

# DUSTY ROSE MILLER, PH.D. | Chemist

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## Qualifications summary

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**Technical expertise:** Electrochemistry, chromatography, spectroscopy, microscopy, cell culture, organotypic cultures, microfluidic engineering and sensor development

**Computer expertise:** Linux, Windows, Origin Lab, LaTeX, Illustrator, Photoshop

**Administrative expertise:** Enthusiasm, integrity, communication, vision, respect, discretion, presence

## Education

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**Ph.D. in Molecular Biology and Biochemistry** 2010–2015

*University of California, Santa Barbara*

Principal investigator: Professor J. Herbert Waite

Committee members: Professors Jacob Israelachvili and Alison Butler

**Bachelor of Science in Immunology and Microbiology** 2004–2008

*University of California, Irvine*

Magna cum laude

## Research experience

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**Postdoctoral Research Scholar** 2016–current

*Vanderbilt University, Chemistry Department*

**Principal investigator:** Professor David E. Cliffl

**Research Focus:** Toxicology, organotypic cultures, microphysiometry, electrochemistry

**Intellectual neighborhoods:** Chemistry, biochemistry, engineering

**Graduate Student Researcher** 2010–2015

*University of California, Santa Barbara*

Biomolecular Science and Engineering Program

**Principal investigator:** Professor J. Herbert Waite

**Research focus:** Underwater adhesives, load-bearing structures, redox, friction

**Intellectual neighborhoods:** Molecular biology, biophysics, nano science and engineering

**Undergraduate Student Researcher** 2006–2008

*University of California, Irvine*

Department of Biological Sciences

**Principal investigator:** Professor Andrea Tenner

**Research focus:** Innate immunity, atherosclerosis

**Intellectual neighborhoods:** Biochemistry, molecular biology

## Publications

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- **Dusty R. Miller**, Ethan McClain, Sara Melow, and David E Cliffl "Leveraging the analytical power of the octadic microphysiometer" In preparation for submission to the Journal of Analytical Chemistry. Estimated submission date: Sept. 2020.
- **Dusty R. Miller**, David K. Schaffer, M. Diana Neeley, Ethan McClain, Adam R. Travis, Frank E. Block III, Jennifer McKenzie, Eric M. Werner, Laura Armstrong, Aaron B. Bowman, Kevin C. Ess, David E. Cliffl,

and John P. Wikswa "An innovative valve enables microformulators and microclinical analyzers and reveals aberrant glutamate metabolism in astrocytes derived from a patient with tuberous sclerosis" In preparation for submission to Sensors and Actuators. Estimated submission date: Aug. 2020.

