

# C. Michael McGuirk

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## EDUCATION

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| <b>University of California, Berkeley</b><br>Philomathia Postdoctoral Fellow with <i>Prof. Jeffrey R. Long</i>                         | 5.1.2016–5.25.2019 |
| <b>Northwestern University</b><br>Ph.D. in Chemistry with <i>Prof. Chad A. Mirkin</i>  | 8.1.2011–3.30.2016 |
| <b>University of Minnesota, Twin Cities</b><br>B.A. in Chemistry with minor in Biochemistry<br><i>Summa Cum Laude</i> with High Honors | 9.1.2006–5.15.2010 |

## RESEARCH TIMELINE

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| <b>2016 – 2019</b> | “Elucidating the Molecular Origins of Step-Shaped Adsorption in Metal–Organic Frameworks”<br><i>Advisor: Prof. Jeff Long, University of California, Berkeley</i>                       |
| <b>2011 – 2016</b> | “Coordination Chemistry-Based Strategies for the Regulation and Enhancement of Hydrogen Bond-Donating Catalyst Activity”<br><i>Advisor: Prof. Chad Mirkin, Northwestern University</i> |
| <b>2010 – 2011</b> | “Development of Anti-Misting Formulations using Non-Newtonian Fluids”<br>Ecolab Inc.   |
| <b>2009 – 2010</b> | “Characterization of Clathrin-Dependent Uptake Mechanisms of Natriuretic Peptide Receptors”<br><i>Advisor: Prof. Lincoln Potter, University of Minnesota, Twin Cities</i>              |
| <b>2008 – 2009</b> | “N-Heterocyclic Carbene-Based Ligands for the Isolation of Transient Cu(I)-Oxo Species”<br><i>Advisor: Prof. William Tolman, University of Minnesota, Twin Cities</i>                  |

## RESEARCH EXPERIENCE

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- **University of California, Berkeley – Long Lab**
  - Discovery of, and molecular-level investigation into, the chemically specific cooperative adsorption mechanism of the commodity chemical carbon disulfide in diamine-appended metal–organic frameworks.
  - Structural investigation of the origins of step-shaped adsorption in stimuli-responsive zeolitic imidazolate frameworks, towards performance optimization for use in the transportation sector.
- **Northwestern University – Mirkin Lab**
  - Established a platform for the *in situ* control of hydrogen bond-donating catalysis, based on a novel synthetic strategy that employed structurally addressable supramolecular coordination structures. These architectures have potential applications in controlled polymerization, chemical sensors, and amplification devices.
  - Harnessed the three-dimensional structural order of metal–organic frameworks for dramatically enhancing the activity of hydrogen bond-donating catalysis through the deliberate obviation of deleterious inter-catalyst association.

## PRIMARY AUTHOR PUBLICATIONS

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1. **McGuirk, C. M.**; Runčevski, T.; Oktawiec, J.; Turkiewicz, A.; Taylor, M.; **Long, J. R.** Influence of Metal Substitution on the Pressure-Induced Phase Change in Flexible Zeolitic Imidazolate Frameworks. *J. Am. Chem. Soc.* **2018**, *140*, 15924.
2. **McGuirk, C. M.**; Siegelman, R. L.; Drisdell, W. S.; Runčevski, T.; Milner, P. J.; Oktawiec, J.; Wan, L. F.; Su, G. M.; Jiang, H. Z. H.; Reed, D. A.; Gonzalez, M. I.; Prendergast, D.; **Long, J. R.** Cooperative Adsorption of Carbon Disulfide in Diamine-Appended Metal–Organic Frameworks. *Nat. Commun.* **2018**, *9*, 5133.
3. **McGuirk, C. M.**; Mendez-Arroyo, J.; d’Aquino, A. I.; Stern, C. L.; **Mirkin, C. A.** A Concerted Two-Prong Approach to the *in Situ* Allosteric Regulation of Bifunctional Catalysis. *Chem. Sci.* **2016**, *7*, 6674.
4. **McGuirk, C. M.**; Katz, M. J.; Stern, C. L.; Sarjeant, A. A.; Hupp, J. T.; Farha, O. K.; **Mirkin, C. A.** Turning on Catalysis: Incorporation of a Hydrogen Bond Donating Squaramide Moiety into a Zr-Metal-Organic Framework. *J. Am. Chem. Soc.* **2015**, *137*, 919.
5. **McGuirk, C. M.**; Mendez-Arroyo, J.; Lifschitz, A. M.; **Mirkin, C. A.** Allosteric Regulation of Supramolecular Oligomerization and Catalytic Activity via Coordination-Based Control of Competitive Hydrogen Bonding Events. *J. Am. Chem. Soc.* **2014**, *136*, 16594.
6. **McGuirk, C. M.**; Stern, C. L.; **Mirkin, C. A.** Small Molecule Regulation of Self-Association and Catalytic Activity in a Supramolecular Coordination Complex. *J. Am. Chem. Soc.* **2014**, *136*, 4689.

