

# Spencer D. Brucks

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Assistant Professor of Chemistry | Harvey Mudd College  
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## Employment

<b>Assistant Professor of Chemistry</b> , Harvey Mudd College	2022 – Present
<b>Postdoctoral Associate</b> , Massachusetts Institute of Technology <i>Advisor: Prof. Laura L. Kiessling</i>	2018 – 2022

## Education

<b>Columbia University, Ph.D. in Chemistry</b> <i>Thesis Title: "Bringing Cyclopropenium to Life"</i> <i>Advisor: Prof. Luis M. Campos</i>	2018
<b>Cornell University, A.B. in Biology and Magna Cum Laude in Chemistry</b> <i>Advisor: Prof. William R. Dichtel</i>	2013

## Research

Polymer stereochemistry structure-function relationships; bio-inspired synthetic polymers; probiotic bacteria growth and function; green synthetic methods; sustainable materials; polyelectrolyte self-assembly and function;

## Awards

<b>Massachusetts Institute of Technology</b> Outstanding Service Award (Chemistry Dept.) Kaufman Teaching Program Certification (University)	2021 2020
<b>Columbia University</b> Pegram Award (Chemistry Dept., five awardees for meritorious research) Travel Grant for 253 <sup>rd</sup> ACS National Meeting (Graduate School of Arts and Sciences) Innovative Teaching Summer Institute Certification (University, 50 participants) Excellent Poster Award (KIAS Seoul Summer School, three awards out of 60 posters) Columbia Presidential Teaching Award (University, three annual awards) Miller Award (Chemistry Dept., five awardees for excellence in teaching) NSF Graduate Research Fellowship (Nationwide, 12% acceptance rate) Columbia-Upjohn Scholar (Chemistry Dept., one annual award for academic excellence)	2018 2016 2016 2015 2015 2015 2015 – 2018 2014 – 2015
<b>Cornell University</b> ACS Undergraduate Research Award (Chemistry Dept., three awardees for excellence in research) Dean's List (College of Arts and Sciences, GPA > 3.65) Robert W. Work Fellowship (one annual award for undergrad research in polymer chemistry)	2013 (Five times) 2009 – 2013 2012

## Teaching

<b>Course Instructor</b> , Harvey Mudd College <i>Chem 24: Core Chemistry Lab</i> <i>Chem 42: Chemistry in the Modern World</i> <i>Chem 56: Organic Chemistry 1</i> <i>Chem 58: Organic Chemistry 1 Laboratory</i> <i>Chem 111: Organic Chemistry 2 Laboratory</i> <i>Chem 182: Biochemistry</i> <i>Chem 184: Biochemistry Lab</i>	SP 2024, FA 2026 SP 2023, 2024; FA 2025, 2026 FA 2022, 2023, 2024 FA 2022, 2023, 2024 SP 2023 SP 2025, 2026 SP 2026
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**Teaching Development***Center for Teaching and Learning Book Club, Claremont Colleges*

FA 2022 – Present

*WRIT 1 Introduction to Academic Writing: Faculty Development Workshop*

SP 2024

*Kaufman Teaching Certificate Program, Massachusetts Institute of Technology*

FA 2020

*Innovative Teaching Summer Institute, Columbia University*

Summer 2016

**Guest Lecturer, Columbia University**

2015 – 2017

*CHEM C3443: Organic Chemistry I**CHEM G6168: Materials Chemistry IIA: Polymer Chemistry***Organic Chemistry Tutor, Columbia University**

2013 – 2018

**Graduate Teaching Assistant, Columbia University**

2013 – 2014

*CHEM C3443: Organic Chemistry I**CHEM C3543: Organic Chemistry Lab***Study Group Leader, Cornell University**

