UNIVERSITY OF DELAWARE

UNIVERSITY OF DELAWARE
ENGINEERING

www.cbe.udel.edu

CHEMICAL & BIOMOLECULAR ENGINEERING

2026 CBE DOCTORAL AND POSTDOCTORAL CANDIDATES

RESUME BOOKLET

COLBURN LAB • 150 ACADEMY STREET • NEWARK DE 19716

UNIVERSITY OF DELAWARE

Chemical & Biomolecular Engineering
Office of the Chair
Newark, DE 19716-3110
Phone: 302-831-2543
Fax: 302-831-1048

January 2026

Dear Friends and Guests:

On behalf of the faculty of the Department of Chemical & Biomolecular Engineering, I am pleased to introduce you to our fourth year PhD students – a talented and energized group who will soon become candidates for professional careers. Many of them will be available for employment within the next year.

Delaware is one of the leading producers of chemical engineering PhDs in the country, with over 250 current graduate students, postdocs, and researchers in the department. The excellence of our department is especially evident in the graduate program, which continues to be ranked as one of the top ten in the United States.

Our students and faculty are driving new research initiatives across the wide range of chemical engineering science and practice—from biomolecular engineering to energy production and sustainable chemistry. A hallmark of the department is its leadership of strong interdisciplinary programs, centers, and institutes that connect faculty, students, industry, and national labs, including the UD-NIST Center for Neutron Science (CNS), Delaware Energy Institute (DEI), Center for Catalytic Science and Technology (CCST), the Catalysis Center for Energy Innovation (CCEI), Center for Biomanufacturing Science and Technology (CBST), Center for Research in Soft matter and Polymers (CRiSP), Center for Hybrid, Active, and Responsive Materials (CHARM), Center for Plastics Innovation (CPI), National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), Center for Clean Hydrogen (CCH), Center for Composite Materials (CCM), and Mid-Atlantic Clean Hydrogen Hub MACH2 – with many of these activities involving our faculty and center leaders. To learn more about these initiatives, the Department, our faculty and their research, and each of the students presenting today, I invite you to visit our web site www.cbe.udel.edu.

The department takes great pride in the successes and accomplishments of our students, who regularly receive awards, fellowships, and other recognitions for their research and teaching. But it is in their subsequent careers that they really come into their own. We are grateful for your interest in their future as potential employers, and we are certain that they will contribute strongly to your organizations. Please feel free to share this compilation of resumes with others in your company.

The concept and format for the fourth-year research symposium originated with our graduate student organization, the Colburn Club. It is an exceptional time to celebrate the leadership and creativity they bring to our community of engineering educators, learners, and scholars.

Sincerely,

Millicent O. Sullivan

Millicent O. Sullivan
Alvin B. and Julie O. Stiles Professor and Department Chair

ENCLOSED RESUMES

Jackie Arnold Walker
James Buchen
Enerelt Burentugs
Sofia Capece
Kenneth Crane-Moscowitz
Emily Doleh
Charles Fields
Jessica Rubira Gamba
Philip Gitman
Jodi Graf
Saloni Gupta
William Hartt
Katie Raudenbush Henderson
Nicholas Houck
Jae Young Kim
Quentin Kim
Stephen Kronenberger
Derron Ma
Christopher Mayhugh
Rajas Milind Mehendale
Izak Minnie
Lily Matabar
Pedro António Reis Moura
Tristan Myers
Juliana Nam
Jacqueline Ngu
Christine Oberhausen
Kiet Pham
Abigayle Polsky
Tessa Posey
Blake Richards
Jay Shah
Eric Slaughter
Arun Senthil Sundaramoorthy
Ching-Mei Wen
Genevieve Yarema
Logan Yeager
Ming Hung Yen

Jackie Rhys Arnold Walker

jackiera@udel.edu | www.linkedin.com/in/jackie-arnold

EDUCATION

University of Delaware, Newark, DE — August 2022 – Present
Doctor of Philosophy in Chemical Engineering | Concentration in Soft Matter
West Virginia University, Morgantown, WV — August 2018 – May 2022
Bachelor of Science in Chemical Engineering | Certificate in Biomedical Engineering
Summa Cum Laude

RESEARCH EXPERIENCE

Graduate Research Assistant, Newark, DE — December 2022 – Present
PhD Advisor: Professor LaShanda T.J. Korley
Department of Chemical and Biomolecular Engineering

- Synthesizing and characterizing lignin-derivable, non-isocyanate polyurethanes (NIPUs) coatings and foams to map structure–property relationships and assess commercial viability
- Synthesizing polyurethane thermoplastics and thermosets for deconstruction testing
- Producing peer-reviewed publications on sustainable polymer systems from biological feedstocks
- Serving as outreach chair, waste manager, and safety liaison for the Korley Research Group

Beckman Scholar, Morgantown, WV — May 2021 – August 2022
Research Advisor: Professor Cerasela Zoica Dinu
Office of Undergraduate Research at West Virginia University

- Conducted an intensive, 15-month, invitation-only research program investigating hyaluronic-acid hydrogels for enzyme immobilization
- Performed biocatalytic assays, kinetics measurements, and polymer characterization
- Engaged in STEM outreach representing the Arnold & Mabel Beckman Foundation

Undergraduate Researcher, Morgantown, WV
Research Advisor: Professor Cerasela Zoica Dinu — December 2018 – May 2022
Department of Chemical and Biomedical Engineering, West Virginia University

- Crosslinked hyaluronic acid with tunable amines to create user-controllable hydrogel platforms for biosensing
- Analyzed enzymatic activity and polymer structure–function relationships
- Created scientific animations for educational videos on topics including enzyme catalysis, kinetics, and energy

Research Advisor: Professor George Spirou — August 2018 – December 2018
Rockefeller Neuroscience Institute, West Virginia University

- Generated 3D reconstructions of oligodendrocytes from microscopy data for virtual reality visualization of mouse brain

TEACHING EXPERIENCE

Graduate Teaching Assistant, Newark, DE — August 2023 – December 2024

- Prepared and graded assignments and interactive lab activities, provided aid in coursework understanding, conducting weekly recitations, and delivered lectures for up to 80 undergraduate students

Academic Tutor, Jefferson County, WV; Monongalia County, WV; New Castle County, DE August 2015 – December 2024

- Tutored middle school through undergraduate students in math, chemistry, physics, and French in group and individual settings

SELECTED PRESENTATIONS

Oral Presentations

- "High-performance, lignin-derivable polymers as sustainable alternatives to petroleum products," Spring 2025 ACS Conference; 2024 UD Summer Research Review
- "Hydrogen Production and Storage Process Design in the Appalachian Region," 2022 WVU Capstone
- "Enzyme Immobilization within a Hyaluronic Acid Matrix for Biosensor Applications," Spring 2022, Summer 2021, and Summer 2020 WVU Undergraduate Research Symposia

Poster Presentations

- "Non-Isocyanate Polyurethanes from Lignin-Derivable Monomers: A Safer and More Sustainable Alternative for High-Performance Applications," Summer 2025 TechConnect World Innovation Conference and Expo; 2025 UD Winter Research Review
- "High-performance, lignin-derivable polymers as sustainable alternatives to petroleum products," Summer 2024 PoWER Conference
- "Enzyme Immobilization within a Hyaluronic Acid Matrix for Biosensor Applications," Summer 2022 Annual Beckman Symposium; Spring 2022 Blaney House Undergraduate Research Highlight; Fall 2021 AIChE Annual Conference; Fall 2019 WVU Undergraduate Research Symposium

PUBLICATIONS

- **J. R. Arnold**, J. Chapman, M. Arnold, C. Z. Dinu, "Hyaluronic Acid Allows Enzyme Immobilization for Applications in Biomedicine." *Biosensors.* 2022, 12(1), 28.
- J. Chapman, **J. R. Arnold**, C. Martinez de la Torre, C. Z. Dinu, "Elucidation of Structure-Function Relationships of Hyaluronic Acid-Based Polymers via Combinatorial Approaches." *ACS Applied Polymer Materials*. 2023, 5(2), 1109-1124.
- R. M. O'Dea, M. Nandi, G. Kroll, **J. R. Arnold**, L. T. J. Korley, T. H. Epps, III, "Toward Circular Recycling of Polyurethanes: Depolymerization and Recovery of Isocyanates." *JACS Au*. 2024, 4(4), 1471-1479.
- **J. R. A. Walker**, C. B. Thompson, G. W. Peterson, T. H. Epps, III; L. T. J. Korley, "Elucidating the Role of Pendent Functional Groups in Lignin-Derivable Polyurethanes." 2025. [in revision]

HONORS & AWARDS

2025 JACS Au Outstanding Paper Award October 2025
2024 Robert Wool Award for Women in Green Engineering April 2024
2023 Morton '58 and Donna Collins Chemical Engineering Fellowship January 1-August 31, 2023
2021 Beckman Scholar Spring 2021 – Summer 2022
1st Place- Oral Presentation, WVU Undergraduate Research Symposium Spring 2022
3rd Place- Undergraduate Research Poster, AIChE Annual Conference Fall 2021
Collegiate Merit Scholarships Fall 2018-Spring 2022

- Neil S. Bucklew, WVU Alumni Association Valedictorian, EQT Student of Excellence, Statler Research Scholars, Engineering Excellence, WV Promise

LEADERSHIP, ORGANIZATIONS, & OUTREACH

Science Policy Advocacy Coalition Fall 2025-Present

- Inaugural cohort

WV Scientists Summer 2025-Present

- Inaugural cohort

Colburn Club, UD Department of Chemical and Biomolecular Engineering Fall 2023-Present

- Outreach Chair (2022-2024)

K-12 STEM Outreach Fall 2018-Present

- Community talks on nanotechnology and green chemistry; science demos for Project Brain Light, the FORGES program, "Meet a Scientist" events, and middle school visitation days; scientist panels for Upward Bound

Chief Engineer of Senior Class Capstone, WVU Summer 2021-Spring 2022
Diversity, Equity, and Inclusivity Committee, WVU Statler College Spring 2021 – Spring 2022

- Undergraduate Representative of Chemical and Biomedical Engineering Department

Developer of science communication YouTube content Summer 2020-Spring 2022
Alpha Lambda Delta Honor Society, WVU Chapter Spring 2019 – Spring 2022
American Institute of Chemical Engineers, WVU Chapter Fall 2018 – Spring 2022

- Outreach Coordinator (2021-2022); Peer Mentor Program Organizer (2021-2022); Peer Mentor (2020-2022); Secretary (2020-2021); Organizer of K-12 STEM outreach competition submission (2021)

Society of Women Engineers, WVU Chapter Fall 2018 – Spring 2022
Resident Assistant, WVU Summer 2019-Spring 2020

JAMES BUCHEN

651.356.2566 • linkedin.com/in/jamesbuchen/ • Newark, DE • james.buchen@outlook.com

EDUCATION

University of Delaware — **Newark, Delaware**
PhD Candidate - Yushan Yan Group — **March 2021 – December 2025**
Principle Investigator-Direct Air Carbon Capture — **November 2024 – October 2025**

- Granted $125K to lead research through Carbontech Development Initiation (CDI) at Columbia University
- Developing novel membrane for electrochemical separations and modeling its performance against competitors

Research Assistant-Direct Air Carbon Capture — **March 2021 – November 2024**

- Worked with Department of Energy to develop electrochemical carbon capture for net zero climate goals
- Achieved a carbon capture device with a 1 MWh ton^{-1} energy requirement surpassing leading technology from Carbon Engineering of 1.8 MWh ton^{-1}.
- Modeled electrode cycling behavior to highlight routes for further energy improvement.
- Designed and built a new test station for carbon capture based on fuel cell and battery fundamentals.
- Coached undergrad student on his first publishable paper for nickel hydroxide battery electrode development.

University of Wisconsin – Madison — **Madison, Wisconsin**
B.S. Chemical Engineering - Dean's List — **2014**

- Minor in Computer Science

Undergraduate Research Assistant - Semiconductors — **2012**

- Produced nanostructures of Gallium and Indium on Silicon wafers that resisted phase boundary deformations.

Undergraduate Research Assistant – Liquid Crystal Droplets — **2011**

- Presented direct correlation of surfactant effect on liquid crystal droplet structure using flow cytometry.

PROFESSIONAL EXPERIENCE

Honeywell UOP — **Des Plaines, Illinois**
Technical Specialist III — **October 2019 – May 2020**

- Deployed Cyclone Erosion monitoring feature to predict equipment life span and enable $10M repair decisions for customers
- Developed predictive yield estimating features enabling customers to unlock +$1M/Y operating income.
- Directed focus group to build internal teams for the Industrial Internet of Things (IIoT) portfolio.

Field Advisor I-II — **January 2017 – October 2019**

- Led a 6-person crew to commission a green field isomerization unit for a refinery.
- Mentored 10 UOP employees in reforming unit regenerations to regain customers product yield and quality.
- Discovered reactor defects and informed customer of risks of early mechanical failure and mitigation tactics.
- After a fire incident, instructed a customer how to fix their sulfur injection system and update their procedures
- Partnered with 14 customers across in Europe, North America, the Middle East, and Asia.

Design Engineer — **August 2014 – January 2017**

- Achieved aggressive engineering project deadline in 6 months vs the normal 10 months by efficiently managing team members across several time zones and departments.
- Initiated and built a training guide to teach new employees how to prepare high quality technical proposals.

Academics

Teaching Experience

- Teaching Assistant for graduate level Electrochemical Processes **Spring 2024**
  - Gave a full lecture on electrochemical separations
- Teaching Assistant for graduate level Chemical Interfaces and Surfaces **Spring 2024**
- Teaching Assistant for undergraduate level Chemical Engineering Laboratory I **Spring 2023**
  - Taught safe lab practices and proper report writing

Presentations/Posters

- Winter Research Review-presentation, University of Delaware, *Hydroxide Exchange Membrane Carbon Capture (HEMCC) Using Nickel Hydroxide Batteries and Flow-through Membranes,* Newark, DE January 22, 2025
- PRiME-presentation, Electrochemical Society (ECS) *Direct Air Capture of Carbon Dioxide Using Nickel Hydroxide Batteries in a Membrane Electrode Assembly* Honolulu, HI October, 6 2024
- Clean Hydrogen for Energy Transition symposium-poster, National Academy of Engineers, *Hydroxide exchange membrane carbon capture (HEMCC) using nickel hydroxide batteries* Newark, DE April 17, 2024
- Environmental Research Symposium-poster, Delaware Environmental Institute (DENIN), *Direct Air Capture (DAC) using nickel hydroxide battery HEMCC,* Newark, DE April 9, 2024
- Winter Research Review-poster, University of Delaware, *Hydroxide exchange membrane carbon capture (HEMCC) using symmetric nickel hydroxide batteries and flow through membranes: Focus on Energy Cost,* Newark, DE January 24, 2024
- Pitch:90-presentation, Delaware Environmental Institute (DENIN), *Capturing CO2 with Batteries,* Newark, DE November 14, 2023
- Carbon Management Research Project Review Meeting-presentation, National Energy Technology Laboratory (NETL), *Nickel hydroxide electrochemically driven carbon dioxide separator Ni(OH)2 - (EDCS),* Pittsburgh, PA, August 28, 2023
- Summer Research Review-presentation, University of Delaware, *Direct air capture of carbon dioxide using nickel hydroxide electrodes,* Newark, DE June 9, 2023
- Environmental Research Symposium-poster, Delaware Environmental Institute (DENIN), *Direct Air Capture (DAC) with Nickel Hydroxide Batteries,* Newark, DE April 12, 2023

Publications

R. James Buchen, Teng Wang, K. Braden Geiger, Y. Naama Gluz, Maurice Artoul, Jean-Phillippe Hiegel, Ben Archai, P. Brian Setzler, Yushan Yan "Hydroxide exchange membrane carbon capture using a nickel hydroxide symmetric battery cell" (In Review) *Nature Energy*, January 2025

R. James Buchen, Harrington Justin, Brian Setzler, Yushan Yan "Technology Readiness Level and comparative analysis of electrochemical carbon capture with focus on energy and flux" (In Preparation) 2026

R. James Buchen, Braden Geiger, Yushan Yan "Electrochemical precipitation of thick-film, porous nickel hydroxide battery electrodes with cobalt and aluminum dopants" (In Preparation) 2025

Daniel S. Miller, Xiaoguang Wang, James Buchen, Oleg D. Lavrentovich, Nicholas L. Abbott, "Analysis of the Internal Configurations of Droplets of Liquid Crystal Using Flow Cytometry", *Anal. Chem.*, 85, 10296−10303, September 2013

Peer Review

Xing Li, Xunhua Zhao, Lingyu Zhang, Anmol Mathur, Yu Xu, Zhiwei Fang, Luo Gu, Yuanyue Liu, Yayuan Liu "Redox-tunable isoindigos for electrochemically mediated carbon capture" *Nature Communications,* 15, February 2024

Enerelt Burentugs

Newark, DE | (224) 469-6278 | enerelt@udel.edu

RESEARCH STATEMENT

I am a chemical engineering PhD candidate passionate about decarbonizing the chemical industry through electrification and carbon capture. My research experience spans Joule-heated reactors, electrochemical biomass conversion, and absorbent stability testing, complemented by industry R&D experience at Evonik Industries AG. I am seeking opportunities to bring this interdisciplinary skillset to industrial R&D challenges.

EDUCATION

University of Delaware Newark, DE

Doctor of Philosophy in Chemical & Biomolecular Engineering. GPA: 3.5/4.0 August 2022- May 2027 (Expected)

- **Provisional thesis title:** Electrified Approaches to Sustainable Chemical Synthesis.
- **PI:** Dr. Raul F. Lobo

Georgia Institute of Technology Atlanta, GA

Bachelor of Science in Chemical & Biomolecular Engineering. GPA: 3.4/4.0 August 2018-May 2022

RESEARCH EXPERIENCE

University of Delaware Newark, DE

Graduate Student Researcher (PI: Dr. Raul F. Lobo) December 2022-Present

Project 1: Joule-Heated Reactor

- Designed a novel Joule-heated reactor using a FeCrAl porcupine coil as heating element and catalyst support for endothermic reactions.
- Developed 3D CFD models (ANSYS-CFX) to analyze temperature distributions, flow dynamics, and mass transfer, identifying design modifications to reduce energy consumption by 85%.

Project 2: Electrochemical Kolbe Synthesis

- Optimized rapid alternating polarity (rAP) Kolbe electrolysis of levulinic acid on carbon electrodes, surpassing conventional platinum/DC benchmarks.
- Built LabVIEW-based data acquisition systems for real-time electrochemical monitoring and developed Python tools for automated reaction metrics analysis.
- Advancing semi-batch and flow cell reactor configurations for scalable electrochemical biomass conversion.

Georgia Institute of Technology Atlanta, GA

Undergraduate Research Assistant (PI: Dr. Christopher W. Jones) May 2021 – May 2022

- Led a project to evaluate the performance of a new zeolite material impregnated with poly(ethylenimine) (PEI) for carbon capture. The evaluation included varying PEI loadings under both wet and dry air conditions.
- Designed and fabricated a custom 3D-printed laminate housing container in SolidWorks for CO_2 breakthrough experiments.

University of Notre Dame Notre Dame, IN

Undergraduate Research Assistant (PI: Dr. Edward Maginn) May 2021 – August 2021

- Conducted molecular dynamics (MD) simulations to analyze the thermophysical properties of ionic liquids with varying structures, elucidating the impact of chemical composition and structure on their properties.

Georgia Institute of Technology Atlanta, GA

Undergraduate Research Assistant (PI: Dr. A. Fatih Sarioglu) January 2019 – May 2020

- Collaborated with the Electrical Engineering Department to design a 3D microfluidic chip using SolidWorks.
- Developed a method to etch wax support material following the production of microfluidic chips.

PROFESSIONAL EXPERIENCE

Evonik Industries AG Allentown, PA
PhD Intern January 2025-April 2025

- Designed and constructed a stability testing unit for carbon capture solvents, selecting instrumentation and materials.
- Managed project execution including vendor coordination, budget tracking, and cross-functional team communication.
- Performed initial commissioning and validation testing to verify system performance

University of Delaware Newark, DE
Lab Safety Manager October 2024-Present

- Maintained safe laboratory operations and ensured compliance with university EHS regulations through routine inspections and hazard assessments.
- Managed chemical inventory systems, conducted periodic audits, and organized quarterly laboratory cleanups.

PUBLICATIONS

- **Burentugs, E.**, Lobo, R. F. Catalytic Ethane Dehydrogenation Using a Porcupine Heating Element in a Joule-Heated Reactor. *Ind. Eng. Chem. Res.* **2025**, *64* (19), 9835–9846.

- Vallace, A., Shah, D. R., **Burentugs, E**., Tucker, A. J., Cavanagh, A. E., Jones, C. W. Synthesis Route to Single-Walled Zeolite Nanotubes Enabled by Tetrabutylammonium Hydroxide. *ACS Mater. Au* **2024**.

- Short, G. N.; **Burentugs, E**., Proaño, L., Moon, H. J., Rim, G., Nezam, I., Korde, A., Nair, S., Jones, C. W. Single-Walled Zeolitic Nanotubes: Advantaged Supports for Poly(Ethylenimine) in CO2 Separation from Simulated Air and Flue Gas. *JACS Au* **2023**, *3* (1), 62–69.

- Chu, C.-H., **Burentugs, E**., Lee, D., Owens, J. M., Liu, R., Frazier, A. B., Sarioglu, A. F. Centrifugation-Assisted Three-Dimensional Printing of Devices Embedded with Fully Enclosed Microchannels. *3D Printing and Additive Manufacturing* **2023**, *10* (4), 609–618.

- Chu, C.-H., Liu, R., Ozkaya-Ahmadov, T., Boya, M., E. Swain, B., M. Owens, J., **Burentugs, E**., Asim Bilen, M., F. McDonald, J., Fatih Sarioglu, A. Hybrid Negative Enrichment of Circulating Tumor Cells from Whole Blood in a 3D-Printed Monolithic Device. *Lab on a Chip* **2019**, *19* (20), 3427–3437.

PATENTS

- Jones, C. W.; **Burentugs, E**.; Korde, A.; Nair, S.; Nezam, I.; SHORT, G. N. Single-Walled Zeolitic Nanotubes Impregnated with an Amine and Methods of Making and Use Thereof. US20230294069A1, September 21, 2023.

TEACHING EXPERIENCE

Department of Chemical and Biomolecular Engineering, University of Delaware Newark, DE
Teaching Assistant, Introduction to Chemical Engineering Spring 2024

- Prepared and graded homework and exam problems for 120 students.
- Led weekly recitation sessions for a group of 30 students.

Department of Chemical and Biomolecular Engineering, University of Delaware Newark, DE
Teaching Assistant, Chemical Engineering Lab II Fall 2023

- Conducted laboratory sessions, providing 24 undergraduate students with hands-on experience of course concepts and laboratory methods.

HONORS AND AWARDS

- Collins Fellowship, **University of Delaware,** 2023
- President's Scholarship, **Ministry of Education and Science of Mongolia**, 2018-2022

Sofia H. Capece

(215) 779-8041 | scapece@udel.edu |

EDUCATION

University of Delaware, Newark, DE August 2022 – Present
Ph.D. Candidate, Chemical and Biomolecular Engineering GPA: 3.76/4.00
Advisor: Prof. Eleftherios Papoutsakis

The Pennsylvania State University, University Park, PA August 2017 – December 2021
Schreyer Honors College
B.S., Chemical Engineering, *Magna Cum Laude* GPA: 3.92/4.00
Thesis: Thermal Conversion and Catalysis Implementation for Food Waste Valorization

- Leonhard Scholars Engineering Program Scholarship Recipient, 2017-2021

RESEARCH EXPERIENCE

Eleftherios Papoutsakis Research Group **Newark, DE**
Ph.D. Candidate August 2022 – Present

- Thesis: Metabolic engineering of a *Clostridium acetobutylicum*/ *Clostridium ljungdahlii* coculture for carbon-neutral isopropanol production.
  - Use CRISPR/Cas9 technology to engineer novel strains of *Clostridium acetobutylicum* for primary acetone production.
  - Perform RNA-Sequencing analysis of *Clostridium acetobutylicum* and *Clostridium ljungdahlii* coculture for understanding of coculture dynamics and transcriptional behavior.

National Renewable Energy Laboratory **Golden, CO**
Science Undergraduate Laboratory Intern June-August 2022

- Designed a kinetic model to describe the adsorption behavior of wastewater contaminants by biochar.

Phillip Savage Research Group **University Park, PA**
Undergraduate Research Assistant August 2019 – December 2021

- Analyzed the effects of catalysts on the hydrothermal liquefaction, carbonization or pyrolysis of food waste for use as biocrude oil.

SKILLS & PROFICIENCIES

- Plasmid design and molecular cloning (*E. coli*, *Clostridia*).
- Microbial cell culture, strain engineering and characterization.
- High-performance liquid chromatography, gas chromatography, flow cytometry, confocal microscopy.

INDUSTRIAL EXPERIENCE

Kimberly-Clark Corporation **Neenah, WI and Roswell, GA**
Raw Materials Engineering Intern May – August 2021

- Problem-solved for raw materials issues occurring within the warehouse or on machines to contribute to material savings.

Global Research and Engineering Co-Op January- August 2020

- Examined data and composed several technical letters to document findings for future material development and opportunities for *Depend* brand adult products.

PUBLICATIONS

Seo, H., **Capece, S.H.,** Hill, J.D, Otten, J.K., Papoutsakis, E.T. *Butyrate as a growth factor of Clostridium acetobutylicum.* Metabolic Engineering 86, 194-207 (2024).

Motavaf, B., **Capece, S.H.**, Eldor, T., Savage, P.E. Recovery of energy and nitrogen via two-stage valorization of food waste. Industrial & Engineering Chemistry Research 61 (33), 12064-12072 (2022).

Motavaf, B., **Capece, S.H.,** Savage, P.E. Screening potential catalysts for the hydrothermal liquefaction of food waste. Energy & Fuels 35 (11), 9347-9499 (2021).

