Victoria Grace Muir, Ph.D.

Assistant Professor of Chemical and Biomolecular Engineering (starting Fall 2024)
University of Delaware • Colburn Laboratory • 150 Academy St • Newark, DE
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Education

University of Pennsylvania (Ph.D.) 2018 – 2022
Department of Bioengineering
National Science Foundation (NSF) Graduate Research Program Fellow
Thesis: *Designing Hyaluronic Acid Granular Hydrogels for Biomaterials Applications*
Thesis Advisor: Prof. Jason A. Burdick

University of Delaware 2014 – 2018
Department of Chemical and Biomolecular Engineering, (B.S.ChE.)
Summa Cum Laude • Honors Degree with Distinction
Barry Goldwater Scholar • Eugene D. duPont Scholar
Minors in Chemistry and Medical Humanities
Honors Thesis: *Photo-sensitive polymer assemblies for nucleic acid delivery*
Thesis Advisors: Prof. Millicent O. Sullivan and Prof. Thomas H. Epps, III

Professional Experience

Assistant Professor, tenure-track Starting Fall 2024
Department of Chemical and Biomolecular Engineering, University of Delaware

Princeton Presidential Postdoctoral Research Fellow 2022 – 2024
Department of Chemical and Biological Engineering, Princeton University
Investigating Phage-Bacteria Dynamics in Porous Media
Advisor: Prof. Sujit S. Datta

Additional Research Experience

Undergraduate Research Assistant 2014 – 2018
Department of Chemical and Biomolecular Engineering, University of Delaware
Thesis: *Photo-sensitive polymer assemblies for nucleic acid delivery*
Research Advisors: Prof. Thomas H. Epps, III and Prof. Millicent O. Sullivan

Vaccine Drug Product Development Intern 2017
Merck, West Point PA
Project: *Effects of Ionic Strength and pH on Thermal Stability of Virus Particles*
Research Advisor: Dr. Babu Medi

Undergraduate Research Assistant 2016
MIT Summer Research Program in Biology, MIT
Project: *Nanoparticle Delivery Methods for CRISPR Ribonucleoproteins (RNPs)*
Research Advisors: Dr. Vikash Chauhan; Prof. Robert Langer

High School Research Assistant 2012 – 2014
Department of Chemical and Biomolecular Engineering, University of Delaware
Project: *Homopolymer blend thin film assembly and characterization*
American Chemical Society Project SEED
Research Advisor: Prof. Thomas H. Epps, III

Awards and Honors

Postdoctoral

AIChE Career and Education Operating Council (CEOC, appointed member, 2023-2025) 2022
Princeton Presidential Postdoctoral Research Fellowship, Princeton University 2022

Graduate

Solomon R. Pollack Award for Excellence in Graduate Bioengineering Research, University of Pennsylvania 2023
UD Future Faculty Workshop Participant, University of Delaware 2022
STAR Award, Society for Biomaterials Annual Meeting, Baltimore, MD 2022
Graduate Teaching Certificate, Center for Teaching & Learning, University of Pennsylvania 2021
AIChE Biomaterials Graduate Student Award Session Presenter, AIChE 2021
Penn BioE Diversity, Equity, and Inclusion (DEI) Scholar, University of Pennsylvania 2021
First Place - Penn Bioengineering Graduate Research Symposium Presentation Competition 2021
AIChE Young Professionals Committee (YPC) Chair (3-year term) 2021
Soft Matter for All Symposium - Selected Speaker, Princeton University and University of Delaware MRSECs 2020
Women in Chemical Engineering (WIC) Travel Award, AIChE 2020, 2021
Penn Prize for Excellence in Graduate Teaching, University of Pennsylvania 2020
Poddar Award for Rising Star in Chemical Engineering, AIChE 2019
NSF Graduate Research Fellowship, University of Pennsylvania 2019
Tau Beta Pi Fellowship, University of Pennsylvania 2019
Fontaine Fellowship, University of Pennsylvania 2018