2010 – 2011

*BioEE 1780: Evolutionary Biology and Diversity*

## Mentoring

**\* Performed Senior Research Thesis****Undergraduate Research Students**25. Will Klick (*Undeclared '29*)

SU 2026 – Present

24. Leo Lam (*Undeclared '29*)

SP 2026 – Present

23. Brian Austin-Handy (*Chemistry '28*)

SP 2026 – Present

22. Tatiana Cardoso\* (*Chemistry '26*)

FA 2025 – SP 2026

21. Sophia Lemus\* (*Joint Chemistry and Biology '26*)

FA 2025 – SU 2026

20. Katie Cooper (*Physics '28*)

SP 2025

19. Kinsey Myrick (*Chemistry '28*)

SP 2025 – Present

18. Adrienne Baik (*Chemistry and Climate '27*)

SP 2025 – Present

17. Amir Gonzalez Camacho\* (*Chemistry '26*)

FA 2024 – SP 2026

16. Leo Romero\* (*Chemistry '25*)

FA 2024 – SP 2025

15. Greyson Karis-Sconyers (*Joint Chemistry and Biology '26*)

SU 2024 – SU 2025

14. Irene Jung (*Joint Chemistry and Biology '27*)

SU 2024 – Present

13. Nicole Fang (*Chemistry '27*)

SP 2024 – FA 2025

12. Emily Fang\* (*Molecular Biology, Pomona '25*)

SP 2024 – SP 2025

11. Claire Boege\* (*Chemistry '25*)

SP 2024 – SP 2025

10. Caetano Pérez-Marchant\* (*Chemistry '24*)

FA 2023 – SP 2024

9. Rodrigo Rosas (*Engineering '26*)

SU 2023

8. Nora O'Connor (*Chemistry '26*)

SU 2023 – SP 2024

7. Sarah Williams (*Mathematical and Computational Biology '25*)

SP 2023

6. Ashley Tan (*Joint Chemistry and Biology '25*)

SP 2023

5. Caroline Sorrells (*Physics '26*)

SP 2023

4. Aech Loar\* (*Chemistry '24*)

SP 2023 – SP 2024

3. Britney Baez\* (*Joint Chemistry and Biology '25*)

SP 2023 – SP 2025

2. Joseph Sherby\* (*Chemistry '23*)

FA 2022 – SP 2023

1. Ethan Flanagan\* (*Chemistry '23*)

FA 2022 – SP 2023

**Prior to Harvey Mudd**10. Shiwei Wang (*MIT graduate student*)

2021 – 2022

9. Sunhee Bae (*MIT graduate student*)

2021 – 2022

8. Carolyn Barnes (*MIT graduate student*)

2021 – 2022

7. Valerie Lensch (*MIT graduate student*)

2020 – 2022

6. Dayanne Carvalho ( <i>MIT undergraduate</i> )	2019 – 2021
5. Melanie Halim ( <i>MIT rotation student</i> )	2019
4. Gil Namkoong ( <i>MIT rotation student</i> )	2018
3. Rachel Starr ( <i>Columbia graduate student</i> )	2016 – 2018
2. Alexa Abdelaziz ( <i>Columbia rotation student</i> )	2016
1. Maria Escamilla ( <i>Columbia summer fellowship</i> )	2015

## Publications

\* Denotes Undergraduate Co-author

### At Harvey Mudd

- O'Connor, N.\*; Gasteazoro, T.\*; Stemple, L.\*; Zhu, L.\*; **Brucks, S. D.**; Vosburg, D. A. "A Pyridine Cyclization Cascade with and without Dichloromethane" *J. Chem. Educ.* **2025**, *102*, 12, 5269–5272 [DOI]
- Baez, B.\*; Karis-Sconyers, G.\*; Flanagan, E.\*; Loar, A.\*; **Brucks, S. D.** "Impact of Stereocontrolled Polynorbornene Synthesis on Degradation Rate" *Macromolecules* **2025**, *58*, 18, 10094–10101 [DOI]
- Alty, J. W.; Barnes, C. E.; Nicoli, A. M.; Turner, B. S.; Beneman, E. A.; Dugan, A. E.; **Brucks, S. D.**; Kruger, A. G.; Schrock, R. R.; Ribbeck, K.; Kiessling, L. L. "Synthetic Mucins as Glycan-Defined Prebiotics" *ACS Cent. Sci.* **2025**, *11*, 6, 918–926 [DOI]
- Johnson, S. N.; **Brucks, S. D.**; Apley, K.; Farrell, M. P.; Berkland, C. "Multivalent Scaffolds to Promote B cell Tolerance" *Mol. Pharmaceutics* **2023**, *20*, 8, 3741–3756 [DOI]