CONFERENCE PRESENTATIONS

Capece, S.H., Seo, H., Papoutsakis, E.T. "Genome Engineering of Clostridium acetobutylicum for Carbon-Neutral Isopropanol Production in a Synthetic Microbial Coculture", AIChE Annual Meeting, Boston, MA, 2025. (Oral Presentation).
Capece, S.H., Seo, H., Otten, J.K., Willis, N., Hill, J., Papoutsakis, E.T. "Harnessing Syntrophic Microbial Cocultures for Carbon-Neutral Supratheoretical Isopropanol Production, Biochemical and Molecular Engineering XXIII, Dublin, Ireland, 2024. (Poster, *Poster Award Winner).
Capece, S.H., Seo, H., Otten, J.K., Willis, N., Hill, J., Papoutsakis, E.T. "CRISPR/Cas9-Based Acetone Pathway Integration in Clostridium acetobutylicum for Isopropanol Production in a Synthetic Coculture System", Mid-Atlantic Synthetic Biology Network Symposium, Newark, DE, 2024 (Poster).

LEADERSHIP & OUTREACH

Mentor, UD Summer Scholars 2024

- Mentor an undergraduate student in molecular cloning skills and *Clostridia* strain characterization

Graduate Teaching Assistant, University of Delaware Dept. of Chemical Engineering

- Chemical Engineering Lab I (Spring 2024)
- Chemical Engineering Lab II (Fall 2025)

Mentor, Letters to a Pre-Scientist (Fall 2023- Spring 2024)

- Exchanged letters with middle-school students to share information on life as a graduate student in engineering.

Mathnasium Tutor, Langhorne, PA

- Assisted middle and high school students with math concepts from arithmetic to pre-algebra (Spring 2022)

Undergraduate Instructional Aide, Pennsylvania State University Dept. of Chemical Engineering

- Material Balances (Fall 2019)

KENNETH CRANE-MOSCOWITZ

Phone: 201-788-4622 | kcranemo@udel.edu | https://www.linkedin.com/in/kenneth-crane-moscowitz/

PROFESSIONAL SUMMARY

Doctoral candidate in Chemical and Biomolecular Engineering (expected PhD defense May 2026) seeking roles in biopharmaceutical formulations, downstream processing, and QC. Graduate research focused on the dynamics, solution behavior, and self-assembly of peptide-based nanoparticles and peptide conjugates. Experienced in scattering, spectroscopy, and surface modification techniques with applications to biologics and soft materials.

RESEARCH EXPERIENCE

University of Delaware, Newark, DE 2020 - Present

Graduate Student Researcher, Department of Chemical and Biomolecular Engineering

- Characterized the dynamics, solution behavior, and self-assembly of peptide-based nanoparticles and peptide conjugates using scattering and spectroscopic methods.
- Screened peptide nanoparticle formulations across varied solution conditions (ionic strength, pH) to identify structure-property relationships and solution behavior.
- Modeled interparticle interactions using DLVO theory.
- Used DLS, SLS, and SAXS to determine protein-protein interactions (B_{22}, k_D, S(q)) and size parameters (M_w, R_h) relevant to stability, aggregation and formulation design.
- Identified stable vs unstable assembly of peptide nanoparticles in DMF/water mixtures
- Prepared clean multilayer thin films of APTES and PEG on mica substrates.
- Performed covalent immobilization of proteins and peptides to a functionalized substrate for subsequent single-molecule force spectroscopy analysis

LABORATORY SKILLS

Characterization	Sample Preparation	Software
DLS, SLS, SAXS, CD, UV-Vis, SEC-MALS, AFM-SMFS, XPS, water contact angle, LC-MS, ^{1}H NMR, HPLC, confocal microscopy	Dialysis, lyophilization, peptide formulation; liquid-phase thin-film deposition; covalent immobilization of proteins and peptides onto functionalized substrates	MATLAB, python, fortran, BioXTAS RAW, SASView, Microsoft Office, Origin

PUBLICATIONS

Crane-Moscowitz, K.; Shi, Y.; Petrich, N.; Pochan, D. J.; Kloxin, C. J.; Furst, E. M *Solution Stability of Coiled-Coil Peptide Nanoparticles with Charge Patches*, In Preparation.

Tang, Y; **Crane-Moscowitz, K.**; Sinha, N.; Guo, R.; Saven, J. G.; Kloxin, C. J.; Pochan, D. J. *Solvent-Mediated Control of Peptide Self-Assembly: Critical Composition for Coiled-Coil Formation in DMF/Water Mixtures*, In Preparation.

Weisen, A. R.; **Crane-Moscowitz, K.**; Saven, J. G.; Furst, E. M; Kloxin, C. J.; Pochan, D. J. *Charge Patch Localization Dictates Assembly and Interactions in Peptide Nanoparticles*, Submitted.

Langenstein, M. G.; **Crane-Moscowitz, K.**; Brennan, J. M.; Kloxin, C. J.; Furst, E. M.; Pochan, D. J. *Sequential Growth of Quantized Peptide Brushes on Colloidal Gold.* **Langmuir,** 2025, *41* (5), 3130–3139.

SELECTED PRESENTATIONS

98th Annual Colloid and Surface Science Symposium, Seattle, WA June 23-26, 2024
Role of Surface Charge on the Dynamics and Interactions between Peptide-Based Coiled Coil Nanoparticles. (Presentation)
21st Gordon Research Conference on Colloidal Macromolecular and Polyelectrolyte Solutions, Ventura, CA Feb 9-16, 2024
Ionic Strength Determines Self-Assembly, Solution Stability, and Interactions between Coiled Coil Nanoparticles (Poster)

EDUCATION

Ph.D. University of Delaware, Anticipated May 2026
Department of Chemical and Biomolecular Engineering
Advisors: Dr. Eric M. Furst, Dr. Christopher J. Kloxin, Dr. Darrin J. Pochan

B.S. Georgia Institute of Technology, August 2020
Department of Chemical and Biomolecular Engineering
Highest Honors, International Plan Degree Designation, Spanish Minor

SELECTED TEACHING EXPERIENCES

University of Delaware-GAANN Teaching Fellow Aug 2022 – July 2023

- Designed a lecture and instructed two sections of CHEG 325: Chemical Engineering Thermodynamics II in collaboration with instructors-of-record, incorporating inclusive teaching practices.

University of Delaware-Teaching Assistant Aug 2021 – Dec 2022

- CHEG 810: Molecular Thermodynamics
- CHEG 811: Chemical Surfaces and Interfaces
- CHEG 401: Chemical Process Dynamics and Control

LABORATORY MENTORSHIP

Randy Serafin and Dylan Stare-Redesigned and implemented protein docking simulations to elucidate the most favorable aggregation configurations for peptide nanoparticles.

UNIVERSITY LEADERSHIP POSITION

University of Delaware-Colburn Club Aug 2020 – Aug 2024
1st-year Representative, 2nd-year Representative, President, 4th-year Representative

- Led graduate student recruiting weekends for over 90 accepted prospective students, incorporating volunteer efforts of 73 graduate students.
- Represented CBE graduate student opinions to the department's Advisory Council.
- Organized Winter Research Review for 60 student presenters and 150 attendees.

HONORS AND AWARDS

Robert L. Pigford Teaching Assistant Award, Newark, DE 2023
GAANN Teaching Fellowship, Newark, DE 2022
Robert L. Pigford Fellowship, Newark, DE 2020
Tau Beta Pi Engineering Honor Society, Atlanta, GA inducted 2019
Eagle Scout Award, Ridgewood, NJ 2015

EMILY DOLEH

edoleh@udel.edu
440-334-3516

EDUCATION

University of Delaware | Newark, DE — August 2022 – Present
Doctor of Philosophy, Chemical and Biomolecular Engineering
Thesis: Development of an inducible stable producer cell line for recombinant adeno-associated virus production
Advisor: Dr. Mark A. Blenner

The Ohio State University | Columbus, OH — May 2022
Bachelor of Science, Chemical Engineering (Biomolecular focus)

RESEARCH EXPERIENCE

University of Delaware Department of Chemical and Biomolecular Engineering – Newark, DE — January 2023 – Present
Graduate Research Assistant

- Developing and optimizing mammalian cell culture processes for suspension and adherent HEK293 systems, including transfection and transduction, to enable consistent viral vector production
- Establishing and maintaining SOPs for upstream production and in-process assays to ensure reproducibility
- Engineering inducible packaging and producer cell lines through promoter engineering and CRISPR editing to improve yield and reduce immune responses focusing on synthetic biology approaches

The Ohio State University – Columbus, OH — February 2020 – May 2022
Undergraduate Research Assistant

- Assisted protein engineering and upstream process development projects to improve biologic stability and yield
- Designed and executed cloning, protein expression, and purification experiments; optimized workflows in collaboration with graduate researchers

LEADERSHIP, MENTORSHIP, AND TEACHING EXPERIENCE

Women in Engineering (WiE) **Chemical and Biomolecular Engineering Representative** — September 2024 – Present

- Partnering with student organizations (WiE, SWE) to design mentorship programs connecting graduate and undergraduate students, fostering professional development

UD Department of Chemical and Biomolecular Engineering: **Graduate Research Mentor** — June 2023 – Present

- Training and supervising four undergraduates in bioprocessing and molecular biology techniques, ensuring accurate documentation, safety compliance, and technical growth

Colburn Club: **Vice President** — September 2024 – September 2025

- Directed event planning and project management for a 200+ person department, facilitated department-wide communication through advisory council meetings/townhalls, and led graduate recruitment initiatives

AWARDS AND FELLOWSHIPS

GAANN Inclusive Teaching Fellowship — July 2024 – June 2025
Morton ’58 and Donna Collins Chemical Engineering Fellowship — January 2023 – August 2023

PUBLICATIONS AND PATENTS

Fu, Q.; Wang, Y.; **Doleh, E.**; Blenner, M.; Yoon, S. *Biochemical Engineering Journal* 2025.
Yoon, S.*, Fu, Q., Blenner, M.**, Doleh, E.** US Patent Application 63/662,862 (2024).

SKILLS

Bioprocess & Cell Culture: Mammalian cell culture, transfection, transduction, rAAV production, cell line development
Analytical & In-Process Assays: qPCR, ELISA, flow cytometry, SDS-PAGE, Western blot, infectivity assays
Molecular Biology: Cloning (Golden Gate, SLIC, Gibson), PCR, bacterial culturing and transformations
Software & Data Analysis: SnapGene, Biorender, JMP, MATLAB, Python, Microsoft Suite
Compliance & Documentation: SOP development, ELN record keeping, lab safety

Charles (Chas) C Fields IV

150 Academy St, 317, Newark, DE 19716 | cfields@udel.edu | (319) 784-7295

Education

University of Delaware, Newark, DE **3.78**

Doctor of Philosophy in Chemical Engineering *August 30, 2021 – Anticipated August 2026*

Advisors: Profs. Raul F. Lobo and Dionisios G. Vlachos

Iowa State University, Ames, IA **3.84**

Bachelor of Science in Chemical Engineering, *Magna Cum Laude* *August 21, 2017 – May 8, 2021*
Minor in General Business

Professional Experience

Graduate Research Assistant, Lobo and Vlachos Research Groups, Newark, DE, *January 2022 – Present*

- Discovered novel catalytic systems for the synthesis and upgrading of biomass-derived molecules targeting platform chemicals for polymeric applications[1,2,4]
- Conducted in-depth molecule structure elucidation and characterization using spectroscopic techniques[1,2,4,5]
- Developed molecule purification processes to reduce contaminant levels for downstream processing[1,2,3]
- Implemented reaction engineering principles for process scale-up leading to a 40-fold increase in synthesis capabilities across multiple chemistries.[1,2]
- Constructed electrochemical reactor systems for monomer synthesis and polycondensation reactor for polymerization reactions

Undergraduate Research Assistant, Cochran Research Group, Ames, Iowa**,** *May 2020 – December 2020*

- Investigated RAFT polymerization of high oleic soybean oils to generate polyacrylate epoxidized polymers
- Developed and scaled a bio-based polymer modified asphalt process at the 1-gallon scale.
- Collaborated on development of bio-based polymer emulsions for applications in asphalt rejuvenation

Laboratory Assistant, Iowa State Bioeconomy Institute, Ames, Iowa**,** *September 2019 – May 2020*

- Explored micro-pyrolysis of plastics for oxidative degradation of polymer chains to enable yeast consumption
- Executed liquid-liquid extraction of phenolic oils from bio-oil for product recovery
- Performed acid hydrolysis of bio-oil for HPLC analysis

Process Engineering Intern, Fluid Quip Technologies, Cedar Rapids, Iowa

May 2017 – August 2017, May 2018 – August 2018, May 2019 – August 2019

- Led sample production and development using patented Clean Sugar Technology™ to convert carbohydrate feedstocks into food and commercial grade sugars assisting in over 100,000 USD in technology sales
- Developed lab-scale simulation of patented Maximized Stillage Co-products™ system for high value protein production in feed grade markets

Skills

- Analytical techniques: ^{1}H-NMR and ^{13}C-NMR including 2-D NMR experiments, chromatography analysis and quantification (GC-FID, GC-MS, HPLC, etc.)

- Software experience in MestReNova, ChemDraw, AspenPlus, and Microsoft Office plus MATLAB and Python

Publications & Patents

1. **Fields, IV, C.C.**, Allgeier, A.M., Vlachos, D.G., Lobo, R.F., Preparation of 4,4'-Dimethylbiphenyl-3,3'-Dicarboxylic Acid. U.S. Provisional Patent Application No.: 63/736,364 (filed 12/19/2024)
2. **Fields, IV, C.C.**, Jain, P., Subramaniam, B., Allgeier, A.M., Vlachos, D.G., and Lobo R.F., Intensification of Renewable 4,4'-Dimethylbiphenyl Synthesis for Recyclable Diesters. *ACS Sustainable Chem. Eng.* 2025, 13, 4, 1754-1761
3. Jain, P., **Fields, IV, C.C.**, Danby, A., Snavely, W., Lee, H.J., Lobo, R.F., and Subramaniam, B., Scalable Synthesis of Dimethyl Biphenyl-4,4'-dicarboxylate from Bio-Derived 4,4'-Dimethylbiphenyl. *ACS Sustainable Chem. Eng.* 2025, 13, 24, 9226–9233
4. **Fields, IV, C.C.**, Speerli, E.D., Allgeier, A.M., Vlachos, D.G., Lobo, R.F., Alkoxycarbonylation of Aryl Triflates for Renewable Diesters. *Under Revision*
5. Garcia Perez, D., Surendharn, R., Angyal, N., Balzer, A.H., **Fields, IV, C.C.,** and Lobo, R.F. Effect of Radical Initiators on Polypropylene Deconstruction. *ACS Sustainable Chem. Eng.* 2025, *Submitted.*

Selected Presentations

2025 Gordon Research Conference: Biomass to Biobased Chemicals and Materials, Newry, ME, *June 1 – 6, 2025*. C Fields et al, Alkoxycarbonylation of Biomass-derived Aryl Triflates | Poster Presentation

9th Annual DENIN Research Symposium, Newark, DE, *April 9, 2024.* C. Fields et al, Intensification of 4,4'-Dimethylbiphenyl Synthesis for Recyclable Diesters | Poster Presentation ***(Awarded First Place Graduate Presenter)***

AIChE Annual Meeting, Orlando, FL, *November 5 – 10, 2023.* C. Fields et al, Intensification of 4,4'-Dimethylbiphenyl Synthesis via Oxidative Coupling and Tandem Diels-Alder and Dehydration of 2-Methylfuran | Oral Presentation

ACS Fall 2023, San Francisco, CA, *August 13 – 17, 2023.* C. Fields et al, Intensification of Renewable 4,4'-Dimethylbiphenyl Synthesis via Oxidative Coupling and Tandem Diels-Alder and Dehydration of 2-Methylfuran | Oral Presentation

28th North American Catalysis Society Meeting, Providence, RI, *June 18 – 23, 2023.* C. Fields et al, Intensification of 5,5'-Dimethyl-2,2'-Bifuran Synthesis from 2-Methylfuran via Oxidative Coupling | Oral Presentation

Leadership and Outreach

Graduate Research Mentor, Newark, DE, *January 2024 – Present*

- Undergraduate researcher, Ethan Speerli. Project: Solvolysis for Polyester Deconstruction and Circularity
- Undergraduate researcher, Peyton Swanson. Project: J-Term Honors Organic Chemistry Laboratory

Graduate Student Government Sustainability Committee, Newark, DE, *August 2022 – Present*

- University of Delaware Office of Sustainability Advisory Council
- Committee Legislative Chair for 2023-2024 Academic Year
  - Managed the authorship and introduction of eight pieces of legislation (lead author on two)
  - Co-authored University of Delaware 2024 Sustainability Report, *April 30, 2024*

Awards & Affiliations

AIChE Professional | Catalysis Club of Philadelphia | University of Delaware Graduate Student Travel Award (2025) | Alpha Kappa Psi | Chemical Engineering Scholarship Fund (2020 – 2021) | Dr. Owen A. Heng Chemical and Biological Engineering Scholarship (2019 – 2020) | Cardinal Leadership Scholar Award Level I (2017 – 2021) | Academic Recognition Award (2017 - 2021)

Jessica Rubira Gamba

Phone: (302) 898-8362 | Email: jgamba@udel.edu | linkedin.com/in/jessicarubira/

PROFESSIONAL SUMMARY

Result-driven and highly motivated PhD candidate in Chemical & Biomolecular Engineering specializing in synthetic biology and protein engineering, with combined academic research and prior industry experience in regulated manufacturing and quality systems. Multidisciplinary expertise in molecular biology, protein production and purification, with strong background in experimental design, assay development and optimization, and mentoring in collaborative, fast-paced environments. Passionate about translating synthetic biology and protein engineering advances into impactful biologics and molecular tools while continuously growing and tackling complex scientific challenges.

SKILLS & QUALIFICATIONS

Molecular Biology: polymerase chain reaction, primer design, library design, site-directed mutagenesis, plasmid assembly
Cell Culture: bacterial fermentation, genomic engineering (lambda red recombineering/MAGE), protein expression and purification, flow cytometry, fluorescence activated cell sorting (FACS), non-standard amino acid incorporation, baculovirus expression systems, mammalian cell expression systems, inclusion bodies
Protein Purification: Affinity and IEX chromatography, Tangential flow filtration, Dialysis, Immunoprecipitation, Magnetic separation
Protein Engineering & Characterization: Bioconjugation and click chemistry, SDS-PAGE, Western blot, Bradford assay
Immunology Techniques & In vitro models: ELISA assay techniques, Multicolor flow cytometry, In vitro immunogenicity assay, Fluorescence polarization, confocal microscopy
Analytical Techniques & Assays: Intact protein LC/MS, Peptide LC/MS-MS, Spectrophotometry, Fluorescence assays, Fluorescence microscopy,
IC50 assays
Soft Skills: Excellent communication and presentation skills, Experienced in collaborative and independent work environments, Team player
Software: Microsoft Office, GraphPad Prism, UNICORN for AKTA systems, AlphaFold, PyMol, MATLAB, Biorender

EDUCATION

Ph.D. **University of Delaware** **2022-2027 (expected)**
Ph.D. Chemical and Biomolecular Engineering
Advisor: Prof. Dr. Aditya M. Kunjapur

M.S. **University of São Paulo, Brazil** **2018-2020**
M.S. Chemical Engineering
Advisors: Dr. Galo Antonio Carrillo Le Roux and Dr. José Gregório Gomez

Grad. Cert. **University of São Paulo, Brazil** **2014-2016**
Graduate Certificate Quality Engineering
Advisor: Prof. Dr. Messias Borges Silva

B.S. **University of São Paulo, Brazil** **2007-2012**
B.S. Biochemical Engineering
Research Advisor: Dr. Walter de Carvalho

RESEARCH EXPERIENCE

University of Delaware (*PhD Candidate)* **2022-2027 (expected)**

- Extensive experience in the development of nsAA incorporation and recombinant protein production pipelines in *E. coli* and *B. subtilis* using surface displays.
- Optimized downstream protein purification after expression via inclusion bodies for in vitro applications.
- Developed a hybrid bacterial-yeast platform for MHC-II screening against epitopes containing non-standard amino acids
- Developed a protein degradation switch dependent on the non-standard amino acid O-methyl-tyrosine (OMY) for biocontainment purposes.

University of Sao Paulo (*Master student)* **2018-2020**

- Analysis of experimental errors and impact on bioprocess parameters in the production of polyhydroxyalkanoates.
- Modeling and study of nutritional limitation in the production of biopolymers.

University of Sao Paulo (*Undergraduate student)* **2008-2010**

- Study of the production of ligninolytic enzymes by *Ceriporiopsis subvermispora*

INDUSTRY EXPERIENCE

Valgroup Packaging Solutions *(Senior R&D Analyst)* **2013 – 2017**

- Planning and development of flexible packaging for food, pharmaceutical, and cosmetics industries.
- Spearheaded technical specifications for industrial-scale production, ensuring raw material approval.
- Introduced cold-seal technology and products
- Represented Quality in R&D, delivering key performance presentations and managing product complaint resolutions.
- Executed Yellow Belt projects using Lean Six Sigma to reduce mechanical adjustment times and material loss, saving up to $510,000 annually.

BASF *(Intern in Responsible Care Management System)* **01/2010 – 12/2010**

- Supported internal and external audits, managed non-conformities, and ensured compliance with customer documentation requirements.
- Developed an online tool to streamline document management processes.

AWARDS

Phillip and Ruth Evans Fellowship	Fall 2025
Robert L. Pigford Fellowship	Fall 2022
NIH-CBI Fellowship	Fall 2022 – present
UAM-Santander Undergraduate Fellowship (CEAL)	Winter 2011
Santander Top España Scholarship	Summer 2010

ORGANIZATIONS AND OUTREACH

Research Mentor	Summer 2024 – present
UD CBE Graduate Student Organization, *International Representative*	2024 – present
UD Women in Engineering (WiE), *Department Representative*	2024 – present
Society for Biological Engineering, *Member*	2024 – present
Engineering Biology Research Consortium (EBRC), *Member*	2024 – present
Letters to a Pre-Scientist (LPS)	2023 – present

Wilmington, DE **Philip Gitman** (860) 748-8551 pgitman@udel.edu

EDUCATION

University of Delaware **Newark, DE**

Doctor of Philosophy, Chemical Engineering, **GPA:** 3.87/4.00 *August 2020 – August 2026 (expected)*

Pigford Fellow, Witheford Fellow, GAANN Fellow, NASA Space Grant Fellow

Thesis Project: "Engineering *Yarrowia lipolytica* for formaldehyde assimilation and the stable production of terpenoids"

University of Connecticut **Storrs, CT**

Bachelor of Science in Engineering, Chemical Engineering, **GPA:** 3.95/4.00 *August 2016 – May 2020*

Honors College, Dean's list in Engineering, Minors: Materials Science & Mathematics

PROFESSIONAL EXPERIENCE

Department of Chemical and Biomolecular Engineering, University of Delaware **Newark, DE**

Graduate Research Assistant, *Mark Blenner Lab* *January 2021 – Present*

- Utilize and develop microbial engineering toolkits to enable formaldehyde assimilation in *Y. lipolytica*
- Implement system biology principles to study and increase beta-carotene titer stability in an engineered *Y. lipolytica* strain
- Created several novel auxotrophic strains of *Y. lipolytica* capable of sensing glycine, serine and homoserine
- Improved methodology for identifying mutations and their impacts on gene function using whole genome sequencing
- Mentored two undergraduate students in analytical, laboratory, and scientific communication techniques

Department of Chemical and Biomolecular Engineering, University of Connecticut **Storrs, CT**

Undergraduate Research Assistant, *Luyi Sun Lab* *May 2017 – May 2020*

- Researched multi-stimuli responsive photochromic materials and their application to rewritable paper and encryption devices
- Developed experiments to understand the material's photochromic mechanism and to control its properties

Oak Ridge National Laboratory, Biosciences Division **Oak Ridge, TN**

Science Undergraduate Laboratory Internship (SULI) Summer Researcher, *Erin Webb Lab* *June 2019 - August 2019*

- Developed and tested machine learning algorithms to evaluate biomass grinding performance and efficacy using Python
- Researched the fundamental biomass grinding properties from literature to apply new model parameters to the ML algorithms

Merck Pharmaceuticals, Engineering Technical Operations **West Point, PA**

MMD Intern, *Kyle Hartman* *May 2018 - August 2018*

- Created a proactive process monitoring tool for Pneumovax®23 to ensure that data is falling within critical process parameters
- Mitigated risk to multi-million dollar batches by allowing users to make process deviations if data is trending poorly

TEACHING AND LEADERSHIP EXPERIENCE

GAANN Fellowship Inclusive Teaching Experience **Newark, DE**

Guest Lecturer, Undergraduate Reaction Kinetics and Reactor Design September 2022 – May 2023

- Presented lectures, designed relevant homework/exam problems, and led office hours for junior chemical engineers

Colburn Club Outreach Program **Newark, DE**

Student Tutor *January 2021 – January 2022*

- Tutor large and small groups of algebra students at Shue-Medill middle school both during and after school

PUBLICATIONS & SKILLS

Worland, Alyssa et al. "Staying productive under pressure: Systems evaluations of β-carotene production in *Yarrowia lipolytica* under continuous fermentation." *Trends in Biotechnology* (2025).

Sivachandiran et al. "Peroxisome engineering of *Y. lipolytica* for fatty alcohol production." *Biotech. and Bioeng.* (in review, 2025).

Oyedeji, Oluwafemi et al. "Understanding the Impact of Lignocellulosic Biomass Variability on the Size Reduction Process: A Review." *ACS Sustainable Chemistry & Engineering* (2020)

Smith, Andrew T et al. "Multi-color Reversible Photochromisms via Tunable Light-Dependent Responses." *Matter* (2020).

Smith, Andrew T et al. "Tailoring Defects in Photocatalysts by Engineering Solvent Interactions for Highly Active and Responsive Color Switching." *Advanced Optical Materials* (2021).

Laboratory and analytical skills: Molecular cloning, PCR, qRT-PCR, CRISPR/Cas9, HPLC, GC-FID, LC-MS, FACS, SDS-Page, Python, Matlab, Prism, HPC: SLURM, Microsoft Excel.