Undergraduate

Warner Award for Outstanding Female in c/o 2018 - Finalist, University of Delaware 2018
University of Delaware Group Exercise Instructor of the Year 2018
AIChE National Outstanding Student Chapter University of Delaware 2018
Industrial Sponsors Senior Student Award, University of Delaware 2018
First Place Poster in Materials Science and Engineering, AIChE Annual Meeting 2017
Slocomb Engineering Scholarship, University of Delaware 2017
Sylvia and Charles S. Joanedis Scholarship, University of Delaware 2017
Barry Goldwater Scholarship, University of Delaware 2016
ACS Undergraduate Symposium in Polymers – Second Place, San Diego, CA 2016
David Buck Memorial Award, University of Delaware 2016
AIChE National Outstanding Student Chapter, University of Delaware 2016
AIChE National Outstanding Sophomore Representative, University of Delaware 2016
General Honors Award, University of Delaware 2016
AIChE National Outstanding Freshman Representative, University of Delaware 2015
Delaware INBRE Summer Research Scholarship, University of Delaware 2015
Eugene D. duPont Full Undergraduate Scholarship, University of Delaware 2014
National AP Scholar 2014
Society of Women Engineers Delaware Chapter College Scholarship 2014
Diamond State Scholarship 2014
ACS Project SEED Scholar 2012, 2013

Publications

1. **V.G. Muir,** S. Weintraub, A.P. Dhand, H. Fallahi, L. Han, J.A. Burdick. “Influence of Microgel and Interstitial Matrix Compositions on Granular Hydrogel Composite Properties”, *Advanced Science*, 2023, 10 (10), 2206117.
2. **V.G. Muir**, T.H. Qazi, S. Weinstraub, B. Moldanado, P. Arratia, and J.A. Burdick. “Sticking Together: Injectable Granular Hydrogels with Increased Functionality via Dynamic Covalent Inter-particle Crosslinking”, *Small.* 2022, 18, 6, 2201115.
3. **V.G. Muir**, M.E. Prendergast, and J.A. Burdick. “Fragmenting Bulk Hydrogels and Processing into Granular Hydrogels for Biomedical Applications”, *J. Vis. Exp.* 2022, 183, e63867.

4. T.H. Qazi, **V.G. Muir**, J.A. Burdick. “Methods to characterize granular hydrogel rheological properties, porosity, and cell invasion”. *ACS Biomater. Sci. Eng.* 2022. 2022, 8, 4, 1427–1442.
5. T.H. Qazi, J. Wu, **V.G. Muir**, S. Weintraub, D. Lee, S. Gullbrand, D. Issadore, J.A. Burdick. “Anisotropic Rod-Shaped Particles Influence Injectable Granular Hydrogel Properties and Cell Invasion”. *Advanced Materials*, 2021, 34, 12, 2109194.
6. **V.G. Muir**, T.H. Qazi, J. Shan, J. Groll, J.A. Burdick, “Influence of Microgel Fabrication Technique on Granular Hydrogel Properties”, *ACS Biomater. Sci. Eng.* 2021, 7, 9, 4269–4281
7. **V.G. Muir** and J.A. Burdick, “Chemically-modified Biopolymers for the Formation of Biomedical Hydrogels”, *Chem. Rev.* 2021, 121, 18, 10908–10949
8. *C.T. Greco, ***V.G. Muir**, T.H. Epps, III, and M.O. Sullivan. “Efficient tuning of siRNA dose response by combining mixed polymer nanocarriers with simple kinetic modeling.” *Acta Biomaterialia*. 50, 407-416, 2017. **Denotes co-first authors*