### Prior to Harvey Mudd

- Deiss-Yehiely, E.\*; **Brucks, S. D.\***; Boehnke, N.; Pickering, A. J.; Kiessling, L. L.; Hammond, P. T. "Surface Presentation of Hyaluronic Acid Modulates Nanoparticle-Cell Association" *Bioconjugate Chem.* **2022**, *33*, 11, 2065–2075 [DOI]
  - \*Equal first-author contribution
- Kruger, A. G.\*; **Brucks, S. D.\***; Yan, T.; Cárcarmo-Oyarce, G.; Wei, Y.; Wen, D. H.\*; Carvalho, D. R.\*; Hore, M. J. A.; Ribbeck, K.; Schrock, R. R.; Kiessling, L. L. "Stereochemical Control Yields Mucin Mimetic Polymers" *ACS Cent. Sci.* **2021**, *7*, 4, 624–630. [DOI]
  - \*Equal first-author contribution
  - Highlighted by *Chemical & Engineering News*, *Forbes*, *Science Daily*, and *MIT News*
- Russell, S. T.; Raghunathan, R.; Jimenez, A. M.; Zhang, K.; **Brucks, S. D.**; Iacob, C.; West, A. C.; Gang, O.; Campos, L. M.; Kumar, S. K. "Impact of Electrostatic Interactions on the Self-Assembly of Charge-Neutral Block Copolyelectrolytes" *Macromolecules* **2020**, *53*, 548–557. [DOI]
- Steinman, N. Y.; Starr, R. L.; **Brucks, S. D.**; Belay, C.; Meir, R.; Golenser, J.; Campos, L. M.; Domb, A. J.; "Cyclopropenium-Based Biodegradable Polymers" *Macromolecules* **2019**, *52*, 3543–3550. [DOI]
- Brucks, S. D.\***; Steinman, N. Y.\*; Starr, R. L.; Domb, A. J.; Campos, L. M. "Crosslinked Colloids with Cyclopropenium Cations" *J. Polym. Sci. A Polym. Chem.* **2018**, *56*, 2641–2645. [DOI]
  - \*Equal first-author contribution
- Freyer, J. L.; **Brucks, S. D.**; Campos, L. M. "Fully Charged: Maximizing the Potential of Cationic Polyelectrolytes in Applications Ranging from Membranes to Gene Delivery through Rational Design" *J. Polym. Sci. A Polym. Chem.* **2017**, *55*, 19, 3167–3174. [DOI]
- Hu, F.\*; **Brucks, S. D.\***; Lambert, T. H.; Campos, L. M.; Min, W. "Stimulated Raman scattering of polymer nanoparticles for multiplexed live-cell imaging" *Chem. Commun.* **2017**, *53*, 6187–6190. [DOI]
  - \*Equal first-author contribution • Selected for cover
- Brucks, S. D.**; Freyer, J. L.; Lambert, T. H.; Campos, L. M. "Influence of Substituent Chain Branching on the Transfection

Efficacy of Cyclopropenium-Based Polymers” *Polymers* **2017**, *9*, 3, 79. [DOI]

• *Selected for cover*

4. Freyer, J. L.; **Brucks, S. D.**; Gobieski, G. S.\*; Russell, S. T.; Yozwiak, C. E.; Sun, M.\*; Chen, Z.; Jiang, Y.\*; Bandar, J. S.; Stockwell, B. R.; Lambert, T. H.; Campos, L. M. “Clickable Poly(ionic liquids): A Materials Platform for Transfection” *Angew. Chem. Int. Ed.* **2016**, *55*, 40, 12382–12386. [DOI]
3. Killops, K. L.; **Brucks, S. D.**; Rutkowski, K. L.\*; Freyer, J. L.; Jiang, Y.\*; Valdes, E. R.; Campos, L. M. “Synthesis of Robust Surface-Charged Nanoparticles based on Cyclopropenium Ions” *Macromolecules* **2015**, *48*, 2519–2525. [DOI]
2. Jiang, Y.\*; Freyer, J. L.; Cotanda, P.; **Brucks, S. D.**; Killops, K. L.; Bandar, J. S.; Torsitano, C.\*; Balsara, N. P.; Lambert, T. H.; Campos, L. M. “The Evolution of Cyclopropenium Ions into Functional Polyelectrolytes” *Nat. Commun.* **2015**, *6*, 5950. [DOI]
1. **Brucks, S. D.**\*; Bunck, D. N.; Dichtel, W. R. “Functionalization of 3D Covalent Organic Frameworks with Monofunctional Boronic Acids” *Polymer* **2014**, *55*, 1, 330. [DOI]

## Funding

“Impact of Stereocontrolled Polymer Synthesis on Degradation”

09/2025 – 08/2027

American Chemical Society Petroleum Research Fund

PRF #68956-UNI7 | \$55,000

## Patents

Ribbeck, K.; Kiessling, L. L.; Werlang, C. A.; **Brucks, S. D.**; Yakovlieva, L.; Wheeler, K. M. “Methods and compositions for treating or preventing a vaginal infection of *gardnerella vaginalis*” December 14, 2023. US Patent # US20230398178 A1

Campos, L. M.; Min, W.; Lambert, T. H.; Hu, F.; **Brucks, S. D.** “Raman-active polymer particles and methods for synthesizing thereof” December 22, 2016. US Patent # US20160367688 A1

Killops, K. L.; Campos, L. M.; **Brucks, S. D.** “Cationic Particles Comprising Cyclopropenium, Their Preparation and Uses” August 10, 2017. US Patent # US20170226246 A1

## Presentations

*Green stereocontrolled polymer synthesis impacts degradation* 05/2026  
Stanford Polymer Collective, Stanford, CA • **Invited for oral presentation**