Jodi Graf

Jodi.graf1112@gmail.com | 610-996-0706 | linkedin.com/in/jodi-graf

PhD student pursuing research in biomaterials, with expertise in immune cell analysis, drug delivery, and tissue engineering. Looking for industry roles that align with my passion for leading engineering solutions that improving human health.

EDUCATIONAL EXPERIENCE

PhD in Chemical and Biomolecular Engineering, **University of Delaware**, Newark DE, 2026 (expected)

- **Dissertation:** *Bioinspired Synthetic Matrices for Driving Immune Cell Response*
- **Advisors:** Catherine Fromen and April Kloxin
- Piloting new bioprinting technology for 3D encapsulation of multi-cellular cultures for *in vitro* lung models
- Applying bioinspired synthetic hydrogels for engineering T-Cell Therapies
- Proficient in cell culture and analysis (qPCR, ELISA, flow cytometry) and hydrogel formulation
- Mentoring undergraduate students in chemical engineering research for > 3 years

BS Chemical Engineering, **Lafayette College,** Easton PA**,** 2020

- **4.0 GPA** – *Summa Cum Laude*, Valedictorian

FELLOWSHIPS AND AWARDS

National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP), March 2023 recognizes and supports outstanding graduate students, pursuing doctoral degrees in science, technology, engineering, and mathematics (STEM)

Recognition of Excellence in Qualifying Exam, Research, and Core Coursework, August 2023

SELECT PUBLICATIONS

Graf, J.; Moore, D.; Grime, C.L.; Fromen, C.A.; Kloxin, A. M. High-throughput bioprinted 3D cultures for probing host-pathogen interactions in bioinspired microenvironments, RSC applied polymers, *submitted 2025*.

Graf, J.; Bomb, K.; Trautmann-Rodriguez, M.; Jarai,B.; Kloxin, A. M.; Fromen, C. A. Macrophage variance: investigating how macrophage origin influences responses to soluble and physical cues with immortalized vs. primary cells in 2D and 3D culture. Frontiers in Biomaterials Science 2024, DOI: 10.3389/fbiom.2024.1399448

Graf, J.; Trautmann-Rodriguez, M.; Sabnis, S.; Kloxin, A. M.; Fromen, C. A. On the path to predicting immune responses in the lung: Modeling the pulmonary innate immune system at the air-liquid interface (ALI). European Journal of Pharmaceutical Sciences 2023, DOI: 10.1016/j.ejps.2023.106596.

Sudduth, E. R.; Kolewe, E. L.; Graf, J.; Yu, Y.; Somma, J.; Fromen, C. A. Nebulization of model hydrogel nanoparticles to macrophages at the air-liquid interface. Frontiers in Chemical Engineering 2023, DOI:10.3389/fceng.2022.1086031

WORK EXPERIENCE

Global Vaccine Technical Operations Associate Specialist **August 2020 –2022**

Merck & Co., Inc., West Point, PA

- Downstream purification global support engineer for the Gardasil®9 large- molecule manufacturing facilities, leading cross-function teams for driving change controls and continuous process improvement projects, as well as increasing capability for product expansion.
- Led franchise projects/sub-workstreams for qualification of global process changes by leading documentation workstream, completing data analysis, and increasing data visualization.

LEADERSHIP & SERVICE

Colburn Club Representative, University Chemical Engineering Department, 2022 – 2025

- Served three consecutive years, as elected First Year, Second Year Representative, and Vice President.
- Leads recruitment and department-wide events to foster community.

EMPOWER Mentor, departmental peer-mentorship group at the University of Delaware, 2023 – 2024

Saloni Gupta

salonig@udel.edu/ 302-250-6448 / linkedin

EDUCATION

University of Delaware — **Newark, Delaware**
Doctor of Philosophy, Chemical Engineering — August 2022 – Present (Expected 2027)
Thesis Advisor: Prof. Aditya Kunjapur

Visvesvaraya National Institute of Technology (VNIT) — **Nagpur, India**
Bachelor of Technology, Chemical Engineering — August 2018 – June 2022

SKILLS

Molecular biology: Polymerase Chain Reaction (PCR), primer design, plasmid assembly
Cell culture: bacterial fermentation, genome engineering (lambda red recombineering/MAGE), protein expression and purification (FPLC), fluorescence activated cell sorting (FACS), non-standard amino acid incorporation
Characterization: HPLC, LC-MS (including LC-QTOF), UV-Vis, tryptic digestion LC-MS/MS, fluorescence spectroscopy, western blotting, SDS-Page, high throughput assay development
Software: Proteome Discoverer, Maxquant, GraphPad Prism, Adobe Illustrator, PyMol, Chimera, Autodock Vina, MATLAB, Python, R (Bioconductor and ggplot2 packages), SuperPro Designer, Spotfire, OpenBabel, GaBi

CURRENT RESEARCH EXPERIENCE

Ph.D. Candidate, Chemical and Biomolecular Engineering — August 2022 – Expected 2027
University of Delaware — *Newark, Delaware*

- Development and optimization of metabolic pathways for non-standard amino acid (nsAA) biosynthesis and incorporation into proteins via enzymatic bioprospecting and cofactor regeneration, high-throughput screening (FACS), genome engineering, and proteomics.
- Collaboration on design of light activatable nsAA biosynthesis and incorporation for controlled peptide cleavage.
- Investigation of post-translation modifications from reduction of nitro functionality encoded onto proteins to explore bioconjugation applications.
- Mentor to a junior chemical engineering undergraduate.

PREVIOUS RESEARCH EXPERIENCE

Undergraduate student researcher, Chemical Engineering — July 2021 – Jan 2022
V. National Institute of Technology (Advisor- Prof. Pradip Dhamole) — *Nagpur, India*

- Designed and simulated ABE fermentation process with non-ionic surfactants in SuperPro Designer, integrating separation technologies for cost-effective product recovery.
- Analyzed and reviewed metabolic pathways in Clostridium species for butanol production, including host development and pathway optimization strategies.

Research Intern, Energy Systems — June 2021 – August 2021
Technical University of Munich (Advisor- Prof. Dr. Hartmut Spliethoff) — *Remote*

- Developed and optimized kinetic and thermodynamic models to study alkali metal release during biomass combustion, comparing one-step and two-step Arrhenius models.

Summer Research Intern, Chemical Engineering — June 2020 – August 2020
Indian Institute of Technology Bombay (Advisor- Prof. Pramod Wangikar) — *Remote*

- Analyzed LC-MS/MS datasets for feature detection and metabolite identification using XCMS in R, Finnee in MATLAB, and XCMS Online; performed baseline correction, compared chromatographs, and predicted unknown metabolites using consensus spectra from METLIN, MassBank, and HMDB.

INDUSTRY EXPERIENCE

Wells Engineer Intern, Subsurface Center
May 2021 – July 2021

ExxonMobil BTC (Supervisor – Joshua S. Pokluda) *Remote*

- Developed R dashboards and Spotfire visualizations to integrate and analyze sensor data from CORVA and WellView for Borehole Integrity Tests.
- Applied Savitzky-Golay smoothing to enhance sensor data clarity.
- Participated in team and global meetings to gain industry and wells engineering insights.

PUBLICATIONS

- **S.P. Gupta**, W. Herron, N.D. Butler, A.M. Kunjapur. Enhancing Bacterial Biosynthesis of an Immunogenic Non-Standard Amino Acid by Improving N-Oxygenase Activity. *In Preparation.*
- D.R. Wyllis, **S.P. Gupta**, S.R. Anderson, A.M. Kunjapur. Advancing genetic code expansion in live cells through metabolic engineering. *In Review at Annual Review of Chemical and Biomolecular Engineering.*
- S.R. Anderson, **S.P. Gupta**, N.D. Butler, M.A. Jones, A.M. Kunjapur. Retention and biosynthesis of diverse nitroarenes in *Escherichia coli* after combinatorial nitroreductase gene deletions. (2025) *In Review at Nature Chemistry.*

POSTERS AND CONFERENCE PRESENTATIONS

- **S.P. Gupta**, W. Herron, N.D. Butler, A.M. Kunjapur. Metabolic Engineering of E. coli for the Production of Immunogenic Nitrated Antigens. *Metabolic Engineering Conference, June 2025.*
- **S.P. Gupta**, W. Herron, N.D. Butler, A.M. Kunjapur. Enhancing Bacterial Biosynthesis of an Immunogenic Non-Standard Amino Acid by Improving N-Oxygenase Activity. *Oral Presentation at AICHE Annual Meeting, November 2025.*

AWARDS & RECOGNITION

- Graduate Student Travel Award, University of Delaware (April and August 2025)
- NIH CBI Affiliate Member (July 2024 – Present)
- Awarded scholarship from Oil & Natural Gas Corporation (ONGC), India (2022)
- Selected for the German Academic Exchange Program DAAD – Wise 2021 to intern at the Technical University of Munich (May 2021, award declined)
- Nomination for Youth Exchange Program organized by Ministry of Youth Affairs & Sports, India (April 2021)
- Awarded NTU Singapore – India Connect Research Internship (March 2021, award declined)
- Awarded Institute Academic Award for outstanding academic performance (January 2021)
- Ranked in the top 1% of the school board at Class XII level made eligible for INSPIRE Scholarship (May 2018)
- Awarded General Proficiency for excellent academic performance at school for 4 consecutive years (2012-2016)

COMMUNITY OUTREACH AND VOLUNTEERING

- EmPOWER Mentor for three consecutive years to first-year incoming PhD students (2023-2025)
- Member of International Metabolic Engineering Society (IMES) (2025)
- Active writer on Medium – “R for Biological Data Analysis,” “Journey to the King's Land”, and “The Storytellers – inspired by the book Sapiens” with more coming on the way
- Member of Indian Institute of Chemical Engineers (IIChe) Student Chapter Programme

WILLIAM H. HARTT V

513-496-8460
qhartt@udel.edu

Summary: Utilizing rheological and mechanical testing, chemical characterization techniques, and machine learning algorithms to develop composition-structure-property relationships and predictive models for the design of complex materials.

EDUCATION

PhD The University of Delaware, Newark, DE **2021 - Present**
Chemical and Biomolecular Engineering
Advisor: Norman J. Wagner
Expected Graduation Date: April 2026

BS The Ohio State University, Columbus, OH **2017-2021**
Chemical Engineering
University Honors Program

RESEARCH EXPERIENCE

Graduate Researcher **8/2021 – Present**
University of Delaware, Chemical Engineering
Advisor: Dr. Norman Wagner

- Developed composition-property relationships for optimal geopolymer mix composition
- Constructed predictive ML models with minimal rheological data for complex fluids
- Created Python code to manipulate and analyze large SAXS/SANS beamline data sets
- First investigation of low Earth orbit (LEO) on lunar geopolymer materials
- Published and presented multiple collaborative manuscripts with internal and external partners

NSF-AFRL INTERN **11/2024 – 6/2025**
Materials and Manufacturing Directorate, AFRL
Gov. Mentor: Dr. Jacob Monzel

- Submitted and awarded NSF-AFRL INTERN funding
- Verified rheological additive to decrease viscosity without hindering material properties
- Curated extensive rheological data set for future ML/AI modelling

AFRL Graduate Student Researcher **6/2023 – 9/2023**
Materials and Processes Division, UES
Gov. Mentor: Dr. Jacob Monzel

- Isolated effect of particle size distribution on geopolymer kinetics

Undergraduate Research Assistant **8/2018 – 5/2020**
Allen Research Group, The Ohio State University 8/2018 – 5/2020
Post-Doc Mentor: Dr. Stephen Baumler
Havenith Research Group, Ruhr Universität Bochum 5/2019 - 8/2019
Post-Doc Mentor: Dr. Federico Sebastiani

SELECTED PUBLICATIONS

6. **William H. Hartt V**, Thaddeus Egnaczyk, Jake George, and Norman J. Wagner, "Unifying rapid strength formation of BP-1 lunar regolith simulant geopolymers via microwave precuring", (submitted – *Advances in Space Research*)

5. **William H. Hartt V** and Norman Wagner, “Impact of particle size distribution on material properties of lunar regolith simulant geopolymer”, (submitted – *Powder Technology*)
4. Thaddeus Egnaczyk, **William H. Hartt** V, Jake George, and Norman J. Wagner, “Effects of low earth orbit exposure on geopolymer material properties”, (submitted – *Advances in Space Research*)
3. Thaddeus Egnaczyk, Ryan P. Murphy, **William H. Hartt V**, and Norman J. Wagner, "Rheo-kinetic and nanoscale structural evolution measurements of aluminosilicate gels", (submitted - *PNAS*)
2. Milad Saadat, **William H. Hartt V**, Norman Wagner, and Safa Jamali, “Data-driven constitutive meta-modeling of nonlinear rheology via multifidelity neural networks”, *Journal of Rheology* 68, 679-693 (2024)
1. Thaddeus Egnaczyk, **William H. Hartt V**, Jennifer Mills, and Norman Wagner, “Composition-property relationships of BP-1 lunar regolith simulant geopolymers for in-situ resource utilization”, *Advances in Space Research* 73, 885-917 (2024)

SELECTED TALKS

6. Thaddeus Egnaczyk, **William H. Hartt V**, and Norman Wanger, “Designing lunar construction materials: Experiments on the international space station,” *University of Delaware Spark! Symposium*, Contributed Talk (April 2025)
5. **William H. Hartt V** and Norman Wagner, “Impact of particle size distribution on the development of lunar regolith simulant geopolymers”, *Society of Rheology 95th Annual Meeting*, Contributed Talk (October 2024)
4. **William H. Hartt V** and Norman Wagner, “Impact of particle size distribution on the development of lunar regolith simulant geopolymers”, *Gordon Research Seminars – Granular Matter*, Contributed Talk (June 2024)
3. **William H. Hartt V** and Norman Wagner, “Connecting rheological and compressive strength evolution for lunar regolith simulant geopolymers”, *XIXth International Congress on Rheology*, Contributed Talk (July 2023)
2. Jennifer Mills, **William H. Hartt V**, and Norman Wagner, “Kinetic modeling of the rheological extent of reaction in model geopolymer gels”, *Society of Rheology 93rd Annual Meeting*, Contributed Talk, (October 2022)
1. **William H. Hartt V**, Jennifer Mills, and Norman Wagner, “Early-stage rheological development and kinetics of geopolymer in exploration of sustainable alternatives to cement”, *Society of Rheology 93rd Annual Meeting*, Poster Presentation, (October 2022)

TECHNICAL SKILLS

- Rheology
- Mechanical Testing
- Particle Technology
- Python / MATLAB Data Analysis
- Machine Learning
- Scanning Electron Microscopy
- Solid State NMR Spectroscopy
- Small Angle Neutron Scattering
- Small Angle X-ray Scattering
- XRD / XRF

MENTORSHIP AND AWARDS

Robert L. Pigford Teaching Assistant Award	2025
CHARM REU Summer Program Mentor	6/2024 - 9/2024
Undergraduate Research Assistant Mentor	12/2022 – 5/2024
Collins Fellow	2022

Katie Raudenbush Henderson

karaudenbush@gmail.com | 717 · 514 · 3964

Education

University of Delaware Aug 2020 – Present

Ph.D. Candidate, Chemical & Biomolecular Engineering
Advisors: Marianthi Ierapetritou and E. Terry Papoutsakis
Research focus: Experimental and computational approaches for scale up of monoclonal antibody production

The Pennsylvania State University Aug 2012 – May 2016

Bachelor of Science in Biomedical Engineering, Biochemical Option

Academic Research Experience

U. Delaware Process Optimization, Modeling and Analysis Laboratory Dec 2020 – Present

P.I. Dr. Marianthi Ierapetritou

- Developed a semi-empirical kinetic model of CHO cell metabolism to predict metabolic behavior across oscillating physical parameters such as pH and dissolved oxygen.
- Simulated culture conditions including pH and dissolved oxygen gradients in MStar computational fluid dynamics (CFD) software, capturing bubble dynamics, mass transfer, and bicarbonate buffer reactions.
- Developed methodology to bridge the timescale gap between mixing time and process time to predict the effects of spatial gradients on full culture durations, linking CFD predicted pseudo-steady physical parameter oscillation characteristics with metabolic model predictions of culture dynamics.
- Created an automated link within an HPC environment between CFD and kinetic models, which allows for model-to-model feedback loops at specified intervals for full culture duration modeling.
- Applied the CFD-metabolic model methodology to several CHO cell lines, such as CHO-K1 cells producing VRC01, industry proprietary cell lines, and CHO DP12 cells, and physical parameter sensitivities pH and dissolved oxygen.
- Awarded North American Mixing Forum (NAMF) Student Award for this methodology in 2024.

U. Delaware Systems and Synthetic Biological Engineering Laboratory April 2021 – Present

P.I. Dr. E. Terry Papoutsakis

- Investigated the impact of various steady and oscillating dissolved oxygen levels on CHO cell metabolism in one liter fed-batch bioreactor experiments.
- Analyzed bioreactor outcomes including concentrations of viable and dead cells, monoclonal antibody product, primary carbon sources (e.g. glucose and glutamine), amino acids, and lactate and ammonia through HPLC (OPC and FMOC derivatized for amino acids and protein A titer methodologies) and a YSI biochemistry analyzer.
- Refined sterile cell culture techniques, bioreactor setup and operation, bioreactor custom control implementation, and equipment maintenance and troubleshooting.

Penn State Acoustofluidics Laboratory in Engineering Science Aug 2014 – Dec 2015

P.I. Dr. Tony Huang

- Correlated ELISA assay color intensity in iPhone images with plate reader results for a Mobile-Health initiative.

Penn State Hershey Medical Center Cancer Institute Summer 2014

P.I. Dr. Wafik El Deiry

- Purified culture of mutant p53 transfected cancer cells for use in colorectal cancer research.

Industrial Experience

Data Science & Applied Mathematics, Merck & Co.

Informatics and Analytics Specialist July 2018 – Aug 2020

Process Modeling and Computational Fluid Dynamics (CFD)

- Performed CFD studies for investigations, scale-up/down of processes, technical transfers, etc. for various key products to reduce experimental waste, enable informed decision making, and de-risk new processes.
- Interfaced with teams across research and development and manufacturing and determine a course of action to utilize engineering models or CFD models to computationally solve mixing problems.
- Co-developed novel method to characterize shear history of particles in a CFD simulation.
- Co-developed novel hybrid model to determine PSD from jet mill design and operating conditions.

Emerging Talent Rotational Program, Merck & Co.

Associate Data Specialist July 2016 – July 2018

Manufacturing Advanced Analytics Rotation 3

- Implemented process constraints to optimize manufacturing schedules and minimize process time
- Performed data mining techniques on manufacturing data to investigate out of specification yields

Oncology Sales and Marketing Advanced Analytics Rotation 2

- Conducted descriptive and predictive analyses of EMR and claims data to Inform market research

Real-World Evidence Business Analysis Rotation 1

- Developed the business case for an enterprise-wide real-world evidence data exchange platform

Publications

Raudenbush-Henderson, K., Ierapetritou, M. Computational methodology for scale-up of monoclonal antibody production in pH heterogeneous bioreactors. (*In preparation*).

Malinov, N.G., **Raudenbush-Henderson, K.**, Ding, C., Reddy, J.V., Ierapetritou, M. (2024). End-to-end process flowsheet modeling for biopharmaceutical production: current state and future potential. *Current Opinion in Chemical Engineering*.

Reddy, J.V., **Raudenbush, K.**, Papoutsakis, E.T., Ierapetritou, M. (2023). Cell-culture process optimization via model-based predictions of metabolism and protein glycosylation. *Biotechnology Advances.*

Selected Presentations

"A computational methodology for the optimization of mAb produced in dissolved oxygen heterogeneous bioreactors (AIChE 2025)

"Application of a computational methodology for mAbs produced in pH heterogeneous bioreactors" (AIChE 2024)

"A novel systematic framework for modeling the effect of heterogeneities in large-scale bioreactors" (NAMF 2024)

"Development of a computational methodology for the prediction of mAbs produced in large scale bioreactors" (AIChE 2023)

"Predicting the effect of gradients on cell culture performance in large scale bioreactors" (AIChE 2022)

Teaching Experience

Graduate Teaching Assistant, University of Delaware, Dept. of Chemical and Biomolecular Engineering

CHEG615: Special Topics in Mixing Spring 2022 and Spring 2023

Professors: Arthur Etchells III, Richard Grenville, and Thomas Simpson

Nicholas Houck

610-463-4613 • nmh@udel.edu
https://www.linkedin.com/in/nicholas-m-houck/

Address: Nicholas Houck, 334 E Main St, Apt N08, Newark DE 19711

Education

University of Delaware — Aug 2022 - Aug 2027
PhD in Chemical and Biomolecular Engineering — GPA: 3.58
Focus: Catalysis

The Pennsylvania State University — Aug 2018 - May 2022
Bachelor of Science in Chemical Engineering | Minor: Energy Engineering — GPA: 3.74

Research Experience

University of Delaware, Newark, DE

Graduate Student Researcher (Experimental) — Jan 2023 - Present

- Analyzes zeolite and glass materials with powder x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy-dispersive x-ray spectroscopy (EDS), physisorption, and chemisorption.
- Performs gas analysis with gas chromatography and mass spectroscopy (GC–MS).
- Synthesized ZSM-5 zeolites via hydrothermal synthesis.
- Ran ethane oxidative dehydrogenation and ammonia synthesis reactions over heterogeneous catalysts.

Graduate Student Researcher (Computational) — Apr 2024 - May 2025

- Modeled and optimized ethane oxidative dehydrogenation (ODHE) reaction conditions with the Cantera package for Python and Bayesian optimization.
- Studied reaction pathways to determine key reactions and species.
- Connected results to experimental data and industrial economic/environmental analysis.

The Pennsylvania State University, University Park, PA

CurtisLab Undergraduate Student Researcher — Oct 2021 - May 2022

- Investigated soil bacteria and their impact on the nitrogen cycle.
- Prepared liquid and agar media and plated bacteria.
- Ventured into bioinformatics and tools/databases such as BLAST, BRENDA, and KEGG.

Academic Experience

University of Delaware, Newark, DE

Graduate Teaching Assistant — Aug 2023 - May 2024

- Aided in the development of a new senior lab experiment focusing on surfactants, emulsion mixing in a 20 L beaker, and droplet size analysis.
- Guided six small groups of undergraduates through laboratory mixing experiments.
- Communicated with industry professionals, professors, and undergraduates to schedule meetings and update course content for senior design.

Publications

- Houck, N. M.; Lobo, R. F. Gas-Phase Oxidative Dehydrogenation of Ethane via NO/O2 Mixtures. *Ind. Eng. Chem. Res.* **2025.** https://doi.org/10.1021/acs.iecr.5c00825.

Certifications

CPR and AED Certified – American Heart Association — Apr 2025 - Apr 2027

Jae Young (Jae) Kim

4 Thompson Circle, Newark DE, 19711| (832) 382 – 5090 | jaekim@udel.edu

PROFESSIONAL SUMMARY

Ph.D. Candidate in Chemical Engineering with expertise in machine learning, and cheminformatics. Published researcher specializing in AI-driven molecular property prediction and molecular design with applications in sustainable chemistry.

TECHNICAL SKILLS

- **Machine Learning & AI:** Neural Networks (MLPs, CNNs, Transformers), Graph Neural Networks (GNNs), Foundation Models, Transfer Learning & Fine-tuning, Conformal Prediction, Clustering, Kernel PCA
- **Software/Programming:** Python, PyTorch, TensorFlow, scikit-learn, RDKit, Pandas, Numpy, chemprop
- **Cheminformatics & Molecular Modeling:** Molecular Fingerprints, SMARTS Patterns, COSMO-RS, Molecular Property Prediction, Structure-Activity Relationships, Molecule design, Spectroscopy

EDUCATION

University of Delaware Aug 2022 - Present
Ph.D. Candidate in Chemical & Biomolecular Engineering

University of Illinois at Urbana Champaign Aug 2016 - May 2022
B.S. in Chemical & Biomolecular Engineering (Graduated with distinction)

EXPERIENCES

Vlachos Lab, University of Delaware Newark, DE
Graduate Research Assistant Jan 2023 – Present

Machine Learning for Molecular Property Prediction

- Developed similarity-based machine learning method for predicting biolubricant viscosities and reduced RMSE by 36% for standard methods while requiring fewer molecular features
- Created clustering models using molecular fingerprints to group structurally similar compounds, optimizing separate machine learning models for each group
- Developed predictive framework using kernel PCA for structure-property embedding, achieving 28-48% RMSE reduction across four ecotoxicity endpoints and bio-lubricant properties
- Implemented distance-aware conformal predictor for reliable uncertainty quantification

Computational Framework for Sustainable Molecule Design

- Engineered Python/RDKit workflow integrating SMARTS-defined reaction rules to design bio-based insecticides and plastics additives from furan and carbamate derivatives
- Enumerated, validated, and screened 72 generated candidates for synthetic feasibility and ecotoxicity, identifying 10 promising molecules
- Built a Python multi-model benchmark software for molecular property prediction, comparing classical ML, neural networks, and fine-tuned foundation models
- Developed an integrated framework enabling data-driven design of molecular classes optimized for functionality, biodegradability, and ecological safety

XRD analysis module for Mo_2C–MoN

- Built an XRD chemometrics module within the PyMESpec toolkit to extract peak positions, phase fractions, rate constants, and crystallite sizes
- Implemented automated peak detection, phase assignment, and Scherrer-based crystallite size estimation
- Applied the module to quantify $Mo_2C \rightarrow MoN$ evolution in MES experiments, generating phase-resolved kinetic and structural metrics

Archer-Daniels-Midland Co. Champaign, IL
CFD Intern Nov 2021 – May 2022

- Performed computational modeling of CSTR in multiphase for ethanol fermentation with Star-CCM+
- Simulated the operation of CSTR and optimized different parameters including oxygen flow rate, reactor volume, etc.

