N.; Huang, X; **Martell, J.D.** *J. Am. Chem. Soc*., **2023**, *145*, 27380–27389. https://doi.org/10.1021/jacs.3c08291.

24. Merrifield, J.L.; Pimentel, E.B.; Peters-Clarke, T.M.; Nesbitt, D.J.; Coon, J.J.; **Martell, J.D.** *Bioconjug. Chem.*, **2023**, *34*, 1380–1386. https://doi.org/10.1021/acs.bioconjchem.3c00254.

23. Kohn, E.M.; Konovalov, K.; Gomez, C.A.; Hoover, G.N.; Yik, A.K.; Huang, X.; **Martell, J.D.**

Terminal Alkyne-Modified DNA Aptamers with Enhanced Protein Binding Affinities. *ACS Chem. Biol.*, **2023**, *ASAP*. https://doi.org/10.1021/acschembio.3c00183.

22. Ogorek, A.N.; Zhou, X.; **Martell, J.D.** Switchable DNA Catalysts for Proximity Labeling at Sites of Protein–Protein Interactions. *J. Am. Chem. Soc.*, **2023**, *145*, 16913–16923. https://doi.org/10.1021/jacs.3c05578.

21. Cox, C.A.; Ogorek, A.N.; Habumugisha, J.P.; **Martell, J.D.** Switchable DNA Photocatalysts for Radical Polymerization Controlled by Chemical Stimuli. *J. Am. Chem. Soc.*, **2023**, *145*, 1818–1825. https://doi.org/10.1021/jacs.2c11199.

20. Cribari, M.A.; Unger, M.J.; **Martell, J.D.** A Horseradish Peroxidase–Mediator System for Benzylic C–H Activation. *ACS Catal.*, **2022**, *12*, 12246–12252. https://doi.org/10.1021/acscatal.2c03424.

19. Pimentel, E.B.; Peters-Clarke, T.M.; Coon, J.J.; **Martell, J.D.** DNA-Scaffolded Synergistic Catalysis. *J. Am. Chem. Soc.*, **2021**, *143*, 21402–21409. https://doi.org/10.1021/jacs.1c10757.

18. Stowe, R.L.; Esselman, B.J.; Ralph, V.R.; Ellison, A.J.; **Martell, J.D.**; DeGlopper, K.S.; Schwarz, C.E. Impact of Maintaining Assessment Emphasis on Three-Dimensional Learning as Organic Chemistry Moved Online. *J. Chem. Educ.*, **2020**, *97*, 2408–2420. https://doi.org/10.1021/acs.jchemed.0c00757.

PUBLICATIONS BEFORE UW–MADISON

17. Kim, E.J.; Siegelman, R.L.; Jiang, H.Z.H.; Forse, A.C.; Lee, J.-H.; **Martell, J.D.**; Milner, P.J.; Falkowski, J.M.; Neaton, J.B.; Reimer, J.A.; Weston, S.C.; Long, J.R. Cooperative Carbon Capture and Steam Regeneration with Tetraamine-Appended Metal–Organic Frameworks. *Science*, **2020**, *369*, 392–396.

16. **Martell, J.D.**†; Milner, P.J.†; Siegelman, R.L.; Long, J.R. Kinetics of Cooperative CO_2 Adsorption in Diamine-Appended Variants of the Metal–Organic Framework Mg_2(dobpdc). *Chem. Sci.*, **2020**, *11*, 6457–6471. (†Co-first authors.)

15. Han, Y.; Branon, T.C.; **Martell, J.D.**; Boassa, D.; Shechner, D.; Ellisman, M.H.; Ting, A.Y. Directed Evolution of Split APEX2 Peroxidase. *ACS Chem. Biol.*, **2019**, *14*, 619–635.

14. Forse, A.C.; Milner, P.J.; Lee, J.-H.; Redfearn, H.N.; Siegelman, R.L.; **Martell, J.D.**; Dinakar, B.; Porter-Zasada, L.B.; Gonzalez, M.I.; Neaton, J.B.; Long, J.R.; Reimer, J.A. Elucidating CO_2 Chemisorption in Diamine-Appended Metal–Organic Frameworks. *J. Am. Chem. Soc.*, **2018**, *140*, 18016–18031.

