

CHRISTOPHER R. SHUGRUE, Ph.D.

Assistant Professor of Chemistry, University of Richmond

Curriculum Vitae

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SUMMARY:

I am an Assistant Professor of Chemistry at the University of Richmond with teaching and research experience at the interface of organic chemistry and chemical biology. I earned a B.A. in chemistry at the College of the Holy Cross and a Ph.D. from Yale University. My 14 publications have focused on organic synthesis, asymmetric catalysis, reactions in water, peptide science, and the modification of therapeutically relevant proteins. I aspire to continue providing a strong intellectual, collaborative, and inclusive environment for all students to reach their full potential both in the classroom as well as in the research laboratory.

PROFESSIONAL POSITIONS:

University of Richmond, Richmond, VA 2021–Present

Assistant Professor of Chemistry

- Research: Development of aqueous reactions as tools for the modification of peptide and protein therapeutics.

Massachusetts Institute of Technology, Cambridge, MA 2019–2021

NIH Postdoctoral Fellow

- Advisor: Prof. Bradley L. Pentelute
- Research: Programing specific reactivity into peptide sequences for the site-selective modifications of proteins.

EDUCATION & TRAINING:

Yale University, New Haven, CT 2013–2019

Ph.D. in Chemistry

- NSF Graduate Research Fellow
- Advisor: Prof. Scott J. Miller
- Dissertation: “Exploration of Phosphothreonine (pThr)-Embedded Peptides as Brønsted Acid Catalysts for Stereoselective Catalysis.”

College of the Holy Cross, Worcester, MA 2009–2013

B.A. in Chemistry, Summa Cum Laude

- Advisor: Prof. Brian R. Linton
- Thesis: “Molecular Recognition Using Hydrogen Bonding Catalysis: Thiourea Derivatives in Stereoselective and Regioselective Synthesis.”
- Cumulative GPA: 3.97/4.00 ▪ Math/Science GPA: 4.00/4.00 ▪ Class Rank: 1/704

University of Texas at Austin, Austin, TX

Summer 2012

NSF Research Experience for Undergraduates

- Advisor: Prof. Stephen F. Martin
- Research: Investigation of asymmetric halonium-induced cyclizations catalyzed by BINOL-derived bifunctional catalysts.

TEACHING EXPERIENCE & OUTREACH:

Research Mentor for Students

Massachusetts Institute of Technology, Brad Pentelute Group

2019–Present

Yale University, Scott Miller Group

2015–2018

- Mentored 1 masters student, 3 undergraduates, 2 high school students, and 1 technical associate in research and provided career guidance.

SPLASH Teacher

Yale University

2014–2017

- Planned and taught classes on special topics to inspire middle school and high school students to take greater interest in science and learning.

Yale Residence College Science Tutor

Yale University, Center for Teaching and Learning

2017–2018

- Served as the drop-in tutor for students taking general chemistry, organic chemistry, physical chemistry, and calculus.

Graduate Teaching Fellow

2013–2014

Yale University, Department of Chemistry

- Taught and graded both an organic chemistry I laboratory section and a general chemistry I discussion section.

Peer Assisted Learning (PAL) Tutor

Holy Cross, Academic Services & Learning Resources

2011–2013

- Organized and taught discussion sections for organic chemistry I (3 semesters) and general chemistry I (1 semester). Coordinated and supervised all PAL tutors (1 semester).

Laboratory Teaching Assistant

Holy Cross, Department of Chemistry

2011–2013

- Assisted supervising and evaluating labs for organic I/II (3 semesters), analytical (1 semester), and physical chemistry (1 semester).

Noyce Tutor

Holy Cross, Department of Education

2010

- Tutored at local elementary schools in the city of Worcester, MA in math and reading. Supervised school service projects.

TRAINING IN TEACHING METHODS:

Kaufman Teaching Certificate Program

Massachusetts Institute of Technology, Teaching & Learning Laboratory 2020

- A workshop series focusing on evidence-based teaching techniques and creating a welcoming classroom environment (*in progress*).

Science Teaching Fellows Course

Yale University, Center for Teaching & Learning 2017

- A course on topics in teaching pedagogy, including evidence-based teaching, course/lesson planning, and inclusive teaching practices.

FUNDING:

NIH F32 Postdoctoral Fellowship

2019–Present

Three years of support for postdoctoral research at MIT.

NSF Graduate Research Fellowship

2014–2018

Three years of financial support toward graduate studies at Yale.

NSF Research Experience for Undergraduates

Summer 2012

Funding for summer research at UT Austin.

Camille and Henry Dreyfus Foundation Summer Research Fellowship

2011

A fellowship awarded for summer research at Holy Cross.

HONORS:

Richard Wolfgang Prize

2019

Awarded for the best doctoral dissertations in chemistry at Yale, 3 of 35 graduates.