Professor Paul Braun's Lab Champaign, IL
Undergrad Research Assistant Aug 2020 – Dec 2021

- Performed synthesis of spiropyran acrylate monomer and polymerized it to make spiropyran polymer hydrogel
- Optimized solvent condition to maximize spiropyran polymer hydrogel's mechanical movement in response to light
- Developed process for spiropyran polymer gel synthesis without solvent and optimized it through multiple experiments
- Modeled mechanical movement of spiropyran polymer at different pH levels with Python

NuMat Technologies Inc. Skokie, IL
Process Engineering Intern Jun 2021 – Aug 2021

- Designed a solvent recovery process with vacuum filtration for recycling and incorporated it into the manufacturing process
- Performed metal-organic frameworks (MOFs) synthesis reaction at lab-scale and collected and analyzed data
- Determined the time and temperature dependency of crystal size growth, and yield of MOFs by kinetic modeling

Publications

1. **J.Y.Kim,** S.A.Khan, D.G.Vlachos. "Similarity-Based Machine Learning for Small Data Sets: Predicting Biolubricant Base Oil Viscosities." *The Journal of Physical Chemistry B*, 2024. DOI: 10.1021/acs.jpcb.4c06687
2. **J.Y.Kim,** D.G.Vlachos. "Distance-aware Molecular Property Prediction in Nonlinear Structure-Property Space." *Journal of Chemical Information and Modeling,* 2025. DOI: 10.1021/acs.jcim.5c01037
3. T.Goculdas, **J.Y.Kim,** et al. "Multiscale Model-driven Discovery of Insecticides for Sustainable Agriculture: A Demonstration of Product-by-design Approach." *ACS Sustainable Chemistry & Engineering,* 2025. DOI: 10.1021/acssuschemeng.5c04608

ADDITIONAL EXPERIENCES

Easychem Inc. Seoul, Korea
International Sales Intern Mar 2019 – Nov 2019

- Cooperated with R&D department to develop and improve products in response to consumers' needs
- Ran booth at International Builders' Show Las Vegas 2019 to market the company's house wrap
- Promoted company's breathable anti-virus fabric at Techtextile Frankfurt 2019, and awarded a "Well-Managed Booth Award" from Korea Trade-Investment Promotion Corporation

U.S. Army Camp Humphreys, Korea
CBRN Specialist (Korean Augmentation) May 2017 – Feb 2019

- Conducted two division-scale and three battalion-scale CBRN Trainings and took care of over 500 promasks in battalion
- Created new promask organizing system for battalion with excel and was awarded a Certificate of Achievement
- Worked as a squad leader for 6 months conducting physical training and started volunteer work program for the local community

LEADERSHIP & TEACHING

UD Korean Graduate Student Association (UD KGSA) Newark, DE
President Aug 2025 - May 2026
Vice President Aug 2024 - May 2025
Treasurer Aug 2023 - May 2024

Department of Chemical & Biomolecular Engineering, University of Delaware Newark, DE
Research Mentor Jan 2025 - Present

- Mentees: Devin Dabagian (2nd year PhD Student at University of Delaware)

Teaching Assistant (Random Variability) Feb 2024 - May 2024

- Evaluation of an average of 4.57 when the department average was 4.32

PROFESSIONAL MEMBERSHIP

AIP Publishing
Peer reviewer 2024 - present
Korean-American Scientists and Engineers Association
Member 2024 - present

HONORS, AWARDS & SCHOLARSHIPS

Philadelphia STLE 2024-2025 Academic Year Scholarship
Philadelphia Section of the Society of Tribologist and Lubrication Engineers (STLE) Jul 2024
Dean's List
University of Illinois at Urbana-Champaign May 2020

CERTIFICATES

Probability & Statistics for Machine Learning & Data Science
Coursera Oct 2023
Deep Neural Networks with PyTorch
Coursera Feb 2023
Convolutional Neural Networks in TensorFlow
Coursera Jan 2023
Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning
Coursera Dec 2022
Machine Learning with Python-From Linear Models to Deep Learning
edx Sep 2022

Quentin Kim

(925)-699-4051 | q.ymkim@gmail.com | linkedin.com/in/quentin-kim

Professional Summary

- Graduate researcher in catalysis, reaction engineering, and process design
- Strong technical background in catalyst synthesis, characterization, and evaluation
- Motivated by exploring innovative technologies for sustainable chemical manufacturing

Education

University of Delaware (UD), Newark, DE *August 2019 – December 2025 (expected)*
Doctoral Student, Chemical Engineering – GPA: 3.79
University of California, Santa Barbara (UCSB), CA *September 2015 – June 2019*
Bachelor of Science, Chemical Engineering – GPA: 3.56

Research Experience

Doctoral Student, UD, Department of Chemical and Biomolecular Engineering
July 2023 – Present. *PI: Dr. Dionisios G. Vlachos*
August 2019 – July 2023. *PI: Dr. Marat Orazov*

- Streamlined experimental procedures for quantitative and replicable microwave reactions
- Identified how microwave heating affects reactions with metal oxide catalysts
- Investigated reaction and diffusion in catalyst reduction with computational collaborators
- Developed syntheses for zeolite encapsulated metal oxide catalysts
- Improved product selectivity in oxidative propane dehydrogenation by employing catalyst properties and reaction engineering
- Constructed flow reactors for reaction/catalyst screening with condensable cofeeds
- Managed and maintained spectroscopy instruments and auxiliary equipment
- Served as safety officer to maintain a safe research environment

Undergraduate Researcher, UCSB, Department of Chemical Engineering
October 2017 – June 2019. *PI: Dr. Susannah Scott*

- Investigated kinetics of lignin depolymerization to support design/verification of high temperature and pressure *operando* MAS NMR studies

Undergraduate Research Intern, National Renewable Energy Laboratory
June 2018 – August 2018. *PI: Dr. Joshua Schaidle*

- Screened and characterized transition metal carbides for catalytic fast pyrolysis
- Identified mass transfer limitations with reaction engineering and kinetics analyses

Skills

Lab experience: Synthesis of metal oxide and zeolite catalysts, catalyst evaluation in flow reactors, microwave reactor operation, XRD, XRF, SEM, physisorption, chemisorption, FTIR/DRIFT spectroscopy, Raman spectroscopy, UV-vis spectroscopy, XPS, method development and quantitative analysis with GC and MS.

Instrumentation experience: Flow reactor construction and maintenance, reactor controls with LabVIEW, GC maintenance/modification, IR and Raman troubleshooting/maintenance.

Software experience: Excel, MATLAB, and Python for data processing and analysis.

Publications

- **Kim, Q.***; Yan, G.*; Worrad, A.*; Srinivas, S.; Yoon, S.; Sourav, S.; Boscoboinik, J.A.;, Zheng, W.; and Vlachos, D.G. Controlling Redox Cycle Dynamics of Reducible Metal Oxides, *Nature Catalysis*, Under review.
- Worrad, A.*; **Kim, Q.**; Sourav, S.; Bhattacharjee, H.; and Vlachos, D.G. PyMESpec: A Python Toolbox for Automated Modulation Excitation Spectroscopic Data Analysis and Transient Experiments, *Catalysis Science & Technology,* Under review.
- Sourav, S.*; Zhou, J.; **Kim, Q.**; Yu, K.; Zheng, W.; and Vlachos, D.G. Dynamics of Inverse Metal Oxides on Metals Catalysts using Spectro-Kinetics: Reversible Brønsted Acid Site Formation and Irreversible Reduction, *Catalysis Science & Technology*, Under review.
- Castro, E.*; Cerón, M.R.; Garcia, A.H.; **Kim, Q.**; Etcheverry-Berríos, A.; *et al*. and Echegoyen, L. A new family of fullerene derivatives: fullerene-curcumin conjugates for biological and photovoltaic applications, *RSC Advances* **2019**, 8, 41692-41698.

Presentations

- **Kim, Q.***; Wang, C.; Yu, K.; Zheng, W.; and Vlachos, D.G. Mechanistic Understanding of Microwave-Assisted Thermal Catalysis in Upgrading Shale Gas, ISCRE28, June 2024.
- **Kim, Q.*** and Orazov, M. Propylene Esterification Coupled to Oxidative Dehydrogenation of Propane: Process Intensification Through Catalyst Design, Winter Research Review, January 2023.
- **Kim, Q.*** and Nash, C. Ethanol dehydration and dehydrogenation over transition metal carbide catalysts, NREL Symposium for SULI, August 2018.

Awards and Honors

- Graduate Student Travel Award, 2024
- CCST Graduate Student Travel Grant Award for International Presentations, 2024
- College of Engineering Dean's Honors List, 2019
- Eagle Scout, Boy Scouts of America, 2014

Community Involvement

- *Colburn Club at UD: Volunteer from 2019-2020*. Tutored 2nd grade students in math at Shue-Medill middle school.
- *AIChE at UCSB: President from 2018-2019, other leadership positions from 2015-2018*. Organized career development, outreach, and social events, including founding a Graduate Research Fair to introduce undergraduates to graduate level research.
- *Coastal Fund at UCSB: Volunteer from 2015-2019.* Cleaned trash and non-native plant species from beaches and environmentally sensitive areas.

Stephen Kronenberger

330-217-3543 | skronen@udel.edu | Newark, DE

EDUCATION

University of Delaware
Doctor of Philosophy: Chemical Engineering
August 2021 – Present
GPA: 3.97
Expected Graduation: May 2026

Rochester Institute of Technology
Bachelor of Science: Chemical Engineering
August 2016 – May 2021
Minors: Applied Mathematics and Applied Statistics
GPA: 4.00
Engineering Honors Program

RELEVANT COURSEWORK

Large Scale Machine Learning University of Delaware, Fall 2022
Modeling, Analysis, and Acquisition of Data University of Delaware, Fall 2021
Principles of Polymer Physics University of Delaware, Spring 2022
Statistical Quality Control Rochester Institute of Technology, Spring 2021

RESEARCH EXPERIENCE

Graduate Thesis — Jan 2022 - Present

Investigation of Hierarchical Structure of Soft Materials using Data Science and Simulation
Primary Advisor: Dr. Arthi Jayaraman Secondary Advisor: Dr. Austin Brockmeier

- Performed molecular simulations to analyze the structure of network morphologies in polymeric systems (polypeptides, ionomer membranes, methylcellulose)
- Developed a new method to analyze membrane scattering data from experimental collaborators
- Integrated machine learning to develop molecular models and topological analysis to characterize network morphology

Computing and Data Science Training for Materials Innovation, Discovery, and Analytics Dec. 2021 – Dec. 2023

As a part of this National Science Foundation research traineeship:

- Led computational and theoretical efforts in a multidisciplinary team during a "hackathon" class. For a project sponsored by International Flavors and Fragrances (IFF), used molecular dynamics and mass transfer theory to predict fragrance molecule release rates from polymeric microcapsules—delivered results within a fast-paced timeline
- Attended seminars with industry, national lab, and academic speakers whose work combines computing, data science, and soft materials
- Designed and filmed outreach videos aimed to make research topics more accessible to the general public

PROFESSIONAL EXPERIENCE

Advanced Digital (ADISE) Intern, Dow Chemical Company — May 2023- September 2023

- Collaborated with experimental R&D scientists and data scientists to build interpretable machine learning models
- Identified key process variables and suggested future experiments for a new silicone processing technique using regression-, tree-, and kernel-based methods to measure feature importance
- Automated data processing workflows, reducing manual effort and minimizing human error

Quality and Technical Services Co-op, Appvion — January 2020-July 2020

- Investigated customer quality complaints across multiple product lines of coated paper
- Designed lab-scale experiments and analyzed large sets of plant-scale process data to propose improvements
- Presented finding to cross-functional teams and leadership

Research and Development Co-op, SolEpoxy — May 2018- December 2018

- Designed and conducted experiments to address customer product issues and develop new epoxy formulations
- Tested materials for several physical, chemical, and electrical properties
- Performed gauge repeatability and reproducibility studies to quantify variation in measurement data

SOFTWARE EXPERIENCE

Programs & Analysis: Python (NumPy, Pandas, TensorFlow, SciPy, Scikit-Learn, etc.), Bash, Git

Simulation Tools: LAMMPS, GROMACS, HOOMD

Statistical Tools: Minitab, JMP, Excel/VBA

PUBLICATIONS

Jha, A.; Kronenberger, S.; Thrasher, C.; Sbalbi, N.; Jayaraman, A.; Jamali, S.; **Multiscale Modeling for Crystallization and Mechanical Properties of End-Functionalized Polymer Grafted Nanoparticles.** *(under preparation)*

Kronenberger, S.; Jayaraman, A. **Effect of Methylcellulose Chain Design on Gelation and Fibril Structure Using Coarse-Grained Modeling.** *Chem. Mater.* **2025**, *37* (13), 4818–4831.

Kronenberger, S.; Gupta, N.; Gould, B.; Peterson, C.; Jayaraman, A. **Random Field Reconstruction of Three-Phase Polymer Structures with Anisotropy from 2D-Small-Angle Scattering Data**. *Soft Matter* 2024, *20* (42), 8493–8504.

Madinya, J. J.; Kronenberger, S.; Gould, B.; Peterson, C.; Jayaraman, A. **Connecting Features of Ionomer Scattering Profiles to the Real-Space Structural Features of Ionomer Domains**. *Macromolecules* **2024**, *57* (16), 8223–8239.

Taylor, P. A.; Kronenberger, S.; Kloxin, A. M.; Jayaraman, A. **Effects of Solvent Conditions on the Self-Assembly of Heterotrimeric Collagen-like Peptide (CLP) Triple Helices: A Coarse-Grained Simulation Study**. *Soft Matter* **2023**, *19* (26), 4939–4953.

PRESENTATIONS

Understanding Hierarchical Structures within Aqueous Methylcellulose Solutions & Gels using Multiscale Molecular Dynamics Simulations (Oral)
American Institute of Chemical Engineers Annual Meeting; San Diego, California, October, 2024

Understanding Hierarchical Structure within Methylcellulose Solutions using Multi-scale Molecular Simulations (Poster)
Polymer Physics Gordon Research Conference; South Hadley, Massachusetts, July, 2024

Computational Analysis of Small Angle Scattering Measurements on Polymer Membranes (Oral)
American Physical Society Annual Meeting; Minneapolis, Minnesota, March 2024

Understanding Ionomer Membrane Morphology through Computational Analysis of Small Angle Scattering Experiments (Poster)
American Physical Society Annual Meeting; Las Vegas, Nevada, March 2023

TEACHING EXPERIENCE

Graduate Teaching Assistant: Molecular Modeling and Simulations of Soft Materials Fall 2022
Created homework assignments; Assisted students with running simulations of soft materials on supercomputers

Undergraduate Teaching Assistant: Thermodynamics, Reaction Engineering Fall 2020, Spring 2021

HONORS & AWARDS

American Physical Society Division of Polymer Physics Padden Award Finalist — Fall 2025
University of Delaware Oral Qualifying Examination and Coursework Commendations — Fall 2022
Rochester Institute of Technology Outstanding Undergraduate Scholar — March 2021
Rochester Institute of Technology Kate Gleason College of Engineering Dean's List — Fall 2016-Spring 2021

DERRON MA

Ph.D. Candidate, Chemical and Biomolecular Engineering, University of Delaware

361 Colburn Laboratory, 150 Academy St, Newark, DE 19716 USA

derronma@udel.edu | (213) 446-5319 | www.linkedin.com/in/derronma

EDUCATION

Ph.D. in Chemical and Biomolecular Engineering Expected 2027
University of Delaware
Advisors: Wilfred Chen and Mark Blenner
Dissertation: Synthetic Acetyl-CoA-Responsive Biological Toolbox for Dynamic Control of Metabolism

B.S. in Biological Systems Engineering Sep 2018 – Jun 2022
University of California, Davis

RESEARCH INTERESTS

Metabolic Engineering with Dynamic Regulation, Synthetic Biology, Protein Engineering

RESEARCH EXPERIENCES

Research Assistant, Wilfred Chen and Mark Blenner Labs, University of Delaware 2022 – Present

Undergraduate Researcher, Ruihong Zhang Lab, University of California, Davis 2022

Undergraduate Researcher, Zhiliang Fan Lab, University of California, Davis 2021

HONORS AND AWARDS

Chemical and Biomolecular Engineering Ph.D. Qualifying Exam Commendation Aug 2023

Dean's List, College of Engineering, University of California, Davis 10 Quarters

Harold and Helen Smith Scholarship, University of California, Davis 2020-2022

John W. and Ernestine L. Heinrich Scholarship, University of California, Davis 2019-2020

PUBLICATIONS

1. **D. Ma**, W. Chen, M. Blenner, "A Real-Time Fluorescent Sensor for Visualizing Intracellular Acetyl-CoA Level Dynamics," *In prep.*
2. A.M. Stohr, **D. Ma**, W. Chen, M. Blenner, "RNA sensors and actuators for dynamic cellular regulation," *In prep.*
3. A.M. Stohr, **D. Ma**, W. Chen, M. Blenner, "Engineering conditional protein-protein interactions for dynamic cellular control," *Biotechnology Advances*, 77, 108457, 2024. DOI: 10.1016/j.biotechadv.2024.108457 [Citations = 2]

PROJECTS

Graduate Research – Engineering Acetyl-CoA-Responsive Toolbox Sep 2022 – Present

- Design and propose dissertation topic, milestones, and timeline
- Express and purify sensor proteins, and conduct in vitro characterization assays
- Transform sensor parts into bacteria and yeast to detect real-time metabolic activity

Undergraduate Researcher in Zhang Lab Mar 2022 – Jun 2022

- Investigated growth kinetics of *Haloferax mediterranei* under distinct sugar supplementation
- Modeled fermentation of *Haloferax mediterranei* in SuperPro Designer

Senior Design Project, EBS 170 Sep 2021 – June 2022

- Designed a continuous stirred tank reactor for bioplastic production as a team of five
- Modeled biochemical processes in SuperPro Designer
- Utilized microbial fermentation to convert crude dairy byproduct into polyhydroxyalkanoates bioplastics
- Presented our poster in engineering design showcase

Undergraduate Researcher in Fan Lab Aug 2021 – Feb 2022

- Assisted in a Pretreatment project using gluconic acid to tackle wheat straw recalcitrance
- Investigated the effects of gluconic acid concentration, pretreatment temperature, and pretreatment time on the breakdown plant cell wall ultrastructure
- Analyzed mass composition of liquid hydrolysate and solid residues with HPLC

RESEARCHERS SUPERVISED

UNDERGRADUATE STUDENT RESEARCHERS

Name	Dept. / Univ.	Recent Position	Period
1. Benjamin Prejean	CBE / UD		Jan 2025 – May 2025

TEACHING EXPERIENCES

Teaching Assistant, CHEG 467 Chemical Engineering Lab II, Distillation Lab Fall 2024
Teaching Assistant, CHEG 867 Protein Engineering Spring 2023

LEADERSHIP EXPERIENCE

Davis Cantonese Christian Fellowship Officer Sep 2020 – Jun 2022

- Serve as a Core officer of the fellowship leadership group

SKILLS

Software: AlphaFold3, Minitab, R, Matlab, Python, MS Visual Studio Code, Solidworks, Fusion 360, SuperPro, Comsol, Pspice, MS Office

Hardware: Biochemical Laboratory Apparatus, Thermocycler, Flow Cytometry, Sonication, Plate Reader, Biosafety Cabinet, SDS-PAGE, Autoclave, HPLC, LC-MS/MS, Spectrophotometer, Incubator, Arduino, Power Tools

Christopher C. Mayhugh

Phone: (630) 470-2496 | Email: cmayhugh@udel.edu | linkedin.com/in/cmayhugh/ | Citizenship: United States

PROFESSIONAL SUMMARY

Results-driven and highly motivated early-career protein scientist/engineer with track record of success in industrial cGMP (2 years experience) and academic research (6 years experience) environments. Multidisciplinary expertise in molecular biology, protein production and purification, and immunological characterization for vaccine design. Passionate about advancing biologics development and providing high-quality, patient-focused solutions for a company where I can continuously grow and solve complex problems.

SKILLS & QUALIFICATIONS

- **Molecular Biology**: Polymerase chain reaction (PCR), Primer design, Gibson assembly, Sanger sequencing, Gel electrophoresis
- **Cell Culture & Protein Expression:** Cell culture, Transformation/transfection and protein expression in microbial (*E. coli*, *B. subtilis*, and *V. natriegens*) and mammalian (adherent & suspension HEK293-derived cell lines) systems
- **Protein Purification:** Affinity and IEX chromatography, Tangential flow filtration, Dialysis, Endotoxin removal
- **Protein Engineering & Characterization:** Site-directed mutagenesis, Bioconjugation and click chemistry, SDS-PAGE, Western blot, Circular dichroism spectroscopy, Bradford assay
- **Immunology Techniques:** ELISA assay techniques, Multi-color flow cytometry, CellTiter-Glo assay
- **In vivo & In vitro Models:** Mouse immunization, Serum/BALF/Whole organ/Bone marrow collection, Ex vivo immune cell culture & activation, In vitro immunogenicity assay, IACUC documentation
- **Analytical Techniques & Assays:** Intact protein LC/MS, Peptide LC/MS-MS, Spectrophotometry, Fluorescence assays, Fluorescence microscopy, TLR4 reporter and LAL assays
- **Soft Skills:** Excellent communication and presentation skills, Experienced in collaborative and independent work environments, Team player
- **Software:** Microsoft Office, GraphPad Prism, UNICORN for AKTA systems, AlphaFold, PyMol, MATLAB, Biorender

EDUCATION

Ph.D. **University of Delaware (UD)** **2020 - Summer 2026 (Expected)**
Ph.D. Candidate, Chemical and Biomolecular Engineering
Advisor: Prof. Aditya M. Kunjapur

B.S. **The University of Alabama (UA)** **2014 - 2018**
B.S., Chemical and Biological Engineering
GPA: 3.8/4.0

RESEARCH EXPERIENCE

University of Delaware (*PhD Candidate)* **2020 – 2026 (Expected)**

- Awarded NIH CBI G1 and G2 Fellowships and AIChE Annual Meeting Division 15 "Best Oral Presentation" Award during my PhD studies.
- Extensive experience in development of nsAA incorporation and recombinant protein production pipelines in various cell types (*E. coli*, *V. natriegens*, *B. subtilis*, adherent and suspension HEK293 cell lines).
- Developed and optimized downstream protein purification chromatography and endotoxin removal processes to prepare recombinant antigens for in vivo applications.
- Designed in vivo and in vitro immunogenicity studies, ELISA assays, and flow cytometry panels to characterize humoral and cellular immune responses elicited by nsAA-modified bacterial and viral antigens.
- Developed bioconjugation methodology (PEGylation) to assess epitope binding by serum IgG antibodies.

Illinois Institute of Technology (*Summer REU Research Assistant)* **Summer 2016**
Faculty Advisor: Dr. Eric Brey

- NSF REU research on the LAMA4-mediated modulation of adipose tissue thermogenicity.

The University of Alabama (*Undergraduate Research Assistant)* **08/2014 – 05/2018**
Faculty Advisors: Dr. Margaret Liu (2014-2016) and Dr. Ian McDonough (2016-2018)

- Metabolic engineering (Liu Lab) and neuroscience (McDonough Lab) research assistant.

INDUSTRY EXPERIENCE

Novartis Gene Therapies *(Bioprocess Engineer I (Downstream),* Libertyville, IL*)* **11/2019 – 7/2020**

- Downstream purification of commercial AAV gene therapy drug (Zolgensma) in cGMP lab environment.

AstraZeneca *(Aseptic Control Technician,* West Chester, OH*)* **10/2018 – 10/2019**

- Verified manufacturing site met cGMP and FDA drug product manufacturing standards to ensure patient safety. Proficiency in cGMP documentation and aseptic technique.

AWARDS

AIChE Division 15 Best Oral Presentation Award	**Fall 2025**
Graduate Student Travel Award, University of Delaware	**Fall 2025**
NIH Chemistry-Biology Interface G2 Fellowship	**Fall 2021**
NIH Chemistry-Biology Interface G1 Fellowship	**Fall 2020**
UA Scholar Academic Merit Scholarship	**2014 - 2018**

PUBLICATIONS

2. **Mayhugh, C.**; Butler, N.D.; Sudduth, E.; Trautmann-Rodriguez, M.; Fromen, C.; Kunjapur, A.M. Nitration of a Foreign Antigen Via Genetic Code Expansion Increases In Vivo Immune Response. (In preparation)
1. McDonough, I.M.; **Mayhugh, C.**; Moore, M.K.; Brasfield, M.B.; Letang, S.K.; Madan, C.R.; Allen, R.S. Young Adults with a Parent with Dementia Show Early Abnormalities in Brain Activity and Brain Volume in the Hippocampus: A Matched Case-Control Study. *Brain Sci.* 2022, *12*, 496. DOI: 10.3390/brainsci12040496

PATENT FILINGS

1. **Mayhugh, C.**; Kunjapur, A.M.; Butler, N.D.; Fromen, C.; Sudduth, E. "Nitration of a foreign antigen can elicit a stronger immune response". U.S. Provisional Application No. 63/356,559. Filed: Jun. 5, 2024.

CONFERENCE PRESENTATIONS & POSTERS

3. **Mayhugh, C.**; Butler, N.; Sudduth, E.; Fromen, C.; Kunjapur, A. "Nitration of a Foreign Antigen Via Genetic Code Expansion Increases In Vivo Immune Response." AIChE Annual Meeting. Nov. 2, 2025. (UD, Oral presentation)
2. **Mayhugh, C.**; Butler, N.; Sudduth, E.; Fromen, C.; Kunjapur, A. "Nitration of a Foreign Antigen Can Elicit a Stronger Immune Response." BMES Annual Meeting. Oct. 23-26, 2024. (UD, Poster)
1. **Mayhugh, C.**; Butler, N.; Sudduth, E.; Fromen, C.; Kunjapur, A. "Nitration of a Foreign Antigen Can Elicit a Stronger Immune Response." NIH High-Risk High-Reward Symposium. Jun. 6-7, 2024. (UD, Poster)

TEACHING & MENTORING EXPERIENCE

Research Mentor, Undergraduate Summer Scholars Program, UD	Summer 2024 – Spring 2025
Teaching Assistant (TA), Thermodynamics II, UD Chemical Engineering	Spring 2024
TA, Protein Engineering, UD Chemical Engineering	Spring 2023
Tutor, Chemistry/Engineering/Mathematics, Applied Tutoring	2017-2018
Tutor, Chemistry/Engineering, UA ENGenuity Lab	2016-2017

Rajas Milind Mehendale

rajasm@udel.edu
sites.google.com/view/rajas-mehendale | linkedin.com/in/rajas-mehendale

Research Interest: I use molecular simulations to study polymer-catalyst interactions and their effect on plastic deconstruction reactions. I aim to integrate these insights to develop robust multiscale models for efficient plastics waste recycling.