13. Forse, A.C.; Gonzalez, M.I.; Siegelman, R.L.; Witherspoon, V. J.; Jawahery, S.; Mercado, R.; Milner, P.J.; **Martell, J.D.**; Smit, B.; Blümich, B.; Long, J.R.; Reimer, J.A. Unexpected Diffusion Anisotropy of Carbon Dioxide in the Metal–Organic Framework Zn_2(dobpdc). *J. Am. Chem. Soc.*, **2018**, *140*, 1663–1673.

12. Milner, P.J.; **Martell, J.D.**; Siegelman, R.L.; Gygi, D.; Weston, S.C.; Long, J.R. Overcoming multiple CO_2 adsorption steps while minimizing water co-adsorption in bulky diamine-appended variants of Mg_2(dobpdc). *Chem. Sci*., **2018**, *9*, 160–174.

11. **Martell, J.D.**; Porter-Zasada, L.B.; Forse, A.C.; Siegelman, R.L.; Gonzalez, M.I.; Oktawiec, J.; Xu, J; Srebo-Hooper, M.; Runčevski, T.; Milner, P.J.; Colwell, K.A.; Autschbach, J.; Reimer, J.A.; Long, J.R. Enantioselective Recognition of Ammonium Carbamates in a Chiral Metal–Organic Framework. *J. Am. Chem. Soc.*, **2017**, *139*, 16000–16012.

10. Milner, P.J.; Siegelman, R.L.; Forse, A.C.; Gonzalez, M.I.; Runčevski, T; **Martell, J.D.**; Reimer,

J.A.; Long, J.R. A Diaminopropane-Appended Metal–Organic Framework Enabling Efficient CO_2 Capture from Coal Flue Gas via a Mixed Adsorption Mechanism. *J. Am. Chem. Soc.*, **2017**, *139*, 13541–13553.

9. **Martell, J.D.**; Deerinck, T.J.; Lam, S.S.; Ellisman, M.H.; Ting, A.Y. Electron Microscopy Using the Genetically Encoded APEX2 Tag in Cultured Mammalian Cells. *Nature Protocols*, **2017**, *12*, 1792–1816.
8. Siegelman, R.L.; McDonald, T.M.; Gonzalez, M.I.; **Martell, J.D.**; Milner, P.J.; Mason, J.A.; Berger, A.H.; Bhown, A.S.; Long, J.R. Controlling Cooperative CO_2 Adsorption in Diamine-Appended Mg_2(dobpdc) Metal–Organic Frameworks. *J. Am. Chem. Soc.*, **2017**, *139*, 10526–10538.
7. **Martell, J.D.**; Yamagata, M.; Deerinck, T.J.; Phan, S.; Kwa, C.G.; Ellisman, M.H.; Sanes, J.R.; Ting, A.Y. A Split Horseradish Peroxidase for the Detection of Intercellular Protein-Protein Interactions and Sensitive Visualization of Synapses. *Nature Biotechnology*, **2016**, *34*, 774–780. (Highlighted in *Nature Methods*)
6. Lam, S.S.; **Martell, J.D.**; Kamer, K.J.; Deerinck, T.J.; Ellisman, M.H.; Mootha, V.K.; Ting, A.Y. Directed Evolution of APEX2 for Electron Microscopy and Proximity Labeling. *Nature Methods*, **2015**, *12*, 51–54.
5. Dwyer, D.J.; Yang, J.H.; Belenky, P.; MacDonald, C.I.; **Martell, J.D.**; Chan, C.T.; Kobayashi, N.; Lobritz, M.A.; Braff, D.; Schwarz, E.G.; Ye, J.D.; Patti, M.; Vercruysse, M.; Ralifo, P.S.; Allison, K.R.; Khalil, A.S.; Ting, A.Y.; Walker, G.C.; Collins, J.J. Antibiotics Induce Redox-Related Physiological Alterations as Part of their Lethality. *PNAS*, **2014**, *111*, E2100–E2109.
4. Rhee, H.-W.; Zou, P.; Udeshi, N.D.; **Martell, J.D.**; Mootha, V.K.; Carr, S.A.; Ting, A.Y. Proteomic Mapping of Mitochondria in Living Cells via Spatially-Restricted Enzymatic Tagging. *Science*, **2013**, *339*, 1328–1331. (Highlighted in *Nature Methods* and in *Nature Reviews Molecular Cell Biology*)
3. **Martell, J.D.**; Deerinck, T.J.; Sancak, Y.; Poulos, T.L.; Mootha, V.K.; Sosinsky, G.E.; Ellisman, M.H.; Ting, A.Y. Engineered ascorbate peroxidase as a genetically-encoded reporter for electron microscopy. *Nature Biotechnology*, **2012**, *30*, 1143−1148. (Highlighted in *Nature Methods*)
2. Doukov, T.; Li, H.; Sharma, A.; **Martell, J.D.**; Soltis, S.M.; Silverman, R.B.; Poulos, T.L. Temperature-dependent spin crossover in neuronal nitric oxide synthase bound with the heme-coordinating thioether inhibitors. *J. Am. Chem. Soc.*, **2011**, *133*, 8326–8334.
1. **Martell, J.D.**; Li, H.; Doukov, T.; Martasek, P.; Roman, L.J.; Soltis, M.; Poulos, T.L.; Silverman, R.B. Heme-coordinating inhibitors of neuronal nitric oxide synthase. Iron–thioether coordination is stabilized by hydrophobic contacts without increased inhibitor potency. *J. Am. Chem. Soc.*, **2010**, *132*, 798–806.