## SECONDARY AUTHOR PUBLICATIONS

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1. Wang, S.; **McGuirk, C. M.**; d’Aquino, A. I.; Mason, J. A.; **Mirkin, C. A.** Metal-Organic Framework Nanoparticles. *Adv. Mater.* **2018**, *30*, 1800202.
2. d’Aquino, A. I.; Cheng, H. F.; Barroso-Flores, J.; Kean, Z. S.; Mendez-Arroyo, J.; **McGuirk, C. M.**; **Mirkin, C. A.** An Allosterically Regulated, Four-State Macrocycle. *Inorg. Chem.* **2018**, *57*, 3568.
3. Wang, S.; **McGuirk, C. M.**; Ross, M. B.; Wang, S.; Chen, P.; Xing, H.; Liu, Y.; **Mirkin, C. A.** General and Direct Method for Preparing Oligonucleotide-Functionalized Metal–Organic Framework Nanoparticles. *J. Am. Chem. Soc.* **2017**, *139*, 9827.
4. Shahjamali, M. M.; Zhou, Y.; Zaraee, N.; Xue, C.; Wu, J.; Large, N.; **McGuirk, C. M.**; Boey, F.; Dravid, V.; Schatz, G. C.; **Mirkin, C. A.** Ag-Ag<sub>2</sub>S Hybrid Nanoprisms: Structural vs. Plasmonic Evolution. *ACS Nano* **2016**, *10*, 5362.
5. Lifschitz, A. M.; Young, R. M.; Mendez-Arroyo, J.; **McGuirk, C. M.**; Wasielewski, M. R.; **Mirkin, C. A.** Cooperative Electronic- and Structural-Regulation in a Bioinspired Allosteric Photoredox Catalyst. *Inorg. Chem.* **2016**, *55*, 8301.

6. Wang, S.; Morris, W.; Liu, Y.; **McGuirk, C. M.**; Zhou, Y.; Hupp, J. T.; Farha, O. K.; Mirkin, C. A. Surface-Specific Functionalization of Nanoscale Metal-Organic Frameworks. *Angew. Chem. Int. Ed.* **2015**, *54*, 14738.
7. Lifschitz, A. M.; Rosen, M. S.; **McGuirk, C. M.**; Mirkin, C. A. Allosteric Supramolecular Coordination Constructs. *J. Am. Chem. Soc.* **2015**, *137*, 7252.
8. Lifschitz, A. M.; Young, R. M.; Mendez-Arroyo, J.; Stern, C. L.; **McGuirk, C. M.**; Wasielewski, M. R.; Mirkin, C. A. An Allosteric Photoredox Catalyst Inspired by Photosynthetic Machinery. *Nat. Comm.* **2015**, *6*, 6541.
9. Lifschitz, A. M.; Young, R. M.; Mendez-Arroyo, J.; Roznyatovskiy, V. V.; **McGuirk, C. M.**; Wasielewski, M. R.; Mirkin, C. A. Chemically Regulating Rh(I)-Bodipy Photoredox Switches. *Chem. Comm.* **2014**, *50*, 6850.
10. Kennedy, R. D.; Machan, C. W.; **McGuirk, C. M.**; Rosen, M. S.; Stern, C. L.; Sarjeant, A. A.; Mirkin, C. A. General Strategy for the Synthesis of Rigid Weak-Link Approach Platinum(II) Complexes: Tweezers, Triple-Layer Complexes, and Macrocycles. *Inorg. Chem.* **2013**, *52*, 5876.
11. Dickey, D. M.; Barbieri, K. A.; **McGuirk, C. M.**; Potter, L. R. Arg 13 of B-Type Natriuretic Peptide Reciprocally Modulates Binding to Guanylyl Cyclase but not Clearance Receptors. *Mol. Pharmacol.* **2010**, *78*, 431.