Research Presentations and Seminars *(**denotes Invited Seminar Speaker)*

1. **V.G. Muir**, S.S. Datta. AIChE Annual Meeting, Orlando, FL. “Dynamics of Phage-Bacteria Interactions in Crowded Environments.” November 2023.
2. **V.G. Muir,** J.A. Burdick, S.E. Gullbrand. Society for Biomaterials Annual Meeting, San Diego, CA. “Injectable Radiopaque Hyaluronic Acid Granular Hydrogels for Intervertebral Disc Repair”. April 2023.
3. **V.G. Muir,** J.A. Burdick. Society for Biomaterials Annual Meeting, San Diego, CA. “Influence of Microgel and Interstitial Matrix Compositions on Granular Hydrogel Composite Properties”. April 2023.
4. ****V.G. Muir**. “Bioengineering with Granular Hydrogels.” University of Delaware Department of Chemical and Biomolecular Engineering Seminar Series, Alumni Lecture, October 2022.
5. ****V.G. Muir**, J.A. Burdick “Sticking Together: Injectable Granular Hydrogels with Increased Functionality via Dynamic Covalent Interparticle Crosslinking.” University of Florida Department of Chemical Engineering Biomaterials Seminar Series, May 2022.
6. ****V.G. Muir**, J.A. Burdick “Designing Hyaluronic Acid Granular Hydrogels for Biomedical Applications”. Soft Matter Coffee Hour (SMatCH), Princeton University. Spring 2022.
7. **V.G. Muir**, J.A. Burdick. Society for Biomaterials Annual Meeting, Baltimore MD. “Sticking Together: Injectable Granular Hydrogels with Increased Functionality via Dynamic Covalent Interparticle Crosslinking.” April 2022.
8. **V.G. Muir**, J.A. Burdick. AIChE Annual Meeting, Boston, MA. “Enhanced Granular Hydrogels with Dynamic Covalent Interparticle Crosslinking.” Biomaterials Graduate Awards Session. November 2021
9. **V.G. Muir**, J.A. Burdick. Society for Biomaterials Annual Meeting, virtual. “Enhanced Granular Hydrogels with Dynamic Covalent Interparticle Crosslinking.” April 2021.
10. **V.G. Muir**, J.A. Burdick. Penn Bioengineering Graduate Research Symposium, virtual. “Granular Hydrogels for Tissue Repair.” January 2021. Awarded First Place in Student Talk Competition.
11. **V.G. Muir**, J.A. Burdick. World Biomaterials Congress, virtual. “Influence of microgel fabrication technique on granular hydrogel properties.” December 2020.
12. **V.G. Muir**, J.A. Burdick. AIChE Annual Meeting, virtual. “Influence of microgel fabrication technique on granular hydrogel properties.” November 2020.
13. **V.G. Muir**, J.A. Burdick. Soft Matter for All Symposium hosted by Princeton University and University of Delaware MRSECs, virtual. “Influence of microgel fabrication technique on granular hydrogel properties.” October 2020.
14. **V.G. Muir**, J.A. Burdick. AIChE Annual Meeting, Orlando, FL. “Combining Shear-thinning and Temporal Covalent Crosslinking in a Hyaluronic Acid Hydrogel.” November 2019.
15. **V.G. Muir**, S. E. Gullbrand, J.A. Burdick. BMES Annual Meeting, Philadelphia, PA. “Combining Shear-thinning and Temporal Covalent Crosslinking in a Hyaluronic Acid Hydrogel.” October 2019.
16. **V.G. Muir**, C.T. Greco. T.H. Epps, M.O. Sullivan. AIChE Annual Meeting Undergraduate Research Symposium, San Francisco, CA. “Efficient tuning of siRNA dose response by combining mixed polymer nanocarriers with simple kinetic modeling.” Fall 2016

17. **V.G. Muir**, C.T. Greco. T.H. Epps, M.O. Sullivan. ACS Annual Meeting Symposium in Polymer Science, San Diego, CA. “Efficient tuning of siRNA dose response by combining mixed polymer nanocarriers with simple kinetic modeling.” Awarded Second Place, Spring 2016
18. **V.G. Muir**, C.T. Greco. T.H. Epps, M.O. Sullivan. AIChE Mid-Atlantic Undergraduate Research Symposium, Newark, DE. “Efficient tuning of siRNA dose response by combining mixed polymer nanocarriers with simple kinetic modeling.” Spring 2016