PATENTS AT UW–MADISON

9. **Martell, J.D.**; Cribari, M.A.; Unger, M.J.; Ogorek, A.N. An Ultrahigh-Throughput Platform for Directed Evolution of Plastic-Degrading Enzymes. *Patent application submitted.*
8. **Martell, J.D.**; Pimentel, E.B. DNA-Scaffolded Combinatorial Platform for Discovery of Synergistic Catalytic Reactions. *Patent application submitted.*
7. **Martell, J.D.**; Ogorek, A.O.; Pimentel, E.B.; Cox, C.A. Switchable Nucleic Acid-Scaffolded Catalytic Systems and Method of Use. *Patent application submitted*.

PATENTS BEFORE UW-MADISON

6. Long, J.R.; **Martell, J.D.**; Porter-Zasada, L.B. An Enantiopure Chiral Metal–Organic Framework in the MOF-74 Family. *Patent pending*.

5. Long, J.R.; Weston, S.C.; Falkowski, J.M.; Kim, E.; **Martell, J.D.**; Milner, P.J.; Siegelman, R.L. Polyamine-Appended Metal–Organic Frameworks as High-Stability Materials for Carbon Dioxide Separations. *Patent pending*.
4. Long, J.R.; Weston, S.C.; Milner, P.J.; **Martell, J.D.**; Siegelman, R.L. Overcoming Two CO_2 Adsorption Steps in Diamine-Appended Metal–Organic Frameworks. *Patent pending*.
3. Ting, A.Y.; **Martell, J.D**. Cytosolically-Active Peroxidases as Reporters for Microscopy. U.S. Patent 9663815, 2017.
2. Ting, A.Y.; **Martell, J.D**.; Rhee, H.-W.; Zou, P. In Vivo Proteomics. US Patent 9624524, 2017.
1. Ting, A.Y.; **Martell, J.D.** Split Peroxidases and Methods of Use. US Patent 9012170, 2015.

CURRENT FUNDING

1. **Title**: Hybrid Biological-Abiotic Proximity Labeling Catalysts for Enhancing Spatially-Resolved Proteomics (NIH 1R01GM150698-01)

Major Goals: The major goal of this project is to develop chemogenetic tools for spatially-resolved proteomic mapping.
Name of PD/PI: Martell, Jeffrey D
Name of Agency: National Institutes of Health, National Institute of General Medical Sciences
Project/Proposal Start and End Date: (MM/YYYY) (if available): 08/01/2023–04/30/2028
Total Award Amount (including Indirect Costs): $1,571,210
PI Percent effort: 1.0 months

2. **Title**: Young Investigator Program: DNA Nanoscaffold Catalysts for Selective Synthesis of Energetic Materials