Education

University of Delaware (UD) Aug 2022 - present
PhD Candidate, Chemical and Biomolecular Engineering (GPA: 4.0/4.0)

Institute of Chemical Technology (ICT) Mumbai, India Aug 2018 - May 2022
Bachelor of Chemical Engineering (B. Chem. Engg) (GPA: 9.81/10.0)
Class Valedictorian

Research Experience

2. UD | Graduate Research Assistant | Vlachos Research Group Jan 2023 - present
Advisor: Prof. Dionisios G. Vlachos

- Developed a methodology to study polymer-catalyst interactions combining DFT calculations on clusters and Replica-Exchange Molecular Dynamics (RE-MD).
- Developed classical force fields for interactions of metal and metal oxide catalysts and supports with mixed plastics.
- Screened pesticide candidates for bioavailability using DFT calculations and applied group-contribution models to compute key physico-chemical properties, guiding future experiments.

1. ICT, Mumbai | Undergraduate Researcher Apr 2019 - May 2022
Mentor: Prof. Vilas G. Gaikar

- Investigated the partitioning of acetic acid between water and organic solvents using atomistic Molecular Dynamics (MD) simulations to guide experiments.
- Integrated Artificial Neural Networks (ANNs) with group contribution models for the prediction of liquid-phase equilibria.

Industrial Experience

Brilliant Polymers Private Limited (BPPL) Mumbai, India
Project Intern May - Jul 2021
Designed a Basic Engineering Package (BEP) to shift the company's polyurethane batch process to a continuous-process pilot plant. The pilot plant is now under construction.

Skills

- **Simulation and theory:** Molecular Dynamics (MD), Replica-Exchange (Parallel-Tempering), hybrid Grand-Canonical Monte Carlo (GCMC) + MD simulations, Molecular Thermodynamics, Polymer Physics, Density Functional Theory (DFT), Artificial Neural Networks (ANNs), Group-contribution models for physico-chemical property prediction.
- **Programming Languages:** Python, Bash, C++.
- **Simulation packages and software:** LAMMPS, GROMACS, Gaussian, VASP, OVITO, MATLAB, Simulink, GNU Octave, RDKit.

Teaching and Mentorship Experience

1. Teaching Assistant

ii. Computers in Chemical Engineering (Prof. E. M. Furst, Prof. W. Hartt) Spring 2025
Served as the first TA for a new senior undergraduate Python scientific computing course, providing instructional and technical support in numerical methods, image analysis, AI, and LLMs.

i. Diffusive Transport Processes (Prof. A. M. Lenhoff) Fall 2023

2. Graduate Student Mentorship

i. Kirsten Sjoberg (Advisor: Prof. Susannah Scott, UC Santa Barbara) June 2025 - present

Understanding the effect of silica surface morphologies and chemistries on the adsorption conformations of polyethylene.

3. Undergraduate Research Mentorship

ii. Elisabeth Roberts May 2025 - present

i. Panachok Kaewrahan Feb 2024 - May 2025

Senior Thesis on "The effect of coarse-graining on conformations of polyethylene melts on catalyst surfaces using Molecular Dynamics".

Grants and Awards

4. Computing allocations: **Mehendale, R.M.**, Vlachos, D.G., (co-PIs) May 2024 - Sept 2025
   800,000 CPU-hours on NSF supercomputers.
3. Ambuja Cement Award for the Class Valedictorian in B. Chem. Engg. 2022
2. Prof. S. B. Pandya Award for the **best Senior Design project.** 2022
1. ICT Alumni Association Prize for **Best Student from Junior Year.** 2021

Publications

(# indicates equal contribution)

2. Goculdas, T.; Kim, J.Y.[#]; **Mehendale, R.M.**[#]; Crossley, M.; Sadula, S.; Vlachos, D.G. "Product by Design: Renewable, Target-Specific, and Safer Solutions for Agricultural Sustainability". *ACS Sustain. Chem. Eng.* 13(35), 14459-14471 (2025).
1. **Mehendale, R.M.**; Vlachos, D.G.; Caratzoulas, S. "Effects of Metal Catalyst Facets on Polyethylene Adsorption". *J. Phys. Chem. C.* 129(4), 2000 -2010 (2025).

Conference Presentations

3. "Effect of catalyst surface morphology on polyethylene adsorption", Gordon Research Conference (GRC) and Seminar (GRS) on Plastics Recycling and Upcycling, NH, 2025.
2. "Effect of metal catalyst facets on polyethylene adsorption", American Physical Society (APS) Global Physics Summit, Anaheim, CA, 2025.
1. "Multiscale Modeling Studies of the Effects of Catalyst Surface Morphology on Polymer Adsorption for Polyethylene Hydrogenolysis", AIChE Annual Meeting, San Diego, CA, 2024.

Leadership Experience

2. HPC Resource Manager, Vlachos Research Group June 2023 - present

- Guided group members on best practices for high-performance computing, focusing on workflow automation and the development of high-speed, low-memory analysis codes.
- Selected to manage the group's allocations on computational clusters and coordinate IT/HPC requests with university IT authorities.

1. International Student Representative Sept 2022 - Sept 2023

Department of Chemical and Biomolecular Engineering, Graduate Student Club

Izak Minnie

PhD Candidate
Department of Chemical and Biomolecular Engineering
University of Delaware
Newark, DE, 19711

302-685-6693 | iminnie@udel.edu

Education

PHD CHEMICAL ENGINEERING | AUGUST 2022- CURRENT | UNIVERSITY OF DELAWARE, NEWARK, DELAWARE, USA

- Awards and achievements: 2023 Schipper Fellow, 2025-26 Department Teaching Fellow
- Advisor: Prof Dongxia Liu
    - Electrochemical reduction of CO_2
    - Electrochemical Refrigeration

BSC ENG (CHEMICAL) (WITH DISTINCTION) | APRIL 2022 | UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, SOUTH AFRICA

- Awards and achievements: Dean's List
  Participant in the merSETA ViroVent Innovation Challenge
- Research project:
    - Dr. Neil Stacey – The use of hollow fibre membrane dialyzers in a liquid-liquid configuration for respiratory support.

BSC HONOURS CHEMISTRY (WITH DISTINCTION) | MARCH 2020 | UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, SOUTH AFRICA

- Awards and achievements: Dean's List Honours
  Dow Achievement Award for Chemistry Honours
  Dow Achievement Award for Best Honours Project
  SACI James Moir Medal 2020
- Honours projects:
    - Prof Charles de Koning and Dr Kennedy Ngwira – Synthesis of UV absorbent xanthones from cardanol derived from cashew nut shell liquid.
    - Prof Manoko Maubane-Nkadimeng – Photocatalytic degradation of paracetamol using carbon dots supported on TiO_2.

BSC (WITH DISTINCTION) | MARCH 2019 | UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, SOUTH AFRICA

- Major: Chemistry, Applied Chemistry
- Minor: Process Engineering Fundamentals, Energy Balances and Applications
- Awards and achievements: Dean's List years of study 1-3
  LABEX Achievement Award for Chemistry I
  Merck Achievement Award for Chemistry III
  LABEX Achievement Award for Chemistry III

Research, Scholarly and Creative Activities

REVIEWS AND PERSPECTIVES

Minnie, I.; Kim, H. K.; Flake, J.; Liu, D. Intermittent CO2 Electrolysis Needs Its Time in the Sun. *Chem Catalysis* **2025**, *5* (1), 101166. https://doi.org/10.1016/j.checat.2024.101166. (Invited)

ARTICLES

Minnie, I.; Warty, A.; Liu, D. Effect of Carbon Support Topology in Cathode Catalyst Layer on Stability of CO2 Electrolyzers. *J. Electrochem. Soc.* **2025**, *172* (7), 074510.

Crandall, B. S.; Ko, B. H.; Overa, S.; Cherniack, L.; Lee, A.; **Minnie, I.**; Jiao, F. Kilowatt-Scale Tandem CO2 Electrolysis for Enhanced Acetate and Ethylene Production. *Nat. Chem. Eng.* **2024**, *1* (6), 421–429.

Jagot, F.; **Minnie, I.**; Rahman, A.; Ntsimango, S.; Ngwira, K. J.; Koning, C. B. de. Hydrogen-Bonded Xanthones as Potential UV Absorbers: The Synthesis of Xanthones from Bio-Renewable Cardanol Utilizing a Ceric Ammonium Sulfate (CAS)-Mediated Oxidation Reaction. *SynOpen* **2022**, *06*, 58–66.

CONFERENCE PROCEEDINGS

Minnie, I.; Warty, A.; Liu, D. Investigation into Periodic Variations in CO2 Electrolyzer Stability at the Hand of Different Carbon Supports. Meet. Abstr. 2025, MA2025-01 (41), 2219.

Minnie, I.; Gibson, S.; Stacey, N. Chapter 11: The Use of Hollow Fibre Membrane Dialysers in a Liquid-Liquid Configuration for Respiratory Support. In *Medical Devices Innovation for Africa*; UCT Libraries: Cape Town, 2022.

Teaching and Mentoring

TEACHING

2025-26 University of Delaware CBE Department Teaching Fellow – Co-taught CHEG322 Chemical Engineering Kinetics & Reactor Design with Prof Kevin Solomon and Prof Victoria Muir

TEACHING ASSISTANT

2024 Fall - CHEG445 Senior Lab, University of Delaware
2023 Fall - CHEG820 Kinetic Processes, University of Delaware
2022 Summer - International Student Teaching Assistants Program, University of Delaware
2019 Spring/Fall - First Year Undergraduate Chemistry Lab, University of the Witwatersrand

MENTORING

2024 Summer/Fall – iBuddy Mentor to one international graduate student, University of Delaware
2024 -2025– Mentored undergraduate RISE student in the Liu Lab, University of Delaware
2024 Winter – Mentored undergraduate student in Liu Lab, University of Delaware
2023 -2025 – EMPOWER Mentor, University of Delaware

Lily Motabar

lmotabar@udel.edu ▪ (240) 505-8257
linkedin.com/in/lily-motabar

EDUCATION

University of Delaware August 2021 – April 2026 (Expected)
Ph.D. Candidate, Chemical and Biomolecular Engineering
- Thesis Topic: Insights into heterogeneity, stability, and self-interactions of biopharmaceuticals

University of Maryland, College Park (UMD) August 2014 – May 2018
B.S., Bioengineering

PROFESSIONAL AND RESEARCH EXPERIENCE

University of Delaware August 2021 – Present
Graduate Research Assistant, Christopher J. Roberts Group

NIST Center for Neutron Research September 2024 – Present
Guest Researcher
- Characterized biophysical attributes, including protein self-interactions, higher order structure, and aggregation, to investigate physical stability of monoclonal antibodies (mAbs) and adeno-associated virus (AAV) vectors
- Applied external stressors such as temperature and hydrostatic pressure to mAb and AAV solutions with the goal of assessing formulation stability and understanding aggregation triggers
- Investigated the role of glycosylation macro-heterogeneity on protein self-interactions via static and dynamic light scattering measurements as a function of formulation conditions
- Establishing and optimizing methods for characterizing AAV solutions via small-angle neutron and x-ray scattering (SANS/SAXS)

AstraZeneca July 2018 – August 2021
Associate Scientist I, Purification Process Sciences
- Supported purification process development for five early-stage programs including monoclonal and bispecific antibodies and antibody-drug conjugates to support AstraZeneca's immuno-oncology portfolio
- Planned, executed, and optimized unit operations including chromatography, viral filtration, and tangential flow filtration to ensure process robustness and fit for commercial manufacturing scale
- Designed purification experiments to address removal of challenging process- and product-related impurities including protein aggregate, fragment, host cell protein, and bispecific antibody mis-pairs
- Contributed to the process development of AZD1222 SARS-CoV-2 vaccine by performing purification unit operations, ensuring robustness and performing process characterization under strict and expedited deadlines

UMD Bioinspired Advanced Manufacturing Lab September 2015 – May 2018
Undergraduate Researcher, NanoPost Topotaxis Team
- Contributed to team efforts designing nanoscale substrates that mimic *in vivo* vascular curvature for the study of directional migration of mammalian cells
- Designed and fabricated the substrates via a 3D-printing laser nanolithography system, making iterative adjustments to produce robust and reliable manufacturing outcomes
- Optimized fabrication conditions to achieve nanoscale feature resolution of 3D architecture unattainable by traditional processes, proving that our method is able to efficiently produce biomimetic constructs

National Institute of Standards and Technology May 2017 – August 2017
Summer Undergraduate Research Fellow
- Constructed 3D cell culture scaffolds of natural components to mimic the extracellular environment, and optimized scaffolds to achieve stiffness within a biologically relevant range, comparable to muscle tissue
- Observed morphology and migration of seeded mammalian cells via confocal microscopy to characterize cell response depending on matrix composition
- Presented findings at the Summer Undergraduate Research Fellowship Colloquium

Summer Undergraduate Research Fellow May 2016 – August 2016

- Designed and successfully 3D-printed microfluidic devices with integrated electronic components, supporting the viability of a cost-effective and high throughput method that improves manufacturing processes of microfluidic devices
- Measured the impedance of injected saline solutions through the prototype microfluidic channel to gain a greater understanding of the impedance/salt concentration relationship to improve electronic functionality

PUBLICATIONS

1. **L. Motabar**, V. Palakollu, H. Shahfar, C.J. Roberts, et. al. Impact of electrostatics on the aggregation, genome release, and self-interactions of AAV9 capsids. *Journal of Pharmaceutical Sciences* 2025, 114(9), 103899.
2. V. Palakollu*, **L. Motabar***, C.J. Roberts. Impact of Glycosylation on Protein-Protein Self-Interactions of Monoclonal Antibodies. *Molecular Pharmaceutics* 2024, 21, 1414−1423. [*Equal contribution]

PRESENTATIONS

1. **L. Motabar**, V. Palakollu, H. Shahfar, C.J. Roberts, et. al. "Investigating the Aggregation, Genome Release, and Self-Interactions of Adeno-Associated Virus Formulations." *CASSS Cell and Gene Therapy Products Symposium.* Summer 2025. (Flash Talk and Poster)
2. **L. Motabar**, V. Palakollu, C.J. Roberts. "Impact of Glycosylation on Monoclonal Antibody Self-Interactions." *2024 Colorado Protein Stability Conference.* Summer 2024. (Poster)
3. **L. Motabar**, M. Aspelund, A. Hunter, et. al. "Investigations of novel mixed-mode cation exchange chromatography for control of aggregates in bispecific antibodies." *American Institute of Chemical Engineers Meeting.* Fall 2020. (Poster)
4. C. Krueger, S. Sturner, H. Palmer, E. Nakas, **L. Motabar**, R.D. Sochol, et. al. "Investigation of Direct Laser Writing for Topotaxis Studies." *Proceedings of the 21st International Conference on Miniaturized Systems for Chemistry and Life Sciences (μTAS 2017), Savannah, Georgia, USA.* (Poster)
5. M. Ibo, **L. Motabar**, D.R. Reyes-Hernandez. "Microfabrication of a 3D, Elastic Cell Microenvironment With Nanoscale Precision Using Layer-by-layer Deposition." *Proceedings of the 21st International Conference on Miniaturized Systems for Chemistry and Life Sciences (μTAS 2017), Savannah, Georgia, USA.* (Poster)

TECHNICAL SKILLS

Laboratory Techniques

Static light scattering; dynamic light scattering; small-angle neutron scattering; small-angle x-ray scattering; analytical ultracentrifugation; fluorescence spectroscopy; UV-Vis spectroscopy; differential scanning fluorimetry; subvisible particle analysis; protein purification via FPLC; HPLC; tangential flow filtration; depth filtration; capillary gel electrophoresis; mammalian cell culture; confocal microscopy; qPCR; ELISA; photolithography; soft lithography; automated liquid handling systems; design of experiments (DOE); 3D printing; aseptic technique

Software Applications

MATLAB; SAS JMP; Origin; IGOR; SasView; Autodesk AutoCAD; GE Unicorn; Minitab

HONORS AND AWARDS

CASSS Cell and Gene Therapy Products Next Generation Investigator Award Received May 2025
University of Delaware Robert L. Pigford Fellowship August 2021 – July 2022
University of Maryland Honors College Citation Received May 2018

AFFILIATIONS

American Chemical Society BIOT Mid-Atlantic Student Chapter, Webmaster August 2023 – August 2025
NIST NCNR User Group Executive Committee, Student Representative August 2023 – March 2025
University of Delaware Colburn Club, AIChE Representative September 2022 – October 2023
University of Maryland Clark School of Engineering Ambassadors September 2017 – May 2018
Alpha Omega Epsilon, Women in Engineering Sorority September 2015 – May 2018
Biomedical Engineering Society September 2015 – May 2018

Pedro António Reis Moura
650 Lehigh Road, Apt I-12 Phone: 848.667.9688 Newark, DE 19711 E-Mail: parm@udel.edu

EDUCATION:

Ph.D., Chemical Engineering, 2022-Present
University of Delaware, Newark, DE

M.S., Chemical Engineering, 2022
University of Colorado Boulder, Boulder, CO

B.S., Chemical Engineering, 2020
New Jersey Institute of Technology, Newark, NJ

- 2020 Summa Cum Laude
- 2018 UR Summer Fellowship Grant
- 2018 Spring URI Phase 1 – Track 1 Grant

WORK EXPERIENCE:

Graduate Researcher | Dr. Dionisios G. Vlachos **2022-Present**
University of Delaware, Newark, DE

- Developing a novel process for enabling the upcycling of multilayer plastics waste.
- Managing the safe exchange and upkeep of hazardous/non-hazardous gases for the laboratory
- Developed a stable catalyst for the hydrolytic depolymerization of polyamide 6 through the study of the hydrothermal stability of heterogeneous catalysts.
- Identified the hydrogenolysis catalytic deconstruction and deactivation pathways of ethylene vinyl acetate and its polyethylene mixtures relevant to multilayer plastics waste.
- Procured, installed, and maintained new laboratory research equipment along with development of the associated EHS-approved experimental protocols.
- Collaborated and mentored fellow scientists in application of newly developed experimental protocols

Graduate Researcher | Dr. J. Will Medlin **2020-2022**
University of Colorado Boulder, Boulder, CO

- Studied the deposition, formation, and oxidation of thiol Self-Assembled Monolayers (SAM) on Pd/Al_2O_3 nanoparticles.
- Collaborated as an experimentalist across universities to study the role of oxidized thiolates in the direct synthesis of hydrogen peroxide.

Undergraduate Researcher | Dr. Sagnik Basuray **2017-2020**
New Jersey Institute of Technology, Newark, NJ

- Developed in coordination with graduate mentors/PhD faculty a novel protein purification device.
- Presented and secured project proposals to research funding committees.

SKILLS:

- Characterization of compositional and additive profiling of mixed plastics feedstocks (DSC, TGA, O-PTIR)
- Heterogeneous catalyst synthesis and characterization (Chemisorption, BET, XRD, Probe IR, XRF, XPS)
- Troubleshooting/Maintenance of reactors, gas & liquid chromatography (MS/FID & MS/DAD/RI), and cryomilling systems
- Python, Origin, and excel for data analysis and visualization

PUBLICATIONS:

- **Moura, P.**, Zheng, W., Selvam, E. & Vlachos, D. G. Hydrolysis of Polyamide 6 to epsilon-Caprolactam over Titanium Dioxide. *ChemSusChem*, (2025).
- **Moura, P.** & Vlachos, D. G. A better fate for PVC. *Nature Sustainability* 7, 1556-1557, (2024).

- **Moura, P.**, Kots, P.A., Vance, B.C., Schyns, Z.O., Najmi, S., Hinton, Z.R., Quinn, C.M., Epps III, T.H., Korley, L.T. & Vlachos, D.G. Catalytic Deconstruction of Ethylene Vinyl Acetate Copolymer and Polyethylene Mixtures via Hydroconversion: Challenges and Solutions. *ACS Sustainable Chemistry & Engineering* 12, 8717-8728, (2024).
- Chen, L., **Moura, P.**, Medlin, J. W. & Gronbeck, H. Multiple Roles of Alkanethiolate-Ligands in Direct Formation of H_2O_2 over Pd Nanoparticles. *Angew Chem Int Ed Engl* 61, (2022).
- Cheng, Y.H., **Moura, P.**, Zhenglong, L., Feng, L., Arokiam, S., Yang, J., Hariharan, M. & Basuray, S. Effect of electrode configuration on the sensitivity of nucleic acid detection in a non-planar, flow-through, porous interdigitated electrode. *Biomicrofluidics* 13, 064118, (2019)
- Li, Z., Cheng, Y.H., Feng, L., Felix, D.D., Neil, J., **Moura, P.** Rahman, M., Yang, J., Azizighannad, S., Mitra, S. & Basuray, S. Communication—electrochemical impedance signature of a non-planar, interdigitated, flow-through, porous, carbon-based microelectrode. *Journal of The Electrochemical Society*, 166, B1669, (2019)

PRESENTATIONS:

2025 Plastics Recycling and Upcycling Gordon Research Conference/Seminar – Southern New Hampshire University, Hooksett, NH

- **Moura, P.**, Zheng, W., Selvam, E. & Vlachos, D. G. Polyamide Conversion to Monomer over Metal Oxide Catalysts. *Seminar/Conference Poster,* July 13th/15th

2025 North American Catalysis Society Meeting - Hyatt Regency, Atlanta, GA

- **Moura, P.**, & Vlachos, D.G. Polyamide Conversion to Monomer over Metal Oxide Catalysts. *POLYMER - Hydrolysis and Pyrolysis,* June 11th

2024 AIChE Annual Meeting - Hilton San Diego Bayfront, San Diego, CA

- **Moura, P.**, Kots, P.A., Vance, B.C., Schyns, Z.O., Najmi, S., Hinton, Z.R., Quinn, C.M., Epps III, T.H., Korley, L.T. & Vlachos, D.G. Catalytic Deconstruction of Ethylene Vinyl Acetate Copolymer and Polyethylene Mixtures. *Conversion of Waste Plastic into Liquid Fuels,* October 30th

2019 AIChE Annual Meeting - Hyatt Regency, Orlando, FL

- **Moura, P.**, Cheng, Y.H., Zhenglong, L. & Basuray, S. Lab-on-a-Chip Device for Shear Enhanced Purification of Macro Biomolecules. *Separations Division: Advances in Bioseparations,* November 12th
- **Moura, P.**, Cheng, Y.H., Zhenglong, L. & Basuray, S. A Bead-Based Microfluidic Testbed for an Enhanced Lab-on-a-Chip Device for Shear Enhanced Purification of Biomolecules. *Undergraduate Student Poster Session: Separations,* November 10th

TEACHING & MENTORSHIP EXPERIENCE:

Graduate Teaching Assistant/Mentor | University of Delaware

- Assisted teaching undergraduate Thermodynamics and graduate Kinetics
- Mentored undergraduate students in conducting research projects

Graduate Teaching Assistant | University of Colorado Boulder

- Designed a final project for examination in undergraduate Heat and Mass Transfer.

PLTL (Peer-led team learning) Leader | Brookdale Community College

- Worked in a team environment along professors to assist students in lower level classes.

Tristan Myers

(785) 633 6166 – tmyers1618@gmail.com – www.linkedin.com/in/tristan-myers

PROFESSIONAL SUMMARY

PhD candidate in Chemical Engineering with 5+ years of experience turning complex simulation and experimental data into quantitative, decision-ready insights. Strong background in Python-based data analysis, scientific computing, and statistical/ML workflows, combined with domain expertise in polymers and soft materials. Co-developed a high-throughput simulation workflow (~100× speedup) for materials design. Experienced in cross-functional projects, collaborating with industry partners, and communicating results to both technical and non-technical stakeholders.

EDUCATION

Ph.D. Chemical Engineering, University of Delaware, Newark, DE; GPA 3.9/4.0 — Expected Aug 2026
Master of Chemical Engineering (Thesis), University of Delaware, Newark, DE — Sept 2023
B.S. in Chemical Engineering, University of Kansas, Lawrence, KS — May 2021

SKILLS

Data analytics and visualization: Python (NumPy, pandas, SciPy, scikit-learn, Matplotlib, OVITO); autonomous computational workflows; exploratory data analysis (EDA), uncertainty analysis
Modeling and simulation: Molecular dynamics (LAMMPS; coarse-grained & all-atom molecular modeling), equilibrium (Green-Kubo) and non-equilibrium MD for thermal conductivity; mechanistic process modeling
Domain expertise: Block copolymer melts and their multiphase morphologies; polymer design-structure–property relationships; thermal transport in soft materials
Computational workflows: Advanced MD protocols (RAPSIDY); Linux, bash scripting, SLURM job management
Collaboration and communication: Cross-functional R&D projects (including industry-supervised hackathon), mentoring, technical writing and presentations

RESEARCH AND PROJECT EXPERIENCE

Jayaraman Lab, University of Delaware — Sept 2023 – present
Doctoral Candidate, Research Assistant

- Design and run large-scale simulation campaigns and Python analysis workflows to relate block copolymer design to multi-scale structure and thermal transport, enabling **data-driven materials design** for thermal management applications
- Collaborate with theory experts to create synergistic simulation + theory workflow that approximates polymer structure in minutes and then selects the most promising candidates for in-depth simulation, **cutting analysis time by 90%+ vs simulation alone**
- Co-developed the RAPSIDY (Rapid Analysis of Polymer Structure and Inverse Design Strategy) workflow to **accelerate detailed simulation analysis by ~100x** compared to standard simulations (2+ weeks per design), guiding the synthesis of soft materials with exceptional structural, thermal, and optical properties

Dow Chemical Co. Hackathon Project, University of Delaware — Feb – May 2025
Technical Lead

- Served as technical lead on interdisciplinary, industry-supervised R&D project to relate polyurethane (PU) molecular design to thermal properties without time- and resource-intensive experiments
- Primarily responsible for designing & writing open-source, user-friendly Python code to **automatically construct large MD simulations** of densely packed PU chains of arbitrary polyol/isocyanate chemistry, significantly reducing manual setup time and error
- **Achieved ≤ 20% relative error vs experiment** for thermal conductivity of three diol monomers, demonstrating the value-add of computational screening in engineering next-generation insulators
- Managed project scope and technical trade-offs to deliver core functionality on schedule, and communicated progress and results to faculty and industry representatives through regular updates and a final presentation

Lenhoff Lab, University of Delaware Nov 2021 – Sept 2023

Graduate Student Researcher

- Developed mechanistic transport model (Python) for depth filtration (DF) in biopharmaceutical manufacturing to meet/exceed phenomenological model accuracy, culminating in M.Ch.E. thesis
- Performed DF experiments while following good laboratory practice (GLP)-aligned safety procedures to gather dataset to perform EDA and parameter-estimation for model across a swath of filtration conditions

Allgeier Lab, University of Kansas Jan 2018 – Aug 2021

Undergraduate Research Assistant

- Led independent research on time-domain nuclear magnetic resonance relaxometry of Kevlar® particle suspensions with paramagnetic inclusions, culminating in two peer-reviewed publications

LEADERSHIP EXPERIENCE

Graduate Student Mutual Aid Network, University of Delaware Feb 2022 – present

Department Representative (Chem. Eng.)