New England Division of the American Institute of Chemists Foundation Award

2013

Awarded for distinction in chemistry, 1 of 30 chemistry majors.

ACS Division of Organic Chemistry Undergraduate Award

2013

Awarded for distinction in organic chemistry, 1 of 30 chemistry majors.

Phi Beta Kappa

2012

A national honor society open to the top 10% of a graduating class.

ACS Undergraduate Award in Analytical Chemistry

2012

Awarded for distinction in analytical chemistry, 1 of 30 chemistry majors.

Alpha Sigma Nu

2012

The national honor society of the Jesuit Order, chosen from top 15% of class who most exhibit the Jesuit commitment to service.

- ACS POLYED Undergraduate Award for Achievement in Organic Chemistry** 2011
Awarded for an excellent student among all sections of intro organic chemistry.
- College of the Holy Cross Honors Program** 2010–2013
A program with advanced educational opportunities in pursuit of interdisciplinary studies in the sciences and humanities, 30 of 704 class members.
- Charles A. Dana Scholarship** 2010–2013
A yearly Holy Cross scholarship awarded for academic excellence and leadership, received 3 times; 8 of 704 class members awarded for 3 years.
- Dean's List First Honors** 2009–2013
Awarded for a GPA above 3.70, 8 of 8 semesters.

DEPARTMENT SERVICE:

Laboratory Safety Officer

Yale University, Scott Miller Group

2014–2018

- Coordinate with Yale EH&S office to ensure lab compliance with government safety regulations; and train and supervise all group members on safe laboratory practices.

Chemistry Department Student Advisory Council

College of the Holy Cross

2011–2013

- Member and co-chair (2012–2013) of committee that served as the chemistry majors' voice to the faculty of the department. Evaluated professors and planned departmental social events.

PUBLICATIONS (ORCID: 0000-0002-3504-9475):

Postdoctoral Publications from Massachusetts Institute of Technology:

14. Tuan, S.; Dieppa-Matos, D.; Zhang, C.; Shugrue, C. R.; Dai, P.; Truex, N.; Zhang, G.; Loas, A.; Pentelute, B. L. An Engineered Reaction Interface for Site-Selective Cysteine Bioconjugation. *Submitted*.
13. Pomplun, S. J.(+); Shugrue, C. R.(+); Schmitt, A. M.; Schissel, C. K.; Farquhar, C. E.; Pentelute, B. L. Secondary Amino Alcohols: Traceless Cleavable Linkers for Use in Affinity Capture and Release. *Angew. Chem. Int. Ed.* **2020**, *59*, 11566–11572. (+ **co-first authors**). [DOI: 10.1002/anie.202003478](https://doi.org/10.1002/anie.202003478).

Graduate Publications from Yale University:

12. Metrano, A. J.; Chinn, A. J.; Shugrue, C. R.; Stone, E. A.; Kim, B.; Miller, S. J. Asymmetric Catalysis Mediated by Synthetic Peptides, Version 2.0: Expansion of Scope and Mechanisms. *Chem. Rev.*, *Accepted*.
11. Dardir, A. H.; Hazari, N.; Miller, S. J.; Shugrue, C. R. Palladium-Catalyzed Suzuki-Miyaura Reactions of Aspartic Acid Derived Phenyl Esters. *Org. Lett.* **2019**, *21*, 5762–5766. DOI: [10.1021/acs.orglett.9b02214](https://doi.org/10.1021/acs.orglett.9b02214). **Highlighted in:** *Synfacts* **2019**, *15*, 1324.
10. Shugrue, C. R.; Sculimbrenne, B. R.; Jarvo, E. R.; Mercado, B. W.; Miller, S. J. Outer-Sphere Control for Divergent Multicatalysis with Common Catalytic Moieties. *J. Org. Chem.* **2019**, *84*, 1664–1672. DOI: [10.1021/acs.joc.8b03068](https://doi.org/10.1021/acs.joc.8b03068).
9. Featherston, A. L.; Shugrue, C. R.; Mercado, B. Q; Miller, S. J. Phosphothreonine (pThr)–Based Multifunctional Peptide Catalysis for Asymmetric Baeyer–Villiger Oxidations of Cyclobutanones. *ACS Catalysis* **2019**, *9*, 242–252. DOI: [10.1021/acscatal.8b04132](https://doi.org/10.1021/acscatal.8b04132). **Highlighted in:** *Synfacts* **2019**, *15*, 0303.
8. Shugrue, C. R.; Featherston, A. L.; Lackner, R. M.; Lin, A.; Miller, S. J. Divergent Stereoselectivity in Phosphothreonine (pThr)-Catalyzed Reductive Aminations of 3-Amidocyclohexanones. *J. Org. Chem.* **2018**, *83*, 4491–4504. DOI: [10.1021/acs.joc.8b00207](https://doi.org/10.1021/acs.joc.8b00207).
7. Shugrue, C. R.; Miller, S. J. Applications of Non-Enzymatic Catalysts to the Alteration of Natural Products. *Chem. Rev.* **2017**, *117*, 11894–11951. **Special Issue:** Natural Product Synthesis. DOI: [10.1021/acs.chemrev.7b00022](https://doi.org/10.1021/acs.chemrev.7b00022).
6. Alford, J. A.; Abascal, N. C.; Shugrue, C. R.; Colvin, S. M.; Romney, D. K. Miller, S. J. Aspartyl Oxidation Catalysts That Dial In Functional Group Selectivity, along with Regio- and Stereoselectivity. *ACS Cent. Sci.* **2016**, *2*, 733–739. DOI: [10.1021/acscentsci.6b00237](https://doi.org/10.1021/acscentsci.6b00237).
5. Shugrue, C. R.; Miller, S. J. Phosphothreonine as a Catalytic Residue in Peptide-Mediated Asymmetric Transfer Hydrogenations of 8-Aminoquinolines. *Angew. Chem. Int. Ed.* **2015**, *54*, 11173–11176. DOI: [10.1002/anie.201505898](https://doi.org/10.1002/anie.201505898).