Major Goals: The major goal of this project is to create hybrid catalysts consisting of DNA appended to synthetic catalysts and to use DNA to enable selective transformations of interest for the synthesis of energetic materials.
Name of PD/PI: Martell, Jeffrey D
Name of Agency: Department of Defense, Office of Naval Research, Energetic Materials Program
Project/Proposal Start and End Date: (MM/YYYY) (if available): 09/01/2022–08/31/2026
Total Award Amount (including Indirect Costs): $750,000
PI Percent effort: 0.3 months

3. **Title**: Porous Protein Framework Materials as Tunable Scaffolds for Abiotic Dual Catalysis

Major Goals: Merge biomolecular scaffolds with abiotic components to drive new chemical transformations that are difficult or impossible using either conventional synthesis or biocatalysis alone.
Name of PI: Martell, Jeffrey
Name of Agency: DOD, Army
Project/Proposal Start and End Date: (MM/YYYY) (if available): 05/01/2021–04/30/2024
Total Award Amount (including Indirect Costs): $450,000
PI Percent effort: 2.5% (0.3 months)

4. **Title**: Safer Cancer Therapies Using Switchable Immune Cells

Major Goals: Creation of immune cells that attack pediatric cancer while avoiding immune response against healthy tissue.
Name of PD/PI: Martell, Jeffrey
Name of Agency: The Hartwell Foundation
Project/Proposal Start and End Date: (MM/YYYY) (if available): 04/01/2021–03/31/2024
Total Award Amount (including Indirect Costs): $300,000

Last updated: January 4, 2024

PI Percent effort: 20% (2.4 months)

STUDENTS MENTORED AT UW–MADISON

Postdoctoral scientists

Dr. Xu Zhou	January 2022–present

Doctoral students

Mario Cribari (Chemistry PhD student)	November 2018–present
Edward Pimentel (Chemistry PhD student)	November 2018–present
Jedidiah Chung (Chemistry PhD student)	November 2019–present
Sifei Fang (Chemistry PhD student)	November 2019–present
Eric Kohn (Chemistry PhD student)	November 2019–present
Ashley Ogorek (Chemistry PhD student)	November 2019–present
Caleb Cox (Chemistry PhD student)	November 2020–present
Kailey Komnick (Chemistry PhD student)	December 2021–present
Ethan Hartman (Chemistry PhD student)	December 2021–present
Jean Paul Habumugisha (Chemistry PhD student)	December 2021–present
Elizabeth Sielaff (Chemistry PhD student)	November 2022–present
Leslie Acevedo (Chemistry PhD student)	November 2022–present
Eli Mertick-Sykes (Chemistry PhD student)	November 2022–present
Zachary Ziolkowski (Chemistry PhD student)	November 2022–present
David Hardy (Chemistry PhD student)	November 2023–present

Masters students

Gillian Good (Chemistry M.S.)	November 2019–June 2021

Post-baccalaureate researchers

Justice Merrifield	August 2022–August 2023

Undergraduate students

Hassan Alkhunaizi	December 2020–May 2022
Justice Merrifield	August 2021–August 2022
Hang Yin	November 2021–May 2023
Maxwell Unger	February 2020–June 2023
Christian Gomez	January 2021–December 2023
Elliot Delfosse	June 2021–present
Annika Hansen	November 2022–present
Sasha Hsu	November 2023–present
Mia Lor	November 2023–present

PRESENTATIONS

2023 May	Northwestern University, Undergrad Chemistry Council Seminar – *Evanston, IL*
2023 May	UC Berkeley Department of Chemistry – *Berkeley, CA*
2023 April	California Institute of Technology Division of Chemistry and ChemE – *Pasadena, CA*
2023 April	UC Santa Barbara Department of Chemistry and Biochemistry – *Santa Barbara, CA*
2023 April	UT Southwestern Medical Center Department of Biochemistry – *Dallas, TX*
2023 March	University of Illinois Urbana-Champaign Department of Chemistry – *Urbana, IL*
2023 March	North Carolina State University Department of Chemistry – *Raleigh, NC*