Poster Sessions

1. **V.G. Muir**, J.A. Burdick. Society for Biomaterials Annual Meeting, Baltimore MD. “Developing Hands-On Biomaterials Education Modules Using Alginate Hydrogels.” April 2022.
2. **V.G. Muir.** Women in Chemical Engineering Symposium, Boston, MA. “Granular Hydrogels for Biomedical Applications” AIChE Annual Meeting, Fall 2021
3. **V.G. Muir**, J.A. Burdick. Penn Bioengineering Graduate Research Symposium, Philadelphia, PA. “Influence of microgel fabrication technique on granular hydrogel properties.” Winter 2020
4. **V.G. Muir**, S. E. Gullbrand, J.A. Burdick. Penn Center for Musculoskeletal Diseases Symposium, Philadelphia, PA. “Combining Shear-thinning and Temporal Covalent Crosslinking in a Hyaluronic Acid Hydrogel for Degenerated Spinal Disc Repair.” Fall 2019
5. **V.G. Muir**, C.T. Greco. T.H. Epps, M.O. Sullivan. AIChE Annual Meeting Undergraduate Poster Session, Minneapolis, MN. “Efficient tuning of siRNA dose response by combining mixed polymer nanocarriers with simple kinetic modeling.*” Awarded First Place in Materials Science*, Fall 2017
6. **V.G. Muir.** Merck Research Laboratories Symposium, West Point, PA. “Viral Vaccine Stability - Effects of Ionic Strength and pH on Thermal Stability.” Summer 2017
7. **V.G. Muir.** MIT Summer Research Symposium, Cambridge, MA. “Nanoparticle Delivery Methods for CRISPR Cas9:sgRNA RNPs.” Summer 2016

Teaching Experience

Squishy Engineering: Using Soft Materials to Solve Hard Problems (CBE 430) Fall 2022
Professor Sujit Datta, Princeton University
Guest Lecture: Granular Materials for Bioengineering

Tissue Engineering (BE553), University of Pennsylvania Fall 2021
Graduate Course in Bioengineering
Professor Jason Burdick, University of Pennsylvania
Teaching Assistant
Guest Lecture: Mechanical properties of hydrogels using interactive activities

Biomaterials III (BE512), University of Pennsylvania Fall 2020
Graduate Course in Bioengineering
Professor Michael Mitchell, University of Pennsylvania
Course delivered virtually
Teaching Assistant
Guest Lectures: Natural Polymers & ECM-Inspired Biomaterials

Tissue Engineering (BE553), University of Pennsylvania Spring 2020
Graduate Course in Bioengineering
Professor Jason Burdick, University of Pennsylvania
Teaching Assistant

Biomaterials III (BE512), University of Pennsylvania Fall 2019
Graduate Course in Bioengineering
Professor Michael Mitchell, University of Pennsylvania
Teaching Assistant
Guest Lectures: Bone Ceramic Engineering, Natural Polymers for Tissue Engineering
Received Penn Prize for Excellence in Graduate Teaching

Introduction to Materials Engineering (MSEG 302), University of Delaware — January 2018
Undergraduate Study Abroad Course in San Sebastián, Spain
Professor Ismat Shah, University of Delaware
Teaching and Program Assistant

Coursework in University Teaching

Inclusive and Equitable Teaching (Semester Course) — Fall 2020
Instructor: Dr. Jamiella Brooks
Center for Teaching and Learning, University of Pennsylvania

Creating a Community in Online Learning (Workshop) — Summer 2020
Instructor: Dr. Ian Petrie
Center for Teaching and Learning, University of Pennsylvania

Teaching to Undergraduates and Graduates in the Same Classroom (Workshop) — Fall 2019
Instructor: Dr. Jason Burdick
Center for Teaching and Learning, University of Pennsylvania

Mentoring Experience

India Ingemi, Undergraduate Student, Princeton University — 01/2023 – 05/2024
Senior Thesis Research
Project: Continuous Characterization of Bacteria-Phage Dynamics in Porous Media

Shoshana Weintraub, Undergraduate Student, University of Pennsylvania — 01/2020 – 05/2022
Penn Littlejohn Research Fellow
Projects: Computational simulations of granular hydrogels; Characterizing contraction flow of granular hydrogels through a syringe needle; 3D printing with granular hydrogel composites

Julio Rivera-de Jesús and Kayla Brown — 05/2021 – 08/2021
Penn Laboratory for Research on the Structure of Matter Virtual REU
Project: Increasing accessibility in biomaterials education and hydrogel research by designing low-cost, Arduino-based biomaterials testing equipment

Karen Xu, M.D./Ph.D. candidate, University of Pennsylvania (summer rotation) — 05/2019 – 08/2019

AIChE Leadership

AIChE Presidential Coaching/ Mentoring Blue Ribbon Task Force — 2022 – present

AIChE Young Professionals Committee (YPC) — 2018 – present
Vice Chair (2021), ***Chair (2022)****, Past Chair (2023)*
Annual Student Conference Coordinator (2020),
K12 Outreach Chair (2019)

