

Molly Carpenter
Department of Chemistry and Biochemistry / BioFrontiers Institute
University of Colorado Boulder
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Boulder, CO 80303
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Experience:

August 2018 – present:

Staff Scientist

dAbL - Ackerman Lab, Dartmouth College, Hanover, NH

Education and Training:

January 2015 - July 2018:

Postdoctoral Research Associate: University of Colorado Boulder, CO

- Assessment of FRET sensors for cell imaging applications

- CRISPR_i genetic screen to identify genes and pathways sensitive to Zn²⁺ nutritional status

Advisor: Dr. Amy Palmer, Department of Chemistry and Biochemistry / BioFrontiers Institute

September 2009-November 2014

Ph.D. in Chemistry: Dartmouth College, NH

Dissertation Title: *Thermodynamic studies of metal interactions with four biomacromolecules using isothermal titration calorimetry.*

Advisor: Dr. Dean Wilcox, Department of Chemistry

August 2005-May 2009

B.S. Chemistry, Minor: Religion, *magna cum laude*

University of the South: Sewanee

Publications:

12. Carter, K. P.*; **Carpenter, M.C.***; Fiedler, B., Jimenez, R.; Palmer, A.E. Critical comparison of FRET-sensor functionality in the cytosol and endoplasmic reticulum: implications for quantification of ions. *Analytical Chemistry*. **2017**. *89*, 9601-9608

11. Pedrosa, M.; Ely, F.; **Carpenter, M.**; Mitic, N.; Gahan, L.; Ollis, D.; Wilcox, D.; Schenk, G. Mechanistic Insight from Calorimetric Measurements of the Assembly of the Binuclear Metal Active Site of Glycerophosphodiesterase (GpdQ) from *Enterobacter aerogenes*. *Biochemistry*. **2017**. *56*, 3328-3336

10. **Carpenter, M.C.**; Palmer, A.E. Native and Engineered Sensors for Ca²⁺ and Zn²⁺: Lessons from Calmodulin and MTF1. *Essays in Biochemistry*. **2017**. *61*, 237-243

9. Qin, Y.; Sammond, D.; Braselmann, E.; **Carpenter, M.C.**; Palmer, A.E. Development of an optical Zn²⁺ probe based on a single fluorescent protein. *ACS Chemical Biology*. **2016**. *11*, 2744-2751.

8. **Carpenter, M.C.**; Palmer, A.E. Unravelling the mysteries of the ring: Tracking heme dynamics in living cells. *PNAS*. **2016**. *113*, 7296-7.

7. **Carpenter, M.C.**; Lo, M.; Palmer, A.E. Techniques for detecting cellular zinc. *Archives of Biochemistry and Biophysics*. **2016**. *611*, 20-9
6. Fiedler, B.L.; Van Buskirk, S.; Carter, K.P.; Qin, Y.; **Carpenter, M.C.**; Palmer, A.E.; Jimenez, R. Droplet Microfluidic Flow Cytometer for Sorting on Transient Cellular Responses of Genetically-Encoded Sensors. *Anal. Chem.* **2016**. *89*, 711-719
5. **Carpenter, M.C.**; Shami Shah, A.; DeSilva, S.; Gleaton, A.; Su, A.; Goundie, B.; Croteau, M.L.; Stevenson, M.J.; Wilcox, D.E.; Austin, R.N. Thermodynamics of Pb(II) and Zn(II) binding to MT-3, a neurologically important metallothionein. *Metallomics*. **2016**. *8*, 605-17.
4. Quinn, C.F.; **Carpenter, M.C.**; Croteau, M.L.; Wilcox, D.E. Isothermal Titration Calorimetry Measurements of Metal Ions Binding to Proteins. *Methods in Enzymology*. **2016**. *567*, 3-21.
3. **Carpenter, M.C.** and Wilcox, D.E. Thermodynamics of the formation of the Insulin Hexamer: metal-stabilized proton-coupled assembly of protein quaternary structure. *Biochemistry*. **2014**. *53*, 1296-1301.
2. Pedroso, M.M.; Ely, F.; Mitić, N.; **Carpenter, M.C.**; Gahan, L.R.; Wilcox, D.E.; Larrabee, J.L.; Ollis, D.L.; Schenk, G. Comparative Investigation of the reaction mechanisms of the organophosphate-degrading phosphotriesterases from *Agrobacterium radiobacter* (OpdA) and *Pseudomonas diminuta* (OPH). *J. Biol. Inorg. Chem.* **2014**. *19*, 1183-9.
1. Owens, S.A.; **Carpenter, M.C.**; Sonne, J.W.H.; Miller, C.A.; Renehan, J.R.; Odonkor, C.A.; Henry, E.M.; Miles, D.T. Reversed-phase HPLC separation of water-soluble, monolayer-protected quantum dots. *J Phys Chem C*. **2011**. *115*, 18952-7.