*From snot to sustainability: Mucin mimics motivate macromolecular manipulations* 03/2026  
ACS National Meeting, Atlanta, GA: CARB Next Generation Glycoscientists • **Invited for oral presentation**

*Green Stereocontrolled Synthesis of Polynorbornene Impacts Degradation Rate* 03/2026  
ACS National Meeting, Atlanta, GA: PMSE Celebrating Polymer Research at Primarily Undergraduate Institutions

*Impact of Stereocontrolled Polymer Synthesis on Structure and Function* 06/2025  
GRC Polymers, Mount Holyoke, MA

*Impact of Stereocontrolled Polymer Synthesis on Degradation* 10/2024  
ExxonMobil Organometallic Catalysis Group, Baytown, TX • **Invited for oral presentation**

*Understanding Probiotic Bacterial Growth for Sustainable Microbiome Management* 10/2024  
Southern CA Branch American Society for Microbiology Annual Meeting, La Jolla, CA • **Invited for oral presentation**

*“It’s What’s on the Inside That Counts”: Structure-Function Investigations on Polymer Scaffolds* 06/2023  
GRC Polymers, Mount Holyoke, MA

*Mucin-inspired materials in microbiome management* 09/2022

Western University of Health Sciences, Pomona, CA • **Invited for oral presentation**

*Modulating macromolecules to mimic mucus* 03/2022  
Wellesley College, Wellesley, MA • **Invited for oral presentation**

*Modulating macromolecules to mimic mucus* 11/2021  
College of William & Mary, Williamsburg, VA • **Invited for oral presentation**

*Modulating macromolecules to mimic mucus* 11/2021  
Harvey Mudd College, Claremont, CA • **Invited for oral presentation**

*Stereochemical control yields mucin mimetic polymers* 11/2021  
ACS SW Meeting: Biohybrid Macromolecular Systems and Supramolecular Assemblies • **Invited for oral presentation**

*Modulating macromolecules to mimic mucus* 10/2021  
Haverford College, Haverford, PA • **Invited for oral presentation**

*Stereochemical control yields mucin mimetic polymers* 07/2021  
New England Glycochemistry Meeting, Virtual • **Invited for oral poster talk**

*Modular nanoparticles for live-cell imaging by stimulated Raman scattering* 06/2017  
GRC Polymers, Mount Holyoke, MA • **Selected for oral presentation by GRS peers**

*Modular nanoparticles for live-cell imaging by stimulated Raman scattering* 06/2017  
GRS Polymers, Mount Holyoke, MA • **Invited for oral presentation**

*Raman-active polymer dots for live cell imaging* 04/2017  
ACS National Meeting, San Francisco, CA: PMSE General Papers / New Concepts in Polymeric Materials

*Raman-active Polymer Nanoparticles for Cell Imaging* 08/2016  
ACS National Meeting, Philadelphia, PA: POLY Polymeric Materials as Imaging Agents & Theranostics

*New Materials for Gene Delivery in Difficult-to-Transfect Cell Lines* 06/2015  
KIAS Summer School, Seoul, South Korea: Polymers in Biology • **Selected for excellent poster award**

*Towards Diazaborole and Boroxine Linked Functional Materials* 08/2012  
ACS National Meeting, Philadelphia, PA: Undergraduate Research Posters

## Outreach & Service

### At Harvey Mudd

Invited Presenter at South Hills High School STEM Conference in West Covina, CA FA 2024  
Academic Vision Strategic Planning Working Group Member SP 2024  
Diversity, Equity, and Inclusion Coordinator for the Chemistry Department FA 2023 – SP 2025  
Faculty Representative on Inclusion, Diversity, Equity, and Access Committee FA 2023 – SP 2025  
Chemistry Faculty Search Committee Member FA 2023  
Invited Speaker at Upland Public Library Book Enders Book Club SP 2023  
Chemistry Department Faculty Representative at Admitted Students Program (Thrice) 2023 – 2025

### Prior to Harvey Mudd

Postdoc Representative on Diversity, Equity, and Inclusion Committee, MIT Chemistry 2020 – 2022  
ShutDownSTEM Organizer and Facilitator, MIT Chemistry (Twice) 2020 – 2021  
Chemistry Postdoctoral Association, MIT Chemistry 2019 – 2022  
Selection Committee for the Graduate Student Presidential Teaching Awards, Columbia University 2016 – 2018  
AFM Superuser, Shared Materials Characterization Lab, Columbia University 2014 – 2018  
Chemistry Graduate Student Teaching Panel, Columbia University (Four times) 2014 – 2017  
PhD for a Day, Columbia University (Four times) 2014 – 2017  
Girls' Science Day, Columbia University (Five times) 2013 – 2017