2022 August	American Chemical Society National Meeting – *Chicago, IL*
2022 May	Army Research Laboratory Biological and Biotechnology Sciences (Virtual Seminar)
2018 June	Seoul National University, Department of Chemistry – *Seoul, South Korea*
2018 June	Peking University, Department of Chemistry – *Beijing, China*
2018 February	University of Colorado Boulder, Department of Chemistry – *Boulder, CO*
2018 February	Rice University, Department of Chemical and Biomolecular Engineering – *Houston, TX*
2018 February	UC Santa Barbara Department of Chemistry and Biochemistry – *Santa Barbara, CA*
2018 January	University of Iowa, Department of Chemistry – *Iowa City, IA*
2018 January	University of Pittsburgh, Department of Chemistry – *Pittsburgh, PA*
2018 January	Carnegie Mellon University, Department of Chemistry – *Pittsburgh, PA*
2018 January	University of California, Department of Chemistry and Biochemistry – *San Diego, CA*
2018 January	University of Wisconsin–Madison, Department of Chemistry – *Madison, WI*
2018 January	University of Massachusetts Amherst, Department of Chemistry – *Amherst, MA*
2018 January	Columbia University, Department of Chemistry – *New York, NY*
2018 January	Princeton University, Department of Chemistry – *Princeton, NJ*
2017 December	Massachusetts Institute of Technology, Department of Chemistry – *Cambridge, MA*
2017 December	Duke University, Department of Chemistry – *Durham, NC*
2017 December	University of North Carolina, Department of Chemistry – *Chapel Hill, NC*
2017 December	Wayne State University, Department of Chemistry – *Detroit, MI*
2017 November	Rutgers University, Department of Chemistry and Chemical Biology – *Piscataway, NJ*
2017 November	New York University, Department of Chemistry – *New York, NY*
2017 June	Center for Gas Separations Nanoporous Materials Seminar – *Berkeley, CA*
2017 May	Ecole Normale Supérieure Paris-Saclay, Laboratory of Biology and Applied Pharmacology – *Cachan, France*
2017 May	Center for Genomic Regulation – *Barcelona, Spain*
2017 April	253rd American Chemical Society National Meeting – *San Francisco, CA*
2016 October	UC Berkeley Philomathia Forum on Energy and Environment – *Berkeley, CA*
2014 October	Boston Symposium on Organic and Bioorganic Chemistry – *Boston, MA*
2013 October	MIT Biological Chemistry Departmental Seminar – *Cambridge, MA*
2013 February	MIT Biophysics Student Seminar – *Cambridge, MA*
2012 September	MIT Picower Institute Plastic Lunch Seminar – *Cambridge, MA*
2011 February	MIT Biophysics Retreat – *Cambridge, MA*

TEACHING EXPERIENCE

2020–2023	Instructor for Chemistry 345 (Undergraduate Intermediate Organic Chemistry) at UW–Madison
2019–2023	Instructor for Chemistry 641 (Graduate Physical Organic Chemistry) at UW–Madison
2011	Head Teaching Assistant for Introductory Biological Chemistry (Course 5.07), MIT
2010	Head Teaching Assistant for Introductory Organic Chemistry (Course 5.12), MIT

OUTREACH

- American Chemical Society Bridge Program Mentor. This 2-year Master's program aims to increase the number of students from underrepresented minority groups who complete PhDs degree in chemistry.
- Chemistry Opportunities (CHOPs) program participant. This program invites ~20 undergraduate students from traditionally underrepresented groups to learn about UW-Madison's chemistry PhD program.

- NSF Research Experiences for Undergraduates (REU) program participant at UW-Madison. This program supports summer research for undergraduates, with a preference for those from underrepresented groups.

SERVICE AND LEADERSHIP ACTIVITIES

- Review Committee Member, UW-Madison internal competition for nomination to Hartwell Foundation Individual Biomedical Research Award (2021)
- UW-Madison Dept. of Chemistry Seminar Committee
- UW-Madison Dept. of Chemistry Admissions Committee
- Proposal reviewer: Office of Naval Research, Army Research Office, Department of Energy, American Chemistry Society Petroleum Research Fund
- On-site NASA grant review panel member (2018)
- Peer reviewer for manuscripts submitted to *Journal of the American Chemical Society*, *Nature Communications*, *Angewandte Chemie*, *Chemical Reviews*, *Chemical Science*, *Cell Reports*, *ACS Sustainable Chemistry & Engineering*, and *Trends in Biotechnology*
- Organizing Committee Member, Miller Research Symposium: selected a panel of seven interdisciplinary speakers and organized the program for the 2017 Miller Institute symposium (2016–2017)