AIChE K12 Committee — 2018 – 2020
K12 Committee and STEM Showcase Volunteer

University of Delaware AIChE Student Chapter Executive Board — 2014 – 2018
President (2018), Vice President (2017),
K12 Outreach Chair (2016), Freshman Representative (2015)
*Received AIChE National Outstanding Student Chapter Award while serving as President

Diversity, Equity, And Inclusion

Women in CBE (WICBE) Committee Member – Professional Development Coordinator 2023 – 2024
Served as one of nine committee members with other Princeton CBE faculty, students, and postdoctoral fellows to address the barriers towards academic and professional success of women.

Penn BE DEI Scholar 2021 – 2022
Served as one of eight committee members with other Penn Bioengineering (BE) faculty, staff, and students to evaluate diversity, equity, and inclusion (DEI) efforts within the department and make actionable plans for improvement.

Spark Mentor 2021
Spark is an organization that works with Middle Schools in Philadelphia to provide career-exploration and social-emotional skill-building opportunities for 7th & 8th-grade students. Met weekly with student mentees for 2 hours and developed a "Spark Project" over a 13-week period.

Project SHORT Mentor 2020 – 2022
Act as a mentor for undergraduate students from underrepresented and minority groups applying to biomedical PhD programs.

GAINS Volunteer 2019 – 2022
Engage with middle school and high school girls interested in pursuing a career in science and engineering through the GAINS (Girls Advancing in STEM) Network.

GEMS Volunteer 2019
Developed and lead a workshop on biomaterials for middle school girls as a part of the GEMS (Girls Engaged in Math and Science) Camp at University of Pennsylvania.

FourYouth Productions Volunteer 2014 – 2018
FourYouth Productions is a non-profit out of Wilmington, DE that provides extracurricular programming in science, art, and cooking for underprivileged youth in Wilmington, DE.

Science Communication and Public Engagement

AIChE Science Communication Efforts 2021 – present
Led a 2-hour workshop on "How to Share Your Research with Everyone" at the AIChE Annual Meeting in 2021. Served on the leadership team to plan both the 2022 and 2023 Three-Minute Thesis (3MT) competition at the AIChE Annual Meetings.

Skype a Scientist – Guest Science Instructor 2020 – 2021
Develop, organize, and lead virtual classroom sessions on medicine and materials for K-12 classrooms.

Beta Day Workshop Leader 2018 – 2020
Develop, organize, and lead a hands-on workshop on biomaterials for Beta Day, an annual event that hosts over one hundred 5th grade students from Philadelphia for a day of science activities at University of Pennsylvania.

Delaware Museum of Natural History – Guest Scientist 2017 – 2021
Develop, organize, and lead hands-on science demonstrations for museum guests.

Science Communication and Professional Development Speaking Engagements

1. **Workshop Leader**: “Making the Most of Your AIChE Experience as a Young Professional”. AIChE Spring Meeting, 2022.
2. **Invited Presenter**: “Why Join AIChE?”. Oregon State University AIChE Student Chapter General Body Meeting, 2022
3. **Workshop Leader**: “How to Share Your Research with Everyone”. AIChE Annual Meeting, 2021
4. **Workshop Leader**: “Applying to PhD Programs and Research Fellowships”. AIChE Annual Student Conferences, 2019, 2020, 2021
5. **Invited Presenter**: “Tissue Engineering: working to repair and regenerate damaged tissue to better human health” Girls Advancing in STEM (GAINS) Network Seminar Series, 2019, 2021
6. **Keynote Speaker**: “Is Chemical Engineering for Me?” Susquehanna Valley AIChE Local Section Awards Banquet, 2020, 2021
7. **Keynote Speaker**: University of Delaware Engineers Week Student Banquet, 2020
8. **Invited Presenter**: “K12 Outreach for Chemical Engineers” AIChE Local Sections Webinar, 2019
9. **Workshop Leader**: “K12 Outreach for Chemical Engineers”. AIChE Spring Meeting, 2019
10. **Keynote Speaker**: University of Delaware Distinguished Scholars Ceremony, 2018
11. **Keynote Speaker**: National Council for Women in Technology Delaware Chapter Awards Ceremony, 2018