Undergraduate Publications from Holy Cross and UT Austin:

4. Klosowski, D. W.; Hethcox, J. C.; Paull, D. H.; Fang, C.; Donald, J. R.; Shugrue, C. R.; Pansick, A. D.; Martin, S. F. Enantioselective Halolactonization Reactions using a BINOL-derived Bifunctional Catalyst: Methodology, Diversification, and Applications. *J. Org. Chem.* **2018**, *83*, 5954–5968. **Highlighted in:** *Synfacts* **2018**, *14*, 0790. DOI: [10.1021/acs.joc.8b00490](https://doi.org/10.1021/acs.joc.8b00490).
3. Shugrue, C. R.; DeFrancisco, J. R.; Metrano, A. J.; Brink, B. B.; Nomoto, R. S.; Linton, B. R. Detection of Weak Hydrogen Bonding to Fluoro and Nitro Groups in Solution using H/D Exchange. *Org. Biomol. Chem.* **2016**, *14*, 2223–2227. DOI: [10.1039/C5OB02360B](https://doi.org/10.1039/C5OB02360B).
2. Shugrue, C. R.; Mentzen, H. H.; Linton, B. R. A colorful solubility exercise for organic chemistry. *J. Chem. Ed.* **2014**, *92*, 135–138. **Cover Article.** DOI: [10.1021/ed4005408](https://doi.org/10.1021/ed4005408).
1. Fang, C.; Paull, D. H.; Hethcox, C. J.; Shugrue, C. R.; Martin, S. F. Enantioselective Iodolactonization of Disubstituted Olefinic Acids Using a Bifunctional Catalyst. *Org. Lett.* **2012**, *14*, 6290–6293. DOI: [10.1021/ol3030555](https://doi.org/10.1021/ol3030555).

PUBLIC PRESENTATIONS:

Seminars:

4. **DARPA Grant Proposal**
Washington, DC *September 2019*
 - Presented a research proposal to the US Defense Advanced Research Project Agency (DARPA).
3. **Dissertation Seminar**
Yale University, New Haven, CT *December 2018*
 - “Development of Phosphothreonine (pThr)-Embedded Peptides as Brønsted Acid Catalysts for Stereoselective Transformations.”
2. **Yale Chemistry Symposium**
Yale University, New Haven, CT *August 2017*
 - “Phosphothreonine as a Catalytic Residue in Peptide-Catalyzed Asymmetric Transfer Hydrogenations.”
1. **Holy Cross Honors Program Thesis Conference**
Holy Cross, Worcester, MA *May 2013*
 - “Molecular Recognition Using Hydrogen Bonding Catalysis.”

Conference Poster Presentations:

4. **Gordon Research Conference on Stereochemistry**
Salve Regina University, Newport, RI *July 2020 (Postponed)*
 - “Secondary Amino Alcohols: Easily Accessible Cleavable Linkers for Use in Affinity Capture and Release.”
3. **Gordon Research Conference on Stereochemistry**
Salve Regina University, Newport, RI *July 2018*
 - “Development of Phosphothreonine-Embedded Peptides as Brønsted Acid Catalysts in Stereoselective Reductions.”
2. **253rd ACS National Meeting**
San Francisco, CA *April 2017*
 - “Phosphothreonine as a Catalytic Residue in Peptide-Catalyzed Asymmetric Transfer Hydrogenations.”
1. **244th ACS National Meeting**
San Diego, CA *March 2012*
 - “Substrate Flexibility in Stereoselectively Catalyzed Michael Reactions.”