- Help plan and facilitate peer-to-peer support for grad students, including an informational campaign on civil rights for international students, independent of university support

KU Engineers Without Borders, University of Kansas Jan 2018 – Aug 2020

Bolivia Project Lead, Aug 2019 – Aug 2020; Treasurer, May 2019 – Aug 2020

- Led a project team of 12 students to spearhead transition to remote project implementation and disbursement of **~$20,000 in project funds** in Colani, Bolivia after onset of COVID-19 pandemic

INDUSTRIAL EXPERIENCE

Bayer Animal Health, Shawnee, KS May 2019 – Aug 2019

Product Supply Intern

- Supported a portfolio of **>$1.5M/year** in continuous-improvement projects by clarifying project goals, tracking key deliverables, and coordinating efforts across production, engineering, and quality

HONORS AND SCHOLARSHIPS

- Axalta Bright Futures Scholarship (U. Del.), CRiSP Travel Award (U. Del.), Outstanding Undergraduate Research in Chem. Eng. (U. Kansas), National Merit Scholar, BSA Eagle Scout

RELEVANT PUBLICATIONS

1. Park, S. J.; **Myers, T.**; Liao, V.; Jayaraman, A. Molecular Systems Design & Engineering 2024, 9 (12), 1235-1253.
2. Park, S. J.; **Myers, T.**; Jayaraman, A. Macromolecules 2025. In review
3. **Myers, T.**; Park, S. J.; Jayaraman, A. In preparation
4. Liao, V.; **Myers, T.**; Jayaraman, A. Soft Matter 2024, 20 (41), 8246-8259.
5. **Myers, T.**; M.Ch.E. thesis, "Mechanistic Modeling of Primary Depth Filtration in Downstream Bioprocessing", University of Delaware, US, Delaware, 2023

JULIANA EYBUN NAM

University of Delaware, Newark, DE, 19711 Tel: (718) – 406 – 6767
Department of Chemical & Biomolecular Engineering Email: jnam@udel.edu

RESEARCH INTERESTS

Machine learning, bioprinting, biofilms, additive manufacturing, soft materials, rheology

EDUCATION

UNIVERSITY OF DELAWARE, *Newark, DE* **August 2022 - Present**
Ph.D. Candidate in Chemical and Biomolecular Engineering • Bayles Lab
GPA: 3.6

CORNELL UNIVERSITY, *Ithaca, NY* **August 2018 – May 2022**
Bachelor of Science (B.S.) in Chemical and Biomolecular Engineering
GPA: 3.4

RESEARCH EXPERIENCE

UNIVERSITY OF DELAWARE, *Newark, DE* **January 2023 – Present**
Ph.D. CANDIDATE
Advisor: Prof. Alexandra V. Bayles
- Thesis Area: Machine learning inverse design tool for high throughput advective assembly
- Thesis Area: Bioprinting with advective assembly

CORNELL UNIVERSITY, *Ithaca, NY* **October 2020 – May 2022**
UNDERGRADUATE RESEARCH ASSISTANT
Advisor: Prof. Rong Yang
Mentor: Prof. Yifan Cheng
- Project Title: Investigating bacteria-surface interactions on the molecular scale
- Project Title: Analyzing the kinetics and stability of enzyme on coated and uncoated surfaces

COLLABORATIONS

2023 – 24	Inter-department collaboration: Mentored two Data Science master students (Yamini Medapati, Lakshmi Sudini) in 6-month long research projects in the Bayles group
2024 - Present	Inter-department collaboration: Lead student a CHARM-backed project with the Hanson group (School of Mariane Science and Policy, Dept of Biological Sciences, DBI).
2025 – 26	Intra-department collaboration: Lead student in the Bayles group in a project with the Fromen group.

AWARDS AND CERTIFICATES

2021	Engineering Learning Initiatives Undergraduate Research Award
2022	Rodriguez Award for Outstanding Research in Polymers
2022 – 24	NRT-MIDAS traineeship
2023	Collins Fellowship
2024	Audience Choice Best Poster at UD Women in Engineering (WIE) Symposium
2024	NRT-MIDAS teaching certificate
2024	Koerner Fellowship

PRESENTATIONS

1. J. E. Nam, A. V. Bayles, "Increasing the Throughput of Bioprinting Using Machine Learning Optimized Advective Assembly," Mid-Atlantic Soft Matter Symposium. February 16, 2024, Georgetown, Washington DC.
2. J. E. Nam, Y. P. Medapati, P. McCauley, A. V. Bayles, "Machine learning guided inverse design of multimaterial additive manufacturing coextrusion nozzles," 95th Society of Rheology Annual Meeting, October 13-17, 2024, Austin, TX.

TEACHING EXPERIENCE

UNIVERSITY OF DELAWARE, Newark, DE, 19711

Fall 2023 and 2024 — TEACHING ASSISTANT
Course: Molecular Thermodynamics
Instructor: Prof. Chris Kloxin
- Graded homework, held office hours

Spring 2024 — TEACHING ASSISTANT
Course: Chemical Engineering Thermodynamics II
Instructors: Prof. Antony Beris, Dr. Vasu Venkateshwaran
- Graded homework, graded quizzes, held office hours, created and graded final project

ITEMPOOL, Bayside, NY, 11361

2017 – 22 — TEACHER
Courses: SAT English and Math, SHSAT English and Math, Biology, Chemistry, Physics, Spanish, Precalculus
- Teaching students in grades 5-12 with an average of 40 students per semester (fall, spring, summer), creating all lesson plans, held office hours, grading all assessments and assignments

SERVICE AND OUTREACH

2021 – 22	Served as co-social chair for Cornell University's American Institute of Chemical Engineering Chapter
2023	Led K12 outreach initiatives as a part of advisor Bayles' outreach program FRACTAL: Forging and Replicating Ambassador Communities to Accelerate Learning. Translated in-class demos (in-class at UD) to 7th grade outreach activities, which were conducted at Shue Medill Middle School
2023 – 24	Served as a member of the Colburn Club Safety Committee
2023 – 25	Served as the treasurer for UD Korean Graduate Student Association (KGSA)
2024	Translated and conducted the same demo from the FRACTAL program as part of the FORGES summer 2024 open house for high schoolers

REFERENCES

Professor Alexandra Bayles	Email:	avbayles@udel.edu
	Address:	213 Colburn Lab University of Delaware Newark, DE, 19711
Professor Rong Yang	Email:	ryang@cornell.edu
	Address:	252 Olin Hall Cornell University Ithaca, NY, 14853
Professor Yifan Cheng	Email:	yifancheng@vt.edu
	Address:	402-B HABB1 (0924) Virginia Tech Blacksburg, VA, 24061

Jacqueline Ngu

(609) 213-9293 | jngu@udel.edu

EDUCATION

University of Delaware, Newark, DE **2022- present**

Ph.D. Chemical Engineering

Case Western Reserve University, Cleveland, OH **2018-2022**

B.S. Chemical Engineering

RESEARCH EXPERIENCE:

Research Assistant | University of Delaware, Vlachos Lab **2022-present**

- Investigated the role of polymer additives and their interactions with Bronsted acid sites and metal sites to understand how they affect catalyst performance and deactivation
- Mitigated hydrocracking catalyst deactivation caused by polymer additives by increasing reaction temperature to promote additive desorption from the catalyst surface
- Elucidated the influence of catalytic acidity, structure, and zeolite topology on product selectivity for the pyrolysis of plastics waste
- Overcame limitations in light olefin selectivity by demonstrating that at short contact times, small pore zeolites can achieve high selectivities toward ethylene and propylene
- Mitigated coke formation in small pore zeolites by synthesizing hierarchical zeolites and by cofeeding steam
- Demonstrated how coupling microwave heating with catalyst acidity can enhance light olefin formation and identified optimal conditions for tuning selectivity via aluminum loading

Undergraduate Research Assistant | Case Western Reserve University, Liu Lab **February 2020- August 2021**

- Conducted electrochemical sensor experiments to identify β-amyloid for early detection of Alzheimer's disease

EMPLOYMENT

Engineering Operations Co-op | Sealed Air Corporation **May 2021-August 2021**

- Designed an alternate water system for a plant to reduce costs, improve safety, and limit waste
- LEAN Six Sigma Yellow belt certified
- Assisted in acquiring data from SAP and analyzing Process Capability Sixpacks for reducing the width and gauge of plastic bags

TEACHING & MENTORSHIP EXPERIENCE

Graduate Teaching Assistant | University of Delaware

- CHEG 325 Chemical Engineering Thermodynamics II **Spring 2024**
- CHEG 615 Special Topics in Mixing **Spring 2025**

Research Mentorship | University of Delaware

- Mentored Mr. Mahdi Al Ismail, an undergraduate student in the Vlachos Lab

LEADERSHIP EXPERIENCE & AWARDS

1st Place Best Oral Presentation, EPIC, June 2025 | Athens, Greece

Overall Best Poster Award Winner, CCP Spring Symposium 2024 | Claymont, DE

Poster Award Winner, CCP Spring Symposium 2024 | Claymont, DE

Gas Systems Manager, University of Delaware, Coordinated gas management with UD facilities personnel

Mentor, EmPOWER, University of Delaware, a student organization that promotes mental health in graduate school

DEI Committee, University of Delaware, fostered DEI principles through events within the Vlachos group

Case Western Reserve University Varsity Swimming 2018- 2022

- Winter 2019-2020 UAA All-Academic Recognition

PEER-REVIEWED PUBLICATIONS

1. **J. Ngu**, S. Najmi, E. Selvam, B. Vance, P. Yang, D.G. Vlachos, "*Catalytic Deconstruction of Organic Additive-Containing Plastics*", *Nature Chemical Engineering*, **2** (2025) 220-228
2. **J. Ngu**, D.G. Vlachos, "*Understanding the effect of additives on plastic waste deconstruction*", Nature Chemical Engineering **2** (2025)167–168
3. E. Selvam, K. Yu, **J. Ngu**, S. Najmi, D.G Vlachos, "*Recycling Polyolefin Plastic Waste at Short Contact Times via Rapid Joule Heating*", Nat. Commun. **15** (2024) 5662
4. P. Yang, G. Wittreich, **J. Ngu**, D.G Vlachos, "*Assessing the Binding of Plastic Additive at Bronsted Acid Sites of Zeolites*", ACS Sustain. Chem. Eng. **12**(29) (2024) 11067–11073
5. **J. Ngu,** E. Selvam, S. Najmi, P. Kots, D.G Vlachos, "*Optimizing Olefin Production in Microwave Slurry Catalytic Pyrolysis of Low-Density Polyethylene",* Industrial & Engineering Chemistry Research **64**(28) (2025) 14100-14109
6. **J. Ngu**, E. Selvam, Song Luo, Dongxia Liu, D.G. Vlachos, "*The role of catalyst acidity and microstructure on light olefin selectivity in polyethylene deconstruction in short contact time pulse Joule-heated reactors*", Applied Catalysis B: Environment and Energy **383** (2026) 126083

PATENTS

E Selvam, P Kots, W Chen, DG Vlachos, J Ngu, S Najmi, B Vance, Microwave-assisted catalytic pyrolysis process and reactor for selectively converting additive-containing plastic alkenes and alkanes, US Patent App. 18/948,419

SELECTED PRESENTATIONS

Oral Presentations

- *9th EPIC* | Athens, Greece
  - 1st Place Oral Presentation
- *ISCRE28* | Turku, Finland
- *266th ACS National Meeting* | *San Francisco, CA*

Poster Presentations

- CCP Spring Symposium 2024 | Claymont, DE
  - Poster Award Winner
- CCP Spring Symposium 2025 | Claymont, DE
  - Overall Best Poster Award Winner

TECHNICAL SKILLS

- Electrochemical Reactors (Microwave, Joule)
- Catalyst Synthesis (Hierarchical Zeolites, Supported catalysts)
- Thermal Analysis (TGA, TPO, TPR, TGA-MS)
- Fourier Transform Infrared Spectroscopy (ATR, Transmission)
- High Pressure and Slurry Reactors
- XRD
- Liquid and Gas Chromatography and Mass Spectrometry
- Nuclear Magnetic Resonance Spectroscopy

Christine M. Oberhausen

1205 Sheldon Drive, Newark, DE ● 860-878-8627 (C) ● coberh@udel.edu
www.linkedin.com/in/christine-oberhausen/

Education

Ph.D. Candidate in Chemical Engineering, University of Delaware| GPA 3.96/4.00 **2026**
B.S. in Chemical Engineering, Yale University | GPA 3.76/4.00 **2021**

Research and Professional Experience

Ph.D. Candidate, Graduate Research Assistant | Prof. Dion G. Vlachos | UD **Jan. 2022-present**
Dissertation: Catalyst and Process Design for Advanced Recycling of Multilayer and Thermoset Plastic

- Elucidated structure-property relationships of heterogeneous catalysts for the direct hydroconversion of EVOH/PE multilayer films through detailed catalyst site characterization and reactivity assessment.
- Intensified reaction productivity by two orders of magnitude from 100 to >11,000 g C_3-C_{25} alkane per gram of metal per hour for EVOH/PE multilayer films via catalyst design and reaction optimization.
- Developed a two-step thermal-catalytic deconstruction process for recycling polyethylene thermosets.
- Mentored and trained undergraduate research assistants on microwave-assisted extraction of organic additives from plastic film waste using binary solvent mixtures.

Undergraduate Research Assistant | Prof. Lisa D. Pfefferle | Yale **Nov. 2019- May 2021**

- Synthesized and tested Ag-functionalized Fe_2O_3 nanosheets for photothermal oxidation of methane.

Lab Operations Intern | Henkel Adhesives **Jun. 2020 – Aug. 2020**

- Measured the thermal, electrical, and mechanical properties of high-performance motor coatings.

Metrology Engineer | Intern Flex **Jun. 2019 – Aug. 2019**

- Developed ISO 13485 control process documentation for Zeiss coordinate-measuring machines.

Industrial Engineer Intern | Otis Elevators **Jun. 2018 – Aug. 2018**

- Performed statistical risk and efficiency analysis for Process Certification of three assembly cells.

Awards and Fellowships

- Richard Wool Award for Women in Green Engineering, UD **2025**
- Robert L. Pigford Teaching Assistant Award, UD **2025**
- Graduate Student Travel Award, Center for Catalytic Science and Technology, UD **2024**
- College of Engineering Travel Award, UD **2024**
- Best Overall Poster, Catalysis Club of Philadelphia Spring Symposium **2024**
- Honorable Mention, National Science Foundation, NSF GRFP **2023**
- Morton ’58 and Donna Collins Chemical Engineering Fellowship, UD **2022**

Technical and Professional Skills

- **Experimental Skills:** Nuclear magnetic resonance spectroscopy (NMR), X-ray photoelectron spectroscopy (XPS), infrared spectroscopy (FT-IR), mass spectrometry (MS), gas chromatography (GC), gel permeation chromatography (GPC), microscopy, thermal gravimetric analysis (TGA), differential scanning calorimetry (DSC), N_2 physisorption (BET), CO chemisorption, Parr reactors, impeller design, catalyst synthesis, solvent-assisted extraction methods, dissolution and precipitation
- **Software and Coding Languages:** MatLab, Python, Minitab, OriginLab, AspenPlus, MestReNova, ChemDraw, Microsoft Office, AutoCAD, SolidWorks, Java, C, C^{++}

Publications (* indicates co-first authors, ** indicates manuscript in preparation)

1. **C.M. Oberhausen**, J.S. Mahajan, J.A. Sun, T. H. Epps, L.T.J. Korley, D.G. Vlachos. Hydrogenolysis of Poly(Ethylene-co-Vinyl Alcohol) and Related Blends over Ruthenium Heterogeneous Catalysts. *ChemSusChem* **2024**, 17 (18). DOI: 10.1002/cssc.202400238
2. **C.M. Oberhausen**, K.A. Auchenbach, D.G. Vlachos. Investigating the Role of Acid Sites in the Hydrocracking of Poly(Ethylene-co-Vinyl Alcohol) Multilayer Plastic Films over Pt/BEA Catalyst. *Chem. Eng. J.* **2025**, 508. https://doi.org/10.1016/j.cej.2025.160869.
3. A.J. Shapiro*****, **C.M. Oberhausen*,** P.J. Brigandi, S. Sengupta, C. Quinn, I. Hegge, D. G. Vlachos, T.H. Epps, III. Deconstruction of Crosslinked Polyethylenes via Two-Step Thermal-Catalytic Process.**
4. **C.M. Oberhausen**, Z.O.G. Schyns, A. Hawkins, L.T.J. Korley, D.G. Vlachos. Tandem Hydrocracking and Hydrogenation for the Catalytic Deconstruction of Multilayer Plastic Films.**
5. **C.M. Oberhausen**, K.A. Auchenbach, J.Y. Kim, D.G. Vlachos. The Selection of Binary Solvent Systems for Efficient Microwave-Assisted Extraction of Polymer Additives from Polyethylene.**
6. A. Mittal, **C.M. Oberhausen**, A.N. Beris, M.G. Ierapetritou, D.G. Vlachos. Insights into Impeller Operation for Selective Tuning in Plastic Hydrogenolysis.**

Selected External Presentations

- **C.M. Oberhausen,** *et al.* Challenges and Solutions for the Hydroconversion of EVOH-Containing Multilayer Film Plastic Waste, CCP Spring Symposium, Wilmington, DE, May 29, 2025 (**Oral, Invited**).
- **C.M. Oberhausen**, K.A. Auchenbach, D.G. Vlachos. The Catalytic Hydrocracking of Poly(Ethylene-co-Vinyl Alcohol) Multilayer Films. AIChE Annual Meeting, San Diego, CA, Oct. 26-31, 2024 (**Oral**).
- **C.M. Oberhausen**, *et al.* Pathways in the Catalytic Hydroconversion of Poly(ethylene-co-vinyl alcohol) Multilayer Films into Lubricants and Fuels. ChemRec I, Malaga, Spain, Apr. 28-May 2, 2024 (**Oral**).
- **C.M. Oberhausen**, D.G. Vlachos. Catalytic Pathways in the Deconstruction of Ethylene Vinyl Alcohol Copolymer. AIChE Annual Meeting, Orlando, FL, Nov. 5-10, 2023 (**Oral**).

Leadership

Head Of Communications | Delaware Graduate Consulting Club, UD **Dec. 2024-present**

- Planned and executed professional seminars and networking events for graduate students.

Editorial Board Member | Frontiers in Energy Research Newsletter, DOE **Jun. 2023-May 2024**

- Authored peer-reviewed research highlights to communicate research findings.

Safety Committee Member | Vlachos Group, UD **Jun. 2022-present**

- Enforced safe lab working practices; upheld a 95% average safety grade by EHS over three years.

President | Pierson College Council, Yale **Sep. 2019- May 2020**

Teaching and Outreach Experience

- **Graduate Teaching Assistant, UD** **Spring 2023, Spring 2024**
- **Undergraduate and Graduate Student Research Mentor, UD** **Jun. 2024-present**
- **Peer Mentor and Webmaster | EmPOWER Mental Health, UD** **2022-present**
- **Math Tutor | Serviam Girls Academy, Wilmington, DE** **2022-2023**
- **English Tutor | English as a Second Language (ESL), Yale** **2017-2020**

Societies, Organizations, and Affiliations

- **Catalysis Club of Philadelphia 2022-present**
- **Am. Inst. of Chem. Eng. (AIChE) 2022-present**
- **Society of Women Engineers 2018-2021**
- **Yale Women's Varsity Soccer 2017-2021**

KIET PHAM

Newark, DE, 19713

https://orcid.org/0000-0003-1580-6632

EDUCATION & RESEARCH EXPERIENCE

GRADUATE DEGREE - PHD CANDIDATE

University of Delaware | *Newark, DE* | *Advisor: Prof. Norman Wagner* | *Aug 2021 – Current*

- Final year Chemical and Biomolecular Engineering doctoral student
- Thesis Project: "Interfacial properties of bio-therapeutics and polymers at the 2D air-liquid interface and the connection to the 3D bulk properties"
- Accelerate predictive long-term stability (sub-visible, visible particles formation) of antibody formulations via interfacial rheology
- Elucidate effects of buffer salt and excipients to the silicone-oil PDMS coating in pre-filled syringes in the correlation to injectability of parenteral drug products.

NIST Center of Neutron Research| Gaithersburg, MD| Guest Researcher| *Aug 2023 – Current*

- Support technology development of a new instrument for interfacial characterization (structure and rheology) – antibodies, surfactants PS20/80, P188 at air-liquid interface and glassy polymers.
- Demonstrate the successful implementations of novel sample environment at neutron research facilities in US-Oak Ridge National Laboratory (ORNL), France - Institut Laue-Langevin (ILL).

INDUSTRY INTERNSHIP EXPERIENCE

Merck & Co., Inc. |*Vaccine Drug Product Development*, *West Point, PA* | *Jun – Nov 2024*

- Research Project: “Effect of environmental stress on stability of vaccine drug substance and drug product”
- Support the stability improvement of GARDASIL vaccine by evaluating the impact of various environmental stress from the upstream process to the final drug product.

Hyperion Materials and Technologies| Columbus, OH| *May – August 2019* & *Jan – May 2020*

- Contributed $30k to annual savings and reduced 3-day to 1-day lead time from per batch by upgrading the acid cleaning step in the Metal-Bond (MB) diamond production based on the result from ICP-MS analysis, Toughness Index analysis.
- Enabled potential $250k to annual savings by supporting sourcing and R&D team in testing new Cubic Boron Nitride (CBN) from the new vendor and assisting product customization.

UNDERGRADUATE DEGREE

University of Cincinnati | *Cincinnati, OH* | *Advisor: Prof. Gregory Beaucage* | *Aug 2016 – May 2021*

- Bachelor’s degree in chemical engineering
- Research project: “Carbon black dispersion in polymer blend studied by Ultra Small Angle X-ray Scattering”

JOURNAL PUBLICATIONS

- **Pham, K**., Thompson, B., Wang, T., Qian, K., Samaddar, S., Liu, Y., Wagner, N. Interfacial pressure and viscoelasticity of antibodies and correlation to their long-term stability in formulation. 2023 *J. Phys. Chem. B*.
- **Pham, K**., Thompson, B., Phan, M., Heinrich F., Wang, T., Qian, K., Liu, Y., Wagner, N. Shear and dilatational rheology and interfacial structure of a monoclonal antibody adsorbed at the air-liquid interface. *2025 Langmuir.*
- Ashkenazi, D., **Pham, K**., Vermant, J., Wagner, NJ. And Gottlieb, M. Evaluation of a novel multimode interfacial rheometer. *2024 J. Rheol.*
- Thompson, B., **Pham, K**., Phan, M., Sanchez-Puga P., Gutfreund P., Wang, T., Qian, K., Heinrich F., Liu, Y., Wagner, N. Competitive Adsorption of Monoclonal Antibodies and Non-Ionic Surfactants at the Air-Water Interface. *2025 J. Appli. Mater. and Interfaces.*
- Novaes-Silva, M., Rodriguez-Hakim, M., Thompson, B., Sanchez-Puga, P., **Pham, K.,** M., Wagner, N., Vermant, J. et al Comparative Structural and Rheological Analysis of Model and Clinical Surfactants. 2025 *Soft matter*
- Thompson, B., Li, Q., **Pham, K**., Tangry, V., Qian, K., Wagner, N. Self-Assembly of Semaglutide in Various Excipient Conditions. 2025 *Molecular Pharmaceutics* (in preparation)
- **Pham, K**., Ashkenazi, D., Thompson, B., Renggli, D.,Gottlieb, M & Wagner, NJ. Interfacial rheology of glassy polymers at the air-water interface: comparison between a high and a low T_g polymer. (in preparation)

CONFERENCE PRESENTATIONS

- **Pham, K**., Ashkenazi, D., Thompson, B., Gottlieb, M. Wagner, N. Thermodynamics and rheology of glassy polymers at quasi-2D air-water interface. ACS Fall 2025 (*oral presentation & sci-mix poster*)
- **Pham, K**., Thompson, B., Phan, M., Sanchez-Puga P., Gutfreund P., Wang, T., Qian, K., Heinrich F., Liu, Y., Wagner, N. Competitive Adsorption of Monoclonal Antibodies and Non-Ionic Surfactants at the Air-Water Interface. *ACS Spring 2025* (oral presentation)
- **Pham, K**., Thompson, B., Phan, M., Heinrich F., Wang, T., Qian, K., Liu, Y., Wagner, N. Competitive Adsorption of Monoclonal Antibodies and Non-Ionic Surfactants at the Air-Water Interface: Order of addition matters. *Biotherapeutics and Vaccines Development Gordon Research Conferences 2024* (poster presentation)
- **Pham, K.**, Thompson, B., Wang, T., Qian, K., Samaddar S., Liu Y., Wagner N. Surface pressure and viscoelasticity of antibodies and their correlation to long term formulation stability. *International Congress on Rheology 2023* (oral presentation)
- **Pham, K.**, Thompson, B., Wang, T., Qian, K., Samaddar S., Liu Y., Wagner N. Relationship between interfacial properties and stability of therapeutic proteins. *ACS Spring 2023* (oral presentation)

TECHNICAL SKILLS

- **Differential Scanning calorimetry** (Merck Internship) – proteins and polymers
- **Fluorescence** (Merck Internship) – proteins
- **Size Exclusion chromatography (**Merck Internship) – proteins
- **Formulation stability study – ELISA assay** (Merck internship)
- **Dynamic/Static Light Scattering** (PhD research) - proteins
- **Small Angle Neutron/X-ray Scattering** (PhD research)- proteins, i.e. mAbs, peptides
- **Neutron/X-ray reflectometry (**PhD research) – proteins at air-liquid, solid-liquid interface
- **Interfacial & Bulk Rheology** (PhD research) – proteins, glassy polymers
- **Surface Tensiometry, Contact angle measurements** (PhD research) – proteins, surfactants
- **Computational skills - MATLAB & Python** (PhD research)
- **Thermogravimetric Analysis (**Undergraduate research) – meso-porous carbon
- **Nuclear Magnetic Resonance (NMR), ATR-FTIR (**PhD research) – PDMS, formulation excipients

AWARDS & CERTIFICATES

- Society of Rheology travel grant for International Congress on Rheology 2023 in Greece
- UD College of Engineering travel grant for ACS conference 2023 and 2025
- 28th CHRNS Neutron School 2022 completion certificate
- Axalta Scholarship Recipient in 2022 and 2023
- Six Sigma Certificate – Yellow Belt granted 2021.