## PATENTS

1. Hodge, C. A.; **McGuirk, C. M.**; Blattner, A. R.; Notermann, C. L. Sprayable Aqueous Chlorine-Based Cleaning Compositions with Reduced Misting. PCT Int. Appl., WO 2015123324 A1 20150820, **2015**.
2. Hodge, C. A.; **McGuirk, C. M.**; Levitt, M. D.; Larson, D.; Kiesel, E.; Blattner, A. R. Development of Extensional Viscosity for Reduced Atomization for Diluted Concentrate Sprayer Applications. PCT Int. Appl., WO 2013043699 A2 20130328, **2013**.
3. Hodge, C. A.; Blattner, A. R.; Kohnke, T. J.; Levitt, M. D.; Marquardt, J. E.; **McGuirk, C. M.**; Silvernail, C. M.; Larson, D. Bio-Based Glass Cleaner and Forming Use Solution. U.S. Pat. Appl. Publ. 20130255719 A1 20131003, **2013**.

## LEADERSHIP AND OUTREACH

### 2018– Current Skype a Scientist Participant

- Hold question and answer sessions about my research and science in general with 11<sup>th</sup> and 12<sup>th</sup> grade classes at Hawaii Technology Academy through Skype video chat.

### 2014– 2016 Phi Lambda Upsilon (PLU), Student Advocacy Chair

- The inaugural holder of a new position at NU that I created designed to be a departmentally recognized voice and resource for individual students having problems with any aspect of graduate school, both professional and personal.

### 2014 – 2016 Basolo, Ibers, Pearson (B.I.P.) Student Seminar Leader

- Served as a lead facilitator of the over 50-year-old tradition of inorganic student seminars at Northwestern University.

**2013 – 2016 Graduate Leadership and Advocacy Council (G.L.A.C.) Department Rep.**

- Represented the interests of graduate students in the department of chemistry to the highest graduate student-run council (G.L.A.C.) at Northwestern University

**2013 – 2014 Phi Lambda Upsilon (PLU), Service Chair**

- Ran all service and fundraising operations, including:
  - Science in the Classroom (S.I.T.C.), a program in which over 50 volunteers travel to inner city Chicago Public Schools to perform visually dynamic scientific demonstrations in 3<sup>rd</sup> and 4<sup>th</sup> classrooms.
  - A trivia fundraiser, from which we raised and donated over \$1,500 to victims of tornados in rural Illinois.
  - A holiday toy, food, and clothing drive. Donated over \$400 worth of goods to a homeless shelter in inner city Chicago
  - The Illinois Chemistry Bee, a statewide chemistry trivia bowl for 8<sup>th</sup> graders.

**SELECT CONFERENCE PRESENTATIONS**

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1. **C. M. McGuirk**, J. R. Long, “Cooperative and Reversible Chemisorptive Capture of Carbon Disulfide in Diamine-Appended Metal-Organic Frameworks” *Nanoporous Materials and Their Applications Gordon Research Conference*, August 7-8, 2017, Andover, NH, **poster presentation**.
2. **C. M. McGuirk**, J. R. Long, “Cooperative and Reversible Chemisorptive Capture of Carbon Disulfide in Diamine-Appended Metal-Organic Frameworks” *ACS National Meeting*, April 6, 2017, San Francisco, CA, **invited speaker**.
3. **C. M. McGuirk**, C. A. Mirkin, “Shape-Shifting Supramolecular Structures Regulated Through Coordination Chemistry”, *PacifiChem*, December 17, 2015, Honolulu, HI, **speaker on behalf of Prof. Chad Mirkin**.
4. **C. M. McGuirk**, C. A. Mirkin, “Allosteric Regulation of Supramolecular Oligomerization and Catalytic Activity via Coordination-Based Control of Competitive Hydrogen Bonding Events”, *Chicago Regional Inorganic Colloquium*, November 22, 2014, Evanston, IL, **invited speaker**.
5. **C. M. McGuirk**, C. A. Mirkin, “Bio-Inspired Allosteric Regulation of Catalysis via Competitive Hydrogen Bonding Events”, *Inorganic Gordon Research Conference*, June 9-10, 2014, Biddeford, ME, **poster presentation**

**GRANTS and AWARDS**

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- DOE EFRC Ten at Ten Award Contributor (2019)
- Philomathia Postdoctoral Fellowship (2016)
- Representative of the Lindau Nobel Laureate Meeting (2015)
- *Journal of the American Chemical Society* referee (2016–present)