

Spencer D. Brucks

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Assistant Professor of Chemistry | Harvey Mudd College
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Employment

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

Education

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

Research

Bio-inspired synthetic polymers; polymer structure-function relationships; human microbiome treatment; sustainable materials; polyelectrolyte self-assembly and function; synthesis and delivery of targeted nanoparticles;

Awards

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

Teaching

Course Instructor, Harvey Mudd College	
<i>Chem 42: Chemistry in the Modern World</i>	SP 2023
<i>Chem 56: Organic Chemistry 1</i>	FA 2022
<i>Chem 58: Organic Chemistry 1 Laboratory</i>	FA 2022
<i>Chem 111: Organic Chemistry 2 Laboratory</i>	SP 2023

Teaching Development

<i>Kaufman Teaching Certificate Program, Massachusetts Institute of Technology</i>	FA 2020
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<i>Innovative Teaching Summer Institute, Columbia University</i>	Summer 2016
Guest Lecturer, Columbia University CHEM C3443: <i>Organic Chemistry I</i> CHEM G6168: <i>Materials Chemistry IIA: Polymer Chemistry</i>	2015 – 2017
Organic Chemistry Tutor, Columbia University	2013 – 2018
Graduate Teaching Assistant, Columbia University CHEM C3443: <i>Organic Chemistry I</i> CHEM C3543: <i>Organic Chemistry Lab</i>	2013 – 2014
Study Group Leader, Cornell University <i>BioEE 1780: Evolutionary Biology and Diversity</i>	2010 – 2011

Mentoring

* Performed Senior research thesis

Research Students

7. Sarah Williams (<i>Mathematical and Computational Biology '25</i>)	2023 – Present
6. Ashley Tan (<i>Joint Chemistry and Biology '25</i>)	2023 – Present
5. Caroline Sorrells (<i>Undeclared '26</i>)	2023 – Present
4. Aech Loar (<i>Chemistry '24</i>)	2023 – Present
3. Britney Baez (<i>Undeclared '25</i>)	2023 – Present
2. Joseph Sherby* (<i>Joint Chemistry and Biology '23</i>)	2022 – 2023
1. Ethan Flanagan* (<i>Chemistry '23</i>)	2022 – 2023

Prior to Harvey Mudd

10. Shiwei Wang (<i>MIT graduate student</i>)	2021 – 2022
9. Sunhee Bae (<i>MIT graduate student</i>)	2021 – 2022
8. Carolyn Barnes (<i>MIT graduate student</i>)	2021 – 2022
7. Valerie Lensch (<i>MIT graduate student</i>)	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

Prior to Harvey Mudd

- Johnson, S.; **Brucks, S. D.**; Apley, K.; Berkland, C. "Multivalent scaffolds to promote B cell tolerance" *Submitted*
- 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]
9. 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]
8. **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
7. 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]
6. 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
5. **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]

Patents

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

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

Prior to Harvey Mudd

Postdoc Representative on Diversity, Equity, and Inclusion Committee, MIT Chemistry	2020 – 2022
ShutDownSTEM Organizer and Facilitator, MIT Chemistry	(<i>Twice</i>) 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	(<i>Four times</i>) 2014 – 2017
PhD for a Day, Columbia University	(<i>Four times</i>) 2014 – 2017
Girls' Science Day, Columbia University	(<i>Five times</i>) 2013 – 2017