Oral Presentations:

- 13th Annual Advanced Imaging Methods Workshop, Berkeley, CA
“The Development and Characterization of FRET-based Zinc Sensors”
Feb. 18, 2016
- New England Regional Meeting of the American Chemical Society, New Haven, CT
“Thermodynamics of the Formation of the Insulin Hexamer”
Oct. 25 2013

Poster Presentations:

- Carpenter, M.C., Miranda, J., Carter, K., Palmer, A.E. *Comparison of Zinc Homeostasis in Normal and Cancerous Prostate Cells*. Gordon Research Conference, Cell Biology of Metals. Mount Snow, VT. July 2015
- Carpenter, M.C. and Wilcox, D.E. *Thermodynamics of the Formation of the Insulin Hexamer*. Frontiers in Metallobiochemistry III. Pennsylvania State University, University Park, PA. May 2014
- Carpenter, M.C. and Wilcox, D.E. *Thermodynamics of the Formation of the Insulin Hexamer*. Gordon Research Conference, Metals in Biology and the Gordon Research Seminar, Inorganic Chemistry. Ventura, CA. January 2014
- Carpenter, M.C.; Lisi, G.P.; Wilcox, D.E. *A Study of Metal-Stabilized Protein Quaternary Structure: a story of ITC troubleshooting*. Users Meeting at GE Healthcare. Boston, MA. March

2012

Carpenter, M.C.; Wilcox, D.E. *Isothermal Titration Calorimetry Studies of Insulin Quaternary Structure*. International Conference on Bioinorganic Chemistry. Perry Sound, Canada. May 2011

Awards:

School of Graduate and Advanced Studies Teaching Prize, Dartmouth College, 2014
John H. Wolfenden Teaching Prize, Chemistry Department, Dartmouth College, 2014
Karen E. Wetterhahn Graduate Fellow in Chemistry, Dartmouth College, 2014
GAANN Fellow, US Dept. of Education Grant, Dartmouth College, 2011 and 2013
GK-12 Fellow, National Science Foundation Grant, DCAL, Dartmouth College, 2012
Chancellor's Scholarship, Merit-based, full-tuition scholarship for 4 years of college, 2005-2009
Alpha Epsilon Delta, *President*, honor society, 2008-2009
The Order of the Gownsmen, University academic honor society, 2006-2009
CRC award, for excellent performance in general chemistry, awarded to top student in general chemistry class, 2006

Teaching Experience:

Chem 41 lab, Biochemistry, Spring, 2018
Lab director

Chem 67, Biophysical Chemistry, Undergraduate culminating seminar course, Winter, 2018
Lecturer

Guest Lecture, Graduate level course in Optical Imaging, Boulder, CO, November 2016

TA Orientation, Dartmouth Center for the Advancement of Learning, Dartmouth College,
Hanover, NH, December 2014
Facilitator

3rd Penn State Bioinorganic Chemistry Workshop, State College, PA, May 28 – June 4, 2014
Graduate Student Instructor

GK-12 NSF program, Woodstock Union High School, Woodstock, VT, 2012-2013
Partner Teacher

Biochemistry, Physical Chemistry, and General Chemistry Courses, Dartmouth Chemistry
Department, Hanover, NH, 2009-2012
Teaching Assistant

Service and Extracurricular:

CU Wizards Show, Boulder, CO, 2017

Girls in STEM day volunteer at the Keystone Science School, Keystone, CO, 2015

Woodstock Union High School Field Trip to Dartmouth Chemistry Department, 2013

Graduate Women in Science and Engineering, Chairperson, Dartmouth College, 2011

Graduate Student Counsel member, Dartmouth College, 2010