- **Dusty R. Miller**, Ethan S. McClain, Jacquelyn A. Brown, James N. Dodds, Andrzej Balinski, Jody C. May, John P. Wikswa, John A. McLean, David E. Cliffel "Chlorpyrifos Disrupts Acetylcholine Metabolism Across Model Blood-Brain Barrier" In preparation for submission to Frontiers in Bioengineering and Biotechnology. Estimated submission date: June 2020
- Sara L. Melow, **Dusty R. Miller**, Evan Gizzie, David E. Cliffel "A low-interference, high-resolution osmium biosensor" In review in Analytical Methods as of March 2020.
- Ethan S. McClain, **Dusty R. Miller**, David E. Cliffel "Electrochemical Acetylcholine Detection in the Presence of Chlorpyrifos " Journal of the Electrochemical Society 2019 vol: 166 (16) pp: G178-G181. DOI:10.1149/2.0711916jes
- **Dusty R. Miller\***, Ethan S. McClain\*, David E. Cliffel, "Electrochemical Microphysiometry Detects Cellular Glutamate Uptake" Journal of the Electrochemical Society, Vol. 165, Issue 12, August 9th 2018, DOI: 10.1149/2.0201812jes
- Anna Nix Davis, Adam R. Travis, **Dusty R. Miller**, David E. Cliffel, "Multianalyte Physiological Microanalytical Devices" Annual Review of Analytical Chemistry, Vol. 10, Pages 93-111, July 2017, DOI:10.1146/annurev-anchem-061516-045334
- Tim J. Lynch, B. Joy Erickson, **Dusty R. Miller**, Ruth R. Finkelstein, "ABI5-binding proteins (AFPs) alter transcription of ABA-induced genes via a variety of interactions with chromatin modifiers" Plant Molecular Biology, December 9th, 2016, DOI:10.1007/s11103-016-0569-1
- **Dusty R. Miller**, Jamie S. Spahn and J. Herbert Waite, "The staying power of adhesion-associated antioxidant activity in *Mytilus californianus*" The Royal Society Interface, Volume 12, Issue 111, October 14, 2015, DOI: 10.1098/rsif.2015.0614
- **Dusty R. Miller**, Saurabh Das, Kuo-Ying Huang, Songi Han, Jacob N. Israelachvili and J. Herbert Waite. "Mussel coating protein-derived complex coacervates mitigate frictional surface damage" ACS Biomaterials Science and Engineering, Volume 1, Issue 11, Pages 1121-1128, October 8, 2015, DOI: 10.1021/acsbiomaterials.5b00252
- Saurabh Das, **Dusty R. Miller**, Yair Kaufman, Nadine R. Martinez Rodriguez, Alessia Pallaoro, Matthew J. Harrington, Maryte Gylys, Jacob N. Israelachvili and J. Herbert Waite. "Tough coating proteins: Subtle sequence variation modulates cohesion" Biomacromolecules, Volume 16, Issue 3, Pages 1002-1008, March 9, 2015, DOI: 10.1021/bm501893y
- Dr. Yasar Akdogan, Dr. Wei Wei, Dr. Kuo-Ying Huang, Dr. Yoshiyuki Kageyama, Eric W. Danner, **Dusty R. Miller**, Nadine R. Martinez-Rodriguez, J. Herbert Waite and Songi Han. "Intrinsic surface-drying properties of bioadhesive proteins" Angewandte Chemie, Volume 126, Issue 42, Pages 11435-11438, October 13, 2014, DOI: 10.1002/anie.201406858
- Dominic E. Fullenkamp, Devin G. Barrett, **Dusty R. Miller**, Josh W. Kurutz and Phillip B. Messersmith. "pH-dependent cross-linking of catechols through oxidation *via* Fe<sup>3+</sup> and potential implications for mussel adhesion" Royal Society of Chemistry Advances, Volume 4, Issue 48, Pages 25127-25134, May 28, 2014, DOI: 10.1039/C4RA03178D
- Jing Yu, Yajing Kan, Michael Rapp, Eric Danner, Wei Wei, Saurabh Das, **Dusty R. Miller**, Yunfei Chen, J. Herbert Waite and Jacob N. Israelachvili. "Adaptive hydrophobic and hydrophilic interactions of mussel foot

proteins with organic thin films” Proceeding of the National Academy of Sciences, Volume 110, Number 39, Pages 15680-15685, September 24, 2013, DOI: 10.1073/pnas.1315015110

## Oral presentations

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- **Organotypic neurovascular unit and electrochemical platform for predictive toxicology**  
Electrochemistry Society Conference, Atlanta, Georgia, October 13-17th, 2019
- **Organotypic culture models for predictive toxicology**  
International Society of Electrochemistry Conference, Bologna Italy, Sept 4th, 2018
- **Neurovascular response to chlorpyrifos for predictive toxicology**  
Chemistry Forum, Vanderbilt University, Nashville TN, April 10th, 2018
- **Adhesion beyond the interface: molecular adaptations of the mussel byssus to the intertidal zone**  
American Chemical Society Central Ohio Valley section, Marshall University, Huntington, WV, November 2016
- **Complex coacervates: Potential role in damage mitigation of the mussel byssus**  
Chemical Society Student Seminar, University of California, Santa Barbara, CA, November 2014
- **Mussel protein and hyaluronic acid coacervate achieve concentrated delivery and provide wear protection to surfaces**  
5<sup>th</sup> International Conference on the Mechanics of Biomaterials and Tissues, Sitges, Spain, December 2013