MENTORSHIP

EMPOWER Mentor, University of Delaware | *Jun 2024 - present*

- Provided guidance for 1st year PhD students in academia and graduate school

Peer Leader, University of Cincinnati | *Aug 2018 – May 2021*

- Provided academic and mental support for freshmen and sophomore students

Resident hall Supporter, University of Cincinnati| *May – Aug 2020*

- Provided mental and dietary support for students in quarantine & isolation for COVID

OUTREACH AND SCIENCE COMMUNICATION

- *Member of Society of Rheology* | *Oct 2022 – present*
- *Member of American Chemical Society* | *Mar 2023 – present*

Abigayle Polsky
Cell: (240) 587-1094
polsky.abigayle@gmail.com

EDUCATION

University of Delaware **Aug 2022 - Present**
Ph.D. Candidate, Chemical Engineering
GPA: 3.73

University of Maryland, Baltimore County **Aug 2018 - May 2022**
Bachelor of Science, Chemical Engineering
GPA: 3.97; Major GPA: 4.0; Summa Cum Laude

PROFESSIONAL EXPERIENCE

University of Delaware **Newark, DE**
Yushan Yan Group; Dept. of Chemical & Biomolecular Engineering *Dec 2022 – Present*
Graduate Researcher

- Ionically conductive polymer optimization within Hydroxide Exchange Membrane (HEM) Electrolyzers, *in progress*
    - Developing a simple and low-cost technique to tailor electrochemical and mechanical properties of ion-conducting polymer in anion exchange membrane water electrolyzers
        - Optimizing the ionomer's catalyst adhesion and mechanical strength
        - Optimizing the membrane's ion conduction and water diffusion
    - Incorporating ceria mesopores into HEM catalysts to increase ionomer retention

Patuxent River Naval Air Station **Patuxent River, MD**
Industrial Processes; Materials Div.; Air Vehicle Engineering Dept. *May 2018 – Dec 2022*
Student Intern

- Coinventor of the portable "Electrodeposition Device"—patent waiting for acceptance—specialized for oxidation-inhibiting coatings and general electroplating
    - Creator of the circuitry, both design and construction
    - Creator of containment case, both CAD modeling and 3D printing
- Optimization of deposition parameters for electrochemical reactions

Fuels & Lubes Chem Lab; Test Methods Div.; Propulsion and Power Dept. *May – Aug 2017*
Student Intern

- Examination of ship fuel and lubrication with mass spectrometry (MS) for analysis of isotopic and inorganic compound contamination
    - Developed standard operating procedures to prevent side reactions within an ICP-QQQ MS with specially formulated inert gas recipes and parameters
    - Identified detectable limits of trace metals in various air/seacraft fuel and lubrication

SKILLS & INSTRUMENTATION OPERATION

Instrumentation

- Atomic force microscope, ion chromatograph, scanning electron microscope, mass spec., dynamic mechanical analyzer, electrochemical impedance spec., x-ray photoelectron spec., dynamic vapor sorption analyzer

Computational Skills

- Proficient: MATLAB, Polymath, ASPEN Simulation, COCO ChemSep
- Basic Experience: SolidWorks, AutoCAD, MakerBot Slicing, Python, Microsoft Excel

EXTRACURRICULAR & ACCOLADES

University Tutoring **Jan 2019 – May 2022**

- *AIChE Peer Mentoring Program*: one-on-one and group tutoring in various chemical engineering courses, physics (kinematics and E&M), calculus I and II, and general chemistry I and II

Dog fostering and walking program **May 2023 – Present**

- Providing a home, care, and basic training to dogs with behavioral issues or those at risk for euthanasia
- "Doggy day out" participant where dogs are taken out of the shelters for the day to get real-life exposure

Tessa Posey, Chemical Engineering Doctoral Candidate

Cell: 610-420-5459 **Email:** tessa.posey@gmail.com **LinkedIn:** www.linkedin.com/in/tessa-posey

PROFESSIONAL SUMMARY

Enthusiastic chemical engineering PhD candidate with a research focus on peptide-based materials.

My doctoral research on peptide-based materials has provided extensive experience in solid-phase peptide synthesis, click-chemistry functionalization, photopolymerization (photoATRP), peptide purification (HPLC), and analytical characterization (NMR, LC-MS, SEC-MALS, CD).

EDUCATION

Doctoral Candidate, Chemical Engineering, University of Delaware, Newark DE August 2020-Current

B.S., Biomedical Engineering, University of South Carolina, Honor's College, Columbia SC August 2016-2020, Leadership Distinction in Research

EXPERIENCE

University of Delaware- Graduate Researcher Advisor: Dr. Christopher Kloxin**, August 2020-Current**

- Synthesized coiled-coil peptide bundles through solid phase peptide synthesis and modified them with click chemistry reactive handles to formulate long thin poly(peptide) rods.
- Performed atom transfer radical polymerization (ATRP) off the peptide bundles to make responsive hybrid peptide-polymer materials.
- Installed peptide click chemistry handles for interhelical stapling of a coiled-coil peptide.

  Techniques/Key Skills: HPLC, LC-MS, Circular Dichroism (CD), SEC-MALS, NMR, photoATRP, Peptide Modification, Bioconjugation, Click Chemistry, SOP Development, Instrument Maintenance

University of Pennsylvania- NSF REU Student Advisor: Dr. Flavia Vitale, **June 2019-August 2019**

- Fabricated and characterized reduced graphene oxide neural microelectrodes utilizing a biocompatible Vitamin-C reduction method; refined procedure for Vitamin-C treatment and device fabrication.

  Techniques/Key Skills: Nanofabrication (Spray-Coating, CVD, Photolithography), AFM, Cleanroom Fabrication (ISO 5/6)

University of Delaware- NSF REU Student Advisor: Dr. Christopher Kloxin, **June 2018-August 2018**

- Synthesized peptides through solid phase peptide synthesis and assembled them into long thin rods using click chemistry reactions; evaluated timing and conditions for thiol-Michael assembly reactions.

University of South Carolina- Undergraduate Researcher Advisor: Dr. Hans-Conrad Zur Loye, **January 2017-March 2020**

- Designed hydrothermal and flux growth reactions with the end goal of discovering novel scintillating and luminescent crystal structures. Optimized coating and synthesis procedure for the discovery of scintillating nanoparticles for optogenetic applications.

  Techniques/Key Skills*:* XRD, SEM, TEM

HONORS AND AWARDS

Robert L. Pigford Teaching Assistant Award, University of Delaware, May 2024
Schipper Fellowship, University of Delaware, January 2021-August 2021
Alpha Eta Mu Beta MINDS Scholar, March 2019
First Place Poster, Sunfest Summer Symposium, University of Pennsylvania, July 2019
Science Undergraduate Research Fellowship, University of South Carolina, August 2017-December 2018
Mini Magellan Grant, University of South Carolina, January 2019- May 2019

LABORATORY MENTORSHIP

Caitlyn Edgar- performed kinetic trials and investigated solution conditions for ATRP of different monomers for the synthesis of varied composition peptide-polymer conjugates
Julia Wolfe- troubleshot the formation and purification of poly(peptide) rods through SEC-MALS and FPLC
Nolan Petrich- developed SOPs for laboratory equipment and established the Peptide-Protein Materials Center (PPMC); calculated the cost and yields of peptide synthesis of different peptide sequences

LEADERSHIP ROLES

- **President** *Alpha Eta Mu Beta Biomedical Engineering Honor Society*
- **Vice President** *Biomedical Engineering Society*
- **Recruitment Chair** *Tau Beta Pi Engineering Honor Society*
- **Community Chair** *Biomedical Engineering Society*
- **Peer Mentor** *University of Delaware Empower*
- **Peer Mentor** *College of Engineering and Computing*

PUBLICATIONS

Posey, T.; Meisenhelter, J.; Pochan, D.; Saven, J.; Kloxin, C. *Enhancement of Coiled-Coil Stability via Interhelical Click-Chemistry Stapling.* In Preparation.
Posey, T.; Halaszynski, N.; Xu, W.; Sutherland, B.; Pochan, D.; Kloxin, C. *Peptide-Based Bottlebrush Nanorods Synthesized via Click Chemistry and ATRP.* In Preparation.
Rears, W.; **Posey, T.**; Dresel, J.; Pochan, D.; Kloxin, C. *Coiled-Coil Peptide–Polymer Star Conjugates via Aqueous Atom-Transfer Radical Polymerization.* In Preparation.
Murphy, B.; Apollo, N.; Unegbu, P.; **Posey, T.**; Rodriguez-Perez, N.; Hendricks, Q.; Cimino, F.; Richardson, A.; Vitale, F. *Vitamin C-Reduced Graphene Oxide Coatings Improve the Performance and Stability of Multimodal Microelectrodes for Neural Recording, Stimulation, and Dopamine Sensing.* **iScience**, 2022, *25*(7), 105710.
Egodawatte, S.; Zhang, E.; **Posey, T**.; Gimblet, G.; Foulger, S.; zur Loye, H. C. *Synthesis of Scintillating Ce^{3+}-Doped $Lu_2Si_2O_7$ Nanoparticles Using the Salt-Supported High-Temperature (SSHT) Method: Solid-State Chemistry at the Nanoscale.* **ACS Applied Nano Materials**, 2019, *2*(4), 1857–1865.

SELECT PRESENTATIONS

Coiled-Coil Peptides as Molecular Building Blocks
Poster Presentation. Gordon Research Conference for Peptide Materials. **01/2025**
Poster Presentation. Gordon Research Conference for the Chemistry and Biology of Peptides **02/2024**
Oral Presentation. Winter Research Review, University of Delaware **02/2024**
Oral Presentation. Summer Research Review, University of Delaware **11/2021**
Fabrication and Characterization of Vitamin-C Reduced Graphene Oxide Neural Microelectrodes
Poster and Oral Presentation. National Nanotechnology Coordinated Infrastructure Convocation, Cornell University **08/2019**
Poster Presentation. ***First Place Poster,*** Sunfest Summer Symposium, University of Pennsylvania **07/2019**
The Synthesis of Scintillating Ce3+ doped Lu2Si2O7 Nanoparticles for Optogenetic Applications
Poster Presentation. Mid-Atlantic Undergraduate Research Conference, Virginia Polytechnic Institute **03/2019**
Material Discovery and Characterization of Luminescent and Scintillating Crystals by Flux Crystal Growth
Poster Presentation. Discover USC, University of South Carolina **04/2019**

TEACHING EXPERIENCE

CHEG304: Random Variability in Chemical Processes, *Teaching Assistant*, University of Delaware (Spring 2023)
CHEG830: Continuum Transport, *Teaching Assistant*, University of Delaware (Spring 2022)
CHEG832: Soft Materials, Colloids, and Polymers, *Teaching Assistant*, University of Delaware (Spring 2022)
BMEN381: Biomedical Engineering Laboratory I, *Teaching Assistant*, University of South Carolina (Fall 2019)

Blake Richards

blakeric@udel.edu

EDUCATION

University of Delaware, PhD Candidate in Chemical & Biomolecular Engineering **Sept 2021 – Current**
Advisors: Dr. Wilfred Chen & Dr. Millicent Sullivan

Iowa State University, Bachelor of Science in Chemical Engineering *Magna Cum Laude* **Sept 2017 – May 2021**
Minors: Biomedical Engineering, Microbiology

Des Moines Area Community College, Associate of Arts *honors* **Sept 2015 – May 2017**

Research Experience

PhD Thesis Project: Conditional protein-based platforms **Sept 2021 – Current**
Advisors: Dr. Wilfred Chen & Dr. Millicent Sullivan

- Engineering synthetic, activatable proteases to help protein-based nanoparticles overcome tumor penetration resistance
- Developed a logic-gated protease activity probe capable of sensing dysregulated, multi-protease diseased environments for diagnostics, prognostics, and biosensing. Improved sensitivity over commercial probes which are incapable of logic
- Designed a highly controllable, leak-free protein conjugation platform enabling precise spatial and temporal control over protein function. With applications in intracellular space, biosensing, gene circuit control, and protein assembly

Griswold Internship, Iowa State University: Drug delivery **Aug 2020 – May 2021**
Advisor: Dr. Ian Schnieder

- Created self-assembled collagen fibril networks to screen aptamers candidates in the development of a force-responsive drug delivery system

Physical Activity and Aging Study, Iowa State University: **June 2019 – Nov 2019**
Principal Investigator: Dr. Duk-Chul Lee

- Conducted cognitive and physical assessments for a longitudinal aging study evaluating aging-related health outcomes

Undergraduate researcher, Iowa State University: RNA bioinformatics **Aug 2017 – Jan 2019**
Advisor: Dr. Susan Lamont

- Generated large RNA from multiple tissue types for transcriptomic analysis
- Identified heat-responsive genes associated with stress tolerance for industry collaborator

Research Experience for Undergraduates (REU), South Dakota State University: **May 2018 – Aug 2018**
Advisor: Dr. Anamika Prasad

- Performed biomechanical analysis of sunflower stalks to improve diagnostics for Phomopsis stem canker
- Utilized SDSU's high-performance computing cluster for SEM image processing and quantitative structural analysis

Honors research, Iowa State University: Inorganic nanomaterial synthesis **May 2018 – Aug 2018**
Advisor: Dr. Javier Vela

- Optimized reaction conditions to synthesize a novel Nowotny-Juza-structured inorganic nanomaterial.

Publications

1. Anthony Stohr, Helena Hansen, **Blake Richards**, et. al; Metabolite-responsive scaffold RNAs for dynamic CRISPR transcriptional regulation, Nucleic Acids Research (2025)
2. **Blake Richards**, Logan Yeager; Leveraging endogenous MMPs for drug delivery in the cancer environment, Expert Opinion on Drug Delivery (2025)
3. **Blake Richards**, Antonio Goncalves; Engineering protein nanoparticles for drug delivery, Current Opinions in Biotechnology (2024)

Blake Richards

blakeric@udel.edu

Teaching Experience

1. CHEG 325 Chemical Engineering Thermodynamics II - **Instructor** — **Feb 2024-March 2024**
2. CHEG 445 Chemical Engineering Laboratory II - **Teaching Assistant** — **Sept 2023 – Dec 2023**
3. CHEG 662 Bioprocess systems analysis - **Teaching Assistant** — **Sept 2022 – Dec 2022**
4. CHEM332 Organic Chemistry II - **Group tutor** (ISU) — **Sept 2019 – Sept 2020**

Conferences & Presentations

1. Blake Richards, Sullivan M.O., & Chen W. Logic Capable Proteolytic Activity Probe, Mid-Atlantic Synthetic Biology Symposium, Newark, 2025
2. Blake Richards, Sullivan M.O., & Chen W. Logic Capable Proteolytic Activity Probe, Emerging Approaches in Protein Engineering and Design, AiCHE Annual Meeting, San Diego, 2024
3. Words for Nerds – Technical Communication presentation series, University of Delaware, 2023
4. Blake Richards, Prasad A., Biomechanical Analysis of Sunflower SEM for Phomopsis stem canker diagnostics, NSF EPSCoR Research Symposium, Sioux Falls, 2018

Patents

1. Provisional Patent: Photoactivatable DogMask — **2025**
2. Provisional Patent: Protease inducible gene circuit (June 13, 2025, #63/823,149) — **2025**
3. Provisional Patent: DogMask: Protease activatable bioconjugation platform (*Oct. 29, 2024, # 63/713,403*) — **2024**
4. Full patent pending: Fluorescent Logic Capable Protease Probe (*June 18, 2024, # 63/661,261*) — **2024**

Fellowships

- Innovation Delaware (InDE) — **2024-2025**
- Graduate Assistance in Areas of National Need (GAANN) – *Department of Education* — **2023-2024**

Leadership

- ACS BIOT mentor — **Aug 2025 – present**
  - Undergraduate students
- Wilfred Chen Lab Manager — **2024 – present**
- EmPOWER Mentor — **Aug 2023 – present**
  - First year PhD Candidates
- Limitless World Summit Speaker – Youth research and entrepreneurship conference — **2024**
- Legislative chair: Graduate student government's sustainability committee — **2023 – 2024**
- Undergraduate research mentor — **2022 - present**

Select Legislation (Legislative Chair 2023-2024)

- *For the Installation & Maintenance of Green Roofs* (SR-2324-06; 2024)
- *Intelligent Waste Collection for Environmentally Sustainable and Economic Waste Management* (SR-2324-08; 2024)
- *Improving Campus Waste Diversion with Clear & Consistent Labeling* (SR-2023-13; 2023)
- *Bring Battery Recycling Stations Across the University of Delaware* (SR-2223-06; 2023)
- *Supporting Bird Populations Through Native Plant Landscaping* (SR-2223-2; 2023)
- *Improving Student Access to Sustainable Food* (SR-2023-09; 2023)

Jay Shah

302-932-6175 | jayshah@udel.edu | https://jay-shah1.github.io/ | https://www.linkedin.com/in/jayshah-iit/

Summary

Adept and motivated chemical engineer with research experience in computational studies of polymers and soft matter systems using molecular dynamics (MD), statistical mechanics, and machine learning.
Strong ability to excel in interdisciplinary teams, collaborating with experimentalists and scientists from diverse backgrounds. Strong record of technical communication, problem-solving, and bridging simulations with experiments.

Education

University of Delaware, Newark, DE — August 2022 – Present
PhD in Chemical Engineering — GPA: 3.9/4
Expected graduation: May 2027

Indian Institute of Technology Gandhinagar — August 2018 – May 2022
B. Tech in Chemical Engineering (with Honors) — GPA: 8.47/10

Technical Knowledge

Programs: Python (NumPy, Pandas, TensorFlow, SciPy, Scikit-Learn, etc.), Bash
Simulation Tools: LAMMPS, GROMACS, Plumed, MATLAB, AutoCAD, Minitab, LATEX

Research Experience

Graduate Research Assistant, University of Delaware — Jan 2023 – Present
Thesis Advisor: Prof. Arthi Jayaraman

- Developed atomistically-informed coarse-grained model of polysulfamide, a class of polymers similar to polyurea, using multiscale simulations and validated with experimental data & provided insights on morphology for polymer blending.
- Performed design-structure-property comparative analysis of polysulfamide and polyurea melt using multiscale simulations.
- Developed machine learning workflows to extract patterns from optical microscopy and X-ray scattering data, streamlining the analysis of semi-crystalline polymers.
- Investigating the influence of crystal size, shape, and orientation on thermal conductivity, providing insights for the design of materials with desired properties.
- Understanding the role of polymer binder architecture influence on the self-assembly of polymer grafted nanoparticle.

NRT Fellow: Computing and Data Science Training for Material innovation, Discovery and Analytics.

- "*Hackathon*" class project with 3M — Investigated how surface topography affects material properties and developed generative ML and diffusion models to create synthetic height maps with customizable properties. **(Paper)**
- Attended seminars, participated in community hours, and created outreach comics to make polymer science accessible as part of the traineeship.

Publications

1. S. Akepati#, N. Gupta#, **J. Shah#**, S. Kronenberger, V. Venkat, R. Adhikari, S. Bianco, D. Adams, A. Jayaraman*, Machine-Learning-Based CREASE-2D Analysis of 2D SAXS Profiles to Characterize Anisotropic Nanostructures in Soft Materials, ACS Measurement AU (2025) **(Paper)**
2. Y. Saxena#, Po. Lin#, **J. Shah#**, T. Asamoah, G. Arya, A. Jayaraman, T. Segura*, Factorial Data-Driven Inverse Design of Granular Hydrogels for Targeted Therapeutic Release, NeurIPS AI4MAT Workshop 2025 **(Paper)**
3. **J. Shah**, A. Jayaraman*, Coarse-grained molecular dynamics simulations of mixtures of polysulfamides, RSC Applied Polymers, (2025) 3, 453-468 **(Paper)**
4. C. Ghoroi, **J. Shah#**, D. Thakar#, S. Baheti# Process design & economics of production of p-Aminophenol, arXiv, 2021

# Equal Contribution

Presentations

1. **J. Shah**, M. Ticknor, Q. Michaudel, R. Hayward, A. Jayaraman*, Linking Polysulfamide Design to Its Semi-Crystalline Morphology Using CG Molecular Dynamics Simulation and Machine Learning, ***AIChE Annual Meeting 2025***
2. **J. Shah**, A. Jayaraman*, Atomistically-informed coarse-grained molecular dynamics simulations of blends of polysulfamides, ***APS Meeting 2025***

3. **J. Shah**, Z. Wu, A. Jayaraman*, Understanding self-assembly of polysulfamides from molecular dynamics simulations using atomistically-informed coarse grained models, ***AIChE Annual Meeting 2024***
4. **J. Shah#**, A. Paruchuri#, L. Nagidi, S. Lu, A. Jayaraman*, Linking polysulfamide design to morphology using molecular simulation and machine learning, ***APS March Meeting 2024 (Poster)***
5. **J. Shah#**, Z. Wu#, A. Jayaraman*, Computational Studies to Understand the Effect of Polysulfamide Designs on Structure and Properties, ***MRS Fall meeting 2023***

Honors & Awards

Outstanding Contributions to NRT MIDAS Fall 2024
aiM Program Best Technical Proposal, Duke University Fall 2024
ATOM Hackathon Best Technical Project Summer 2024
Morton and Donna Collins Chemical Engineering Fellowship, University of Delaware Spring 2023
Dean's List, IIT Gandhinagar 2021

Experience

Course Project - Computer architecture, University of Delaware Fall 2024
Mentor: Prof. Sunita Chandrasekaran

- Analyzed simulations by tracking key metrics such as cache performance, latency, bandwidth, and leveraging Roofline Analysis to pinpoint memory or compute bottlenecks
- Gained hands-on experience with benchmark suites, performance profilers, and executing code on various NVIDIA and AMD HPC system

Research Intern, University of Miami May 2021 – July 2021
Mentor: Prof. Ramin Moghaddass

- Built a simulation framework for network anomaly detection in large-scale water networks using synthetic data to validate and test the model.
- Developed a hierarchical method utilizing three deep neural networks to compress information from network topology, network status, and sensor data for anomaly detection.
- Submitted conference paper IISE Annual Conference and Expo, Seattle 2022

Inventor, Invention Factory May 2019 – June 2019
Mentor: Prof. Alan Wolf and Prof. Eric Lima, Copper Union, NY

- Designed a self-adjusting, automatic sun Visor and solar shade system for vehicles that determines the blocking needs of an individual driver in bright sunlight that prevent accidents
- Learned Arduino-based sensor integration and 3D printing for rapid prototyping of custom electronic solutions.
- Project featured in The Better India and The Indian Express and File Patent Application for Indian (No.201921027106) and US Provisional Patent (EFS Id-37376706, Application Number - 62911388, Confirmation Number -1074)

Teaching Experience

Computing and Data Science for Soft Materials Innovation and Design, University of Delaware Spring 2025
Molecular Modeling and Simulation of Soft Materials, University of Delaware Fall 2024
Teaching Certificate, NRT MIDAS, University of Delaware *Summer 2024*
Process Control, IIT Gandhinagar Spring 2022
Teaching Certificate, IIT Gandhinagar *Fall 2022*
Fluid Mechanics Lab, IIT Gandhinagar Spring 2021

Community and Professional Service

ACCESS and DARWIN HPC Proposal
Contributed to multiple HPC proposals by estimating computational resource requirements, benchmarking performance, and providing scientific justifications to align research objectives with funding priorities.

Soft Materials, Colloids and Polymers Outreach Activity
Ran demonstrations of polymer behavior and rheological properties for middle school students

Annuity, Finance Club, *IIT Gandhinagar*
Founded a student club on personal finance literacy and organized a webinar series with 5+ renowned economists and business leaders, engaging over 300 students.

ERIC D. SLAUGHTER

630 Lehigh Rd. Newark DE 19711 • Cell: 847.772.4853 •ersla@udel.edu• linkedin.com/in/ericdslaughter

Education

University of Delaware — Newark, DE
PhD. Candidate: Chemical and Biomolecular Engineering — *Anticipated 2026*

University of Minnesota, Twin Cities — Minneapolis, MN
Bachelor of Science: Chemical Engineering (B.Ch.E.) *Magna Cum Laude* — May 2022

Research Interests

Improving CAR-T cell therapy manufacturing workflows through novel soft-materials and dynamic flow-based cell culture approaches to improve the accessibility and effectiveness of the treatment in clinical settings.

Research/Professional Experience

PhD Candidate
University of Delaware, A. Kloxin and C. Fromen Research Labs – Newark, DE — January 2023 – Present
Graduate research assistant with the goal of using tangential flow filtration and hydrogel to improve CAR T manufacturing, with particular focus in optimizing viral transport, T-cell activation, and cell growth environments.

- Identifying valuable gaps in knowledge, developing, and leading long term research plans, and designing experiments
- Collecting and analyzing data using flow cytometry (Novocyte, 3 laser), immunostaining, confocal microscopy (Zeiss LSM 800) and mammalian cell culture techniques (both Primary T-cells isolated from hPBMCs and cell lines (Jurkat, RAW 264.7))
- Analyzing and interpreting data using NovoExpress, Excel, ImageJ/FIJI, and GraphPad Prism 9
- Communicate scientific results in oral presentations (formal and informal) and manuscripts

Undergraduate Research Assistant — September 2020 – August 2022
University of Minnesota, Tranquillo Research Lab – Minneapolis, MN
Undergraduate research with the goal of quantifying the effect of "stress avoidance" on the migration of human dermal fibroblasts in response to uniaxial stretch.

- Independently developed staining, imaging, and computational pre-processing protocols for assessing the migration and alignment of fibroblasts under induced uniaxial stretch using ImageJ/FIJI
- Designed experiments, analyzed data, and presented results to my adviser and PI to collaboratively make long term project decisions and plans
- Developed specialized expertise in optimizing fluorescent imaging of phalloidin and hoechst-33342 stains using Biotek's Cytation™ Cell Imaging Multi-Mode Reader and Gen5 Image plus+ software
- Executed computational modeling of fibroblast and melanoma cell migration data using MATLAB and non-linear regression fitting of random walk models

Biomaterials Technical Aide — January 2021 – June 2022
3M Corporation – St Paul, MN
Technical apprenticeship with a specialized focus in conducting research in development of process and materials in the areas of pDNA, AAV, and mAB purification with key experimental responsibilities being in running pilot HPLC (Pendotech, GE AKTA avant), quantification assays (ELISA, picogreen), DNA purification, and polymer synthesis.

- Independently researched and advised on purchasing decisions for equipment and analytical assays
- Analyzed results for big picture trends, compiling them in concise summaries and presenting them to my mentors to make future research decisions
- Managed and independently led pilot experiments employing root cause problem solving and strong organizational skills
- Proficiency in microbiological and analytical techniques including but not limited to: SEM imaging, LC/HPLC (particularly ion-exchange chromatography), gel electrophoresis, UV spectroscopy, cell electroporation, ELISAs, cell culture, and sterile technique.

Research and Development Engineering Co-op January 2020 - August 2020
SUEZ Water Technologies and Solutions (SUEZ Group) – Minnetonka, MN
Engineering Co-op with a focus in the implementation of new testing equipment for R&D, control system design, and development of laboratory SOPS and PFDs.

- Project manager of implementing and installing a new flat sheet membrane and spiral wound element testing equipment for product analysis and development, including design of parts in SolidWorks
- Designed testing qualification plans based on hands on experimentation and statistical analysis in JMP
- Researched the optimization of agitation spacer design for future CFD analysis
- Designed and obtained management approval for a tank overflow failsafe system to improve lab safety and ergonomics
- Improved laboratory documentation by designing a new work instruction and creating process flow diagrams for various lab and manufacturing equipment

Awards and Honors

Shirley T. Russell Teaching Fellowship	2025-2026
Univ Delaware GAANN Inclusive Teaching in Chemical Engineering Fellowship	2024-2025
Univ Delaware Commendation for PhD coursework, research, and qualifying exam	2023
Tau Beta Pi	2020
Univ Minnesota Dean's List	F2020, Sp2019, F2018

Publications

Google Scholar: https://scholar.google.com/citations?user=GcnT5SYAAAAJ&hl=en
ORCID: https://orcid.org/0000-0002-7932-5638

1. **Eric Slaughter**, Aida López Ruiz, Zaining Yun, Jacob McCoskey, Jonathan Steen, Joe Almassian, Will Trout, Aparajita Chatterjee, Aida Fuseini, Dustin Chang, Christina Carbrello, Yama Abassi, Abraham Lenhoff, Catherine Fromen and April Kloxin. CAR-T Manufacturing: Harnessing Tangential Flow Filtration and Hydrogels to enhance Transduction and Select Distinct Populations. *In preparation.*
2. Aida López Ruiz, **Eric Slaughter**, Kartik Bomb, Paige J. LeValley, Zaining Yun, Jacob McCoskey, Kara Levine, Aparajita Chatterjee, Christina Carbrello, Dustin Chang, Yama A. Abassi, Abraham M. Lenhoff, Catherine A. Fromen* and April M. Kloxin*. Bio-functional hydrogel coated membranes to decrease T-cell exhaustion in manufacturing of CAR T cells. *Frontiers in Immunology*. **2025.** https://doi.org/10.3389/fimmu.2025.1513148 [Journal IF: 5.9]
3. Aida López Ruiz*, **Eric D Slaughter*,** Catherine A. Fromen, April M. Kloxin. Bridging the gender gap in autoimmunity with T-cell targeted biomaterials. *Current Opinion in Biotechnology*. **2024**. https://doi.org/10.1016/j.copbio.2024.103075 [Journal IF: 7.7] **authors contributed equally*

Presentations

Oral Presentations

1. **Eric Slaughter**, Aida López Ruiz, Zaining Yun, Jacob McCoskey, Jonathan Steen, Joe Almasian,, Aparajita Chatterjee, Aida Fuseini, Dustin Chang, Christina Carbrello, Yama Abassi, Abraham Lenhoff, Catherine Fromen, and April Kloxin. Harnessing Tangential Flow Filtration and Hydrogels to Enhance Transduction and Select Distinct Populations for CAR T Manufacturing. *AICHE Annual Meeting. San Diego. Materials Engineering and Sciences Division* (October 2024).
2. **Eric Slaughter**, Aida López Ruiz, Zaining Yun, Kartik Bomb, Paige LeValley, Jacob McCoskey, Kara Levine, Aparajita Chatterjee, Dustin Chang, Christina Carbrello, Yama Abassi, Abraham Lenhoff, Catherine Fromen, and April Kloxin. Tangential Flow Filtration Device Flow Patterns enhance T-cell Transduction for CAR T-cell Manufacturing. *ACS BIOT Division Annual Meeting. New Orleans. Cell and Gene Therapies* (March 2024)

Posters

1. **Eric Slaughter**, Aida López Ruiz, Zaining Yun, Kartik Bomb, Paige LeValley, Jacob McCoskey, Kara Levine, Aparajita Chatterjee, Dustin Chang, Christina Carbrello, Yama Abassi, Abraham Lenhoff, Catherine Fromen, and April Kloxin. Tangential Flow Filtration Device Flow Patterns enhance T-cell Transduction for CAR T-cell Manufacturing. *ACS BIOT Division Annual Meeting. New Orleans. BIOT Sci-Mix* (March 2024)

ARUN SENTHIL SUNDARAMOORTHY

Ph.D Candidate, Department of Chemical & Biomolecular Engineering, University of Delaware, Newark, DE 19716,
Email ID: arunsent@udel.edu, LinkedIn: http://linkedin.com/in/arun-senthil-sundaramoorthy-6b834577

SUMMARY

Driven by a passion for research, quantitative analysis, and advancing the fundamental understanding of process systems to enable innovative solutions. Experienced in Computational Fluid Dynamics, modeling, optimization, machine learning, and control, with a strong track record of applying these tools to address complex scientific and engineering challenges and deliver impactful, practical outcomes.

EDUCATION & EXPERIENCE

- Ph.D, Chemical & Biomolecular Engineering, University of Delaware, Newark, DE, USA. 2021-Present.
  Thesis: Design and Optimization of Scalable Microwave Reactors for Advanced Chemical Manufacturing.
  Advisor: Prof. Dionisios G. Vlachos, Prof. Raul F. Lobo and Late Prof. Babatunde A. Ogunnaike.
- M.Sc, Process Control, University of Alberta, Edmonton, CA. 2018-21.
  Thesis: Probabilistic Graphical Models for Data Reconciliation and Causal Inference in Process Data Analytics.
  Advisor: Prof. Biao Huang.
- B.Tech, Chemical Engineering, SVCE, Anna University, Chennai, IN. 2014-18.
  Thesis: Computational Process Design of Styrene Manufacturing Process.
  IIT, Madras Summer Intern Project: State-Estimation for Nonlinear Dynamic Systems.
  Advisor: Prof. Shankar Narasimhan

SKILLS & INTERESTS

- **Technical Expertise & Interests:** Computational Fluid Dynamics, Multi-Scale Modeling, Transport Phenomena, Process Optimization, Machine Learning, Bayesian Statistics, Causal Inference, Industrial Data Science & Analytics, Process Control.
- **Programming Languages & Softwares:** MATLAB, Python, C++, COMSOL, Aspen Plus, R and Minitab (User proficiency).

AWARDS & DISTINCTIONS

- Graduate Student Travel Award by University of Delaware (2024), ISCRE Travel Award (2023), FGSR-University of Alberta (2019/20), AICTE-INAE Grant (2018).
- American Chemical Society Graduate Student Success Grant (2025-26).
- Captain Thomas Farrell Greenhalgh Memorial Graduate Scholarship (2018/2019) - University of Alberta
- Graduate Research Assistant Fellowship (2018/2020) - University of Alberta

KEY PROJECTS

University of Delaware

- **Design of Scalable Microwave Reactors**
  - Develop scalable computational fluid dynamic models to investigate the scalability of microwave-heated chemical reactors.
  - Elucidate transport phenomena governing reactor scale-up in advanced chemical manufacturing processes.
- **Coarse-Graining Methods for Large Scale Complex Reactive Flow Simulation**
  - Developed a nonlinear coarse-graining method integrated with machine learning to simulate reactive flows in structured reactors that are otherwise computationally intensive or infeasible to model using fully resolved CFD.
  - The method agrees well with CFD results and reduces computational time from days or hours to just minutes.
  - The proposed approach facilitates rapid material screening and provides critical insights for designing modular monolith reactors suited for remote natural gas processing applications.
- **Dynamic Modelling and Surrogate Optimization for Integrated Methane Dehydroaromatization (DHA) Process**
  - Developed and validated an integrated fixed-bed reactor model for an intensified DHA process, demonstrating improved aromatic yields and methane conversion.
  - Conducted comprehensive parametric analyses to quantify the influence of operating conditions on reactor performance and design.
  - Applied a surrogate modeling framework for the integrated process to optimize aromatic yield and process efficiency.

University of Alberta

- **Explainable Machine Learning Model and Causal Inference Workflow Development for Prediction of Column Flooding & Weeping in Industrial Deethanizer Unit**
  - Developed an explainable machine learning framework integrating graph theory and sparse optimization to reconstruct networks from industrial time-series data for early prediction of flooding events.
  - Linked predictions to underlying chemical engineering principles and quantified causality using statistical measures.
  - Validated the framework in an industrial setting, enabling safer operation by preventing column upsets and shutdowns.
- **Design of Virtual (Soft) Sensors to Predict Boiling Points in Industrial Fractionators**
  - Developed machine learning models incorporating process knowledge and variable selection techniques for online property prediction.
  - Addressed challenges of limited data availability and missing values in developing robust, data-driven models.
  - Validated the models in real-time industrial environments.
- **Bayesian Networks for Complex Process Flow-Networks with Recycle Streams**
  - Developed design principles and methodologies to construct Bayesian networks from process flow-networks with recycle streams.
  - Applied the method to reconcile process data errors involving unmeasured variables using the expectation–maximization algorithm.
- **Theoretical Limits of Gaussian Graphical Models with Bayesian Inference**
  - Derived Cramér-Rao Lower Bound (CRLB) for the sparse inverse covariance estimator.
  - Developed a Variational Bayesian inference method to optimize the regularization parameter of the estimator.

SERVICE & LEADERSHIP ROLES

Academic Service Reviewer for IEEE Access, Data-Centric Engineering (Cambridge University Press Journal)

Professional Forum Graduate Student Member in AIChE, SIAM, and IEEE (Control System Society)

Leadership Roles Vice-President Student Symposium, SVCE. Organizing Member for IRC Workshop, U of Alberta.

PEER REVIEWED PUBLICATIONS

Google Scholar: `https://scholar.google.com/citations?user=dZ-h3mcAAAAJ&hl=en`

- **Sundaramoorthy, A S**, R. F. Lobo, and D. G. Vlachos, "Coarse-grained models for scale-up of structured reactors," *Ind. & Eng. Chem. Research*, vol. 64, no. 28, pp. 14 110–14 121, 2025
- **Sundaramoorthy, A S**, S. Kim, B. A. Ogunnaike, R. F. Lobo, and D. G. Vlachos, "Modeling and optimization of methane dehydroaromatization coupled with chemical looping and temperature swing adsorption," *Ind. & Eng. Chem. Research*, 2024
- O. Dogru, K. Velswamy, F. Ibrahim, Y. Wu, **Sundaramoorthy, A S**, B. Huang, S. Xu, M. Nixon, and N. Bell, "Reinforcement learning approach to autonomous pid tuning," *Comp. & Chem. Engineering*, p. 107760, 2022
- **Sundaramoorthy, A S**, J. Valluru, and B. Huang, "Bayesian network approach to process data reconciliation with state uncertainties and recycle streams," *Chem. Eng. Science*, p. 116996, 2021
- **Sundaramoorthy, A S**, S. K. Varanasi, B. Huang, Y. Ma, H. Zhang, and D. Wang, "Sparse inverse covariance estimation for causal inference in process data analytics," *IEEE Trans. on Control Systems Technology*, pp. 1–13, 2021
- **Sundaramoorthy, A S**, A. P. A. Natarajan, and S. Sithanandam, "Comparative performance analysis of industrial scale catalytic steam reformer with membrane steam reformer," in *Comp. Aided Chem. Engineering*, 2018, vol. 43, pp. 699–704
- **Sundaramoorthy, A S**, R. F. Lobo, and D. G. Vlachos, "Machine learned coarse graining of reactive flow in structured reactors to scale-up steam methane reforming for hydrogen production," *In Preparation*, 2025/26
- Y. Kwak, **Sundaramoorthy, A S**, A. Mittal, C. Arumugam, B. Teressa, D. Debraj, H. Goyal, and D. G. Vlachos, "A research roadmap for microwave catalysis and reactors," *Under Review in Chem. Soc. Reviews*, 2025/26
- **Sundaramoorthy, A S**, R. F. Lobo, and D. G. Vlachos, "On scaling of microwave heated structured reactors," *In Preparation*, 2025/26

CONFERENCE PRESENTATIONS

- 3^{rd} **International Conference on Unconventional Catalysis, Reactors & Applications (UCRA)**, Warsaw, PL (2024) (Oral).
- 27^{th} **International Symposium for Chemical Reaction Engineering (ISCRE 27)**, Quebec City, CA (2023) (Oral).
- **IRC Workshop on Process Control, Data Analytics & Machine Learning**, Edmonton, CA (2019,20 & 21) (Oral).
- 69^{th} **Canadian Chemical Engineering Conference**, Halifax, CA (2019) (Oral).
- 28^{th} **European Symposium on Computer Aided Process Engineering (ESCAPE-28)**, Graz, AT (2018) (Oral).

Wen, Ching-Mei

Ph.D. candidate in Chemical and Biomolecular Engineering (Expected March-May 2026)
University of Delaware | Email: cmwen@udel.edu | LinkedIn: Ching-Mei Wen

Ph.D. candidate in Chemical and Biomolecular Engineering with expertise in techno-economic analysis (TEA), life cycle assessment (LCA), sustainable supply-chain design, and process systems modeling. Skilled in emissions modeling, greenhouse gas accounting, and geospatial analysis using Python (OpenCage, Google APIs), as well as Aspen simulations for large-scale mass and energy balances. Demonstrated collaboration with industry, with results published in leading journals and presented at conferences. Seeking to apply my expertise in process systems engineering, optimization, and sustainability analysis to address challenges in energy transition and carbon-neutral biomanufacturing.

EDUCATION

Ph.D. (Candidate) Chemical Engineering — **University of Delaware, Sep 2021 – Present (Newark, DE)**
Advisor: Marianthi Ierapetritou

M.S. Chemical Engineering — **National Tsing Hua University, June 2020 (Hsinchu, Taiwan)**
Advisor: Yuan Yao
Thesis: Connectivity Graphs in Thermographic and Process Data Analysis

WORK EXPERIENCE

Taiwan Semiconductor Manufacturing Co., Ltd. (TSMC) — Hsinchu, Taiwan
Position: R&D Process Engineer (Chemical Vapor Deposition) — Aug 2020 - Mar 2021

- Built and optimized deposition recipes on Lam Research CVD systems using Design of Experiments (DOE).
- Monitored process performance through Statistical Process Control (SPC) charts.
- Collaborated with integration engineers and external suppliers to resolve technical issues and implement corrective actions.

Micron Technology, Inc. — Taichung, Taiwan
Position: Process Engineer Intern (Dry Etch) — Jul - Aug 2019

- Monitored SPC charts for dry etch processes to sustain yield quality.
- Designed an offline analysis framework for process fault classification using R.

RESEARCH EXPERIENCE

University of Delaware – Ph.D. Research (2021-Present)

- Designed and optimized sustainable bio-based chemical supply chains (e.g., isopropanol and triacetic acid lactone), applying techno-economic analysis (TEA), life cycle assessment (LCA), and Aspen simulations to evaluate cost and carbon reduction potential.
- Collaborated with DSM-Firmenich on sustainability assessments, using SuperPro Designer simulations and publishing results in peer-reviewed journals.
- Developed an optimization-based framework integrating flux balance analysis (FBA) and metabolic pathway analysis (MPA) to identify metabolic objective functions in cellular systems.

National Tsing Hua University – M.S. Research (2018-2020)

- Applied thermographic data analysis combined with sparse principal component analysis (sPCA) and pixel connectivity to enhance defect detection accuracy and process monitoring.
- Developed data-driven fault diagnosis approaches using symbolic transfer entropy to capture causal relationships in industrial process dynamics.

SELECTED PUBLICATIONS

Citations from Google Scholar Profile: (Last updated Nov/07/2025) H-index: 5; Total citations: 77

1. **Wen, C. M.**, Papoutsakis, E., & Ierapetritou, M. (2025). Optimization-based framework with flux balance analysis (FBA) and metabolic pathway analysis (MPA) for identifying metabolic objective functions. *PLOS Computational Biology*, *21*(10), e1013635. [Journal Impact Factor: 3.6, Citations 0].
2. **Wen, C. M.**, & Ierapetritou, M. (2025). Improving life cycle assessment consistency for biomass-derived processes: A case study on triacetic acid lactone production with CO2 recycling. *Computers & Chemical Engineering*, *201*, 109244. [Journal Impact Factor: 3.9, Citations 1].
3. **Wen, C. M.**, & Ierapetritou, M. (2025). Topology-informed derivative-free metaheuristic optimization method. *Computers & Chemical Engineering*, *194*, 108973. [Journal Impact Factor: 3.9, Citations 2].
4. **Wen, C. M.**, Foster, C., van Winden, W., & Ierapetritou, M. (2024). Toward Net-Zero Greenhouse Gas Emission: Techno–Economic and Life Cycle Analyses of Routes for Triacetic Acid Lactone (TAL) Bioproduction. *ACS Sustainable Chemistry & Engineering*. [Journal Impact Factor: 7.1, Citations 1].
5. **Wen, C. M.**, & Ierapetritou, M. (2024). Optimization of Sustainable Supply Chain for Bio-Based Isopropanol Production from Sugar Beet using Techno-economic and Life Cycle Analysis. *Computers & Chemical Engineering*, 108836. [Journal Impact Factor: 3.9, Citations 6].

CONFERENCE PRESENTATIONS

1. **Wen, C. M.**, & Ierapetritou, M. Multi-Objective Optimization of a Sustainable Bio-Based Isopropanol Supply Chain Under Uncertainty. In 2025 AIChE Annual Meeting. Boston, MA, November 2-6, 2025. *Oral presentation (by Zhifei Yuliu)*
2. **Wen, C. M.**, Foster, C., van Winden, W., & Ierapetritou, M. Toward net-zero greenhouse gas emission: Techno-economic and life cycle analyses of routes for triacetic acid lactone (TAL) bioproduction. Foundations of Computer Aided Process Design (FOCAPD) conference, Breckenridge, CO, July 14-18, 2024. *Oral and Poster presentations*
3. **Wen, C. M.**, Ierapetritou, M., Optimizing the Sugar Beet-to-Isopropanol Supply Chain: A Model Development with Emphasis on CO_2 utilization Biotechnology. In 2024 AIChE Annual Meeting. San Diego, CA, October 27-31, 2024. *Oral presentation*
4. **Wen, C. M.**, Ierapetritou, M., Enhancing Stochastic Optimization through Topology Data Analysis: A Novel Approach for Improved Efficiency and Robustness. In 2024 AIChE Annual Meeting. San Diego, CA, October 27-31, 2024. *Poster presentation*
5. **Wen, C. M.**, Ierapetritou, M., & Papoutsakis, E., Graph-Based Multi-Objective Flux Balance Analysis: A Novel Framework for Determining Optimal Weights in Multi-Objective Functions. In *2023 AIChE Annual Meeting*. Orlando, FL, November 5-10, 2023. *Oral presentation*

AWARDS AND HONORS

Awarded Best Paper at FOCAPD 2024 for "Exploring Net-Zero Greenhouse Gas Emission Routes for Bio-Production of Triacetic Acid Lactone"	Jul 2024
Recognized for exceptional coursework performance	Aug 2022
Selected as a keynote paper at the European Symposium on Computer Aided Process Engineering (ESCAPE-31) for "Symbolic Transfer Entropy for Root Cause Analysis of Process Disturbances," presented by Dr. Yuan Yao	2021

TECHNICAL SKILLS

Sustainability & Assessment Tools	SimaPro, Activity Browser (LCA tool), TEA frameworks
Modeling & Optimization	GAMS, Python (Pyomo), MATLAB, R
Process Simulation	Aspen Plus, SuperPro Designer
Additional Tools	Moldex3D, SolidWorks, thermographic camera

Genevieve Yarema

(586) 404-0138 | yarema@udel.edu | LinkedIn

Research Interests:

Membrane reactors, joule heating, nonthermal gas separation, decarbonization, CO_2 electrolysis, water electrolysis, fuel cells, photocatalysts, solar fuels, battery materials

Education:

PhD: Chemical Engineering, University of Delaware, Newark, DE College of Engineering	GPA 3.88	May 2027 (expected)
BS: Chemical Engineering, Wayne State University, Detroit, MI College of Engineering and Irvin D. Reid Honors College	GPA 3.92	May 2022
HS: Grosse Pointe South	GPA 4.27	May 2018

Research Projects:

Liu Research Group (liud@udel.edu)

University of Delaware, Newark, DE — February 2024 - present

Developing an innovative joule heated immobilized molten salt membrane for use in an energy-efficient ammonia synthesis membrane reactor. Evaluates the membrane permeability and selectivity for ammonia separation at various feed concentrations, temperatures, and heating methods using GC, MS, and UV-Vis. Investigates the ammonia transport mechanism using EIS, XRD, and FTIR. Collaborates with other researchers to integrate catalysts in the reactor. Mentored a high school student on gas characterization methods July 2025.

June 2023 - February 2024

Investigated the effect of joule heated conductive carbon molecular sieve membranes towards selective hydrogen separation. Adjusted the synthesis methods of conductive carbon molecular sieve hollow fibers to improve selectivity for gas separation at room temperature.

Jiao Research Group

University of Delaware, Newark, DE — January 2023 - April 2023

Investigated methods of reducing the amount of IrO_2 used in the anode of neutral pH water electrolysis for improving the cost-effectiveness of green hydrogen. Assembled varying concentrations of IrO_2 and Ti_4O_7 for the anode in a no-gap membrane electrode assembly. Determined the resistance of the cell in operation, as well as the hardware and supporting materials, using the five electrode EIS technique.

Nikolla Research Group

Wayne State University, Detroit, MI — September 2019 - May 2022

Investigated the effect of B-site cation composition in $LaBO_3$ perovskite structure of cathode electrocatalysts on the electrochemical performance of CO_2 reduction in solid oxide electrolysis cells. Synthesized electrolyte supported cells with various cathode electrocatalysts by sol-gel technique. Collaborated with other researchers to electrochemically test the $LaBO_3$ perovskite electrocatalysts using linear sweep voltammetry and characterize them using XRD.

Genevieve Yarema
(586) 404-0138 | yarema@udel.edu | LinkedIn

Presentations:

Delaware Space Grant Spring Research Symposium — Apr 2025, Smyrna, DE
A Joule-heated Molten Salt Membrane for Ammonia Synthesis Via Membrane Reactor

AICHE Undergraduate Poster Competition — Nov 2021, Boston, MA
The Effect of B-Site Composition in Perovskites for Electrochemical CO_2 Reduction in Solid Oxide Electrolysis Cells

Junior Science and Humanities Symposium (AEOP Program) — Mar 2018, Detroit, MI
The Speed of Muons from Different Angles

Publications:

[1] Yarema, G.; Liu, Z.; Warty, A.; Koybasi, H.; Liu, D., Ammonia Permeable $LiNO_3$ Immobilized Molten Salt Membrane for Ammonia Production via Thermal Catalytic Membrane Reactor. (under preparation **2026**)

[2] Yarema, G.; Warty, A.; Yang, J.; Liu, Z.; Hu, L.; Liu, D., Membrane Reactors for Ammonia Production: Insights into Ammonia-Permeable Membranes, Synthesis Catalysts, and Their Integration. *ACS Nano* **2025**, https://doi.org/10.1021/acsnano.5c12610.

[3] Tezel, E.; Yarema, G.; Freire, M.; Whitten, A.; Denecke, R.; McEwen, J.; Nikolla, E., Electrochemical CO_2 Reduction in Solid Oxide Electrolysis Cells: The Role of B-site Cations in Perovskites. *Journal of the Electrochemical Society* **2022**, *169*(3), 034532, https://doi.org/10.1149/1945-7111/ac5e9b.

[4] Tezel, E.; Whitten, A.; Yarema, G.; Denecke, R.; McEwen, J. S.; Nikolla, E., Electrochemical Reduction of CO_2 using Solid Oxide Electrolysis Cells: Insights into Catalysis by Nonstoichiometric Mixed