## Poster presentations

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- **Organotypic culture models for predictive toxicology**  
Gordon Research Conference: Cellular and Molecular Mechanisms of Toxicology, Andover NH, Aug. 11-16, 2019
- **Organotypic culture models for predictive toxicology**  
International Society of Electrochemistry Conference, Providence RI, Sept 2017
- **Hyaluronic acid and mussel foot protein coacervate achieve concentrated delivery, wear protection, and lubrication to surfaces**  
Science of Adhesion Gordon Conference, Mount Holyoke College, MA, July 2013
- **Hyaluronic acid and mussel foot protein coacervates provide boundary lubrication and enhanced wear protection to surfaces**  
Materials Research Outreach Symposium, Santa Barbara, CA, February 2013

## Posters

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- **Enzymatic Detection of Neurotransmitters through Electrochemical Microphysiometry**  
Ethan McClain, **Dusty R. Miller**, David E. Cliffl  
Vanderbilt Institute for Collaborative Bioscience, Vanderbilt University, Nashville TN, Aug 2018

## Fellowships, scholarships, and awards

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<b>NIH T32 Training Grant in Environmental Toxicology</b> <i>Vanderbilt University</i>	<b>2017-2020</b>
<b>Travel grant</b> <i>University of California, Santa Barbara</i>	<b>2013</b>
<b>Amgen Outstanding Doctoral Student Award</b> <i>University of California, Santa Barbara</i>	<b>2010</b>

## Teaching experience

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**Teaching assistant**, Biophysical Chemistry, under the direction of Professor J. Herbert Waite **2010–2015**  
*University of California, Santa Barbara, Department of Molecular, Cellular, and Developmental Biology*

**Tasks:** Lead 20 students in discussion section, 2 sections a week and grade.

**Teaching assistant**, Organic Chemistry, under the direction of Professor Justin Russak **2011**  
*University of California, Santa Barbara, Department of Chemistry*

**Tasks:** Lead and grade 20 students in lab, 4 labs/week. Proctor and grade for three 200-student lectures.

**Organic chemistry tutor**, Learning and Academic Resource Center **2006-2008**  
*University of California, Irvine, Department of Chemistry*

**Tasks:** Lead discussion groups of 8-10 students 6 times a week.

## Mentoring Experience

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**Research mentor**, Ethan McClain, Graduate Student Researcher **2017-current**  
*Vanderbilt University, Department of Chemistry*

**Tasks:** Assist in research development and execution, review presentations, and edit papers.

**Research mentor**, Sara L. Melow, Graduate Student Researcher **2017-current**  
*Vanderbilt University, Department of Chemistry*

**Tasks:** Assist in research development and execution, review presentations and edit papers.

**Research mentor**, Elly Shin, Undergraduate Student Researcher **2018-2019**  
*Vanderbilt University, Department of Chemistry*

**Tasks:** Help develop research plans and oversee research execution. Review and edit presentations and papers.

**Research mentor**, Jamie Spahn, Undergraduate Student Researcher **2012-2015**  
*University of California, Santa Barbara, College of Creative Studies*

**Tasks:** Help develop research plans, oversee research execution, review and edit presentations and papers.

**Internship mentor**, Miriam Steinmann, Cooperative International Science and Engineering Internship **2014**  
*University of California, Santa Barbara, College of Creative Studies*

**Tasks:** Develop research plans, oversee research execution, review and edit presentations and papers.

**Research mentor**, Maryte Gylys, Undergraduate Student Researcher **2011-2014**  
*University of California, Santa Barbara, Department of Molecular, Cellular, and Developmental Biology*

**Tasks:** Develop research plans, oversee research execution, review and edit presentations and papers.

**Program mentor**, Paige Smith, Research Intern in Science and Engineering **2012**  
*University of California, Santa Barbara, Materials Research Laboratory*

**Tasks:** Develop research plans, oversee research execution, co-create presentations and papers.

**Program mentor**, Lauren Rehbein, California Nanosystems Institute, Apprentice Researchers (AR) **2011**  
*University of California, Santa Barbara, Center for Science and Engineering Partnerships (CSEP)*

**Tasks:** Introduce laboratory techniques, oversee research execution, co-create and attend presentations.

## Languages

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**English:** Native speaker

**Spanish:** Basic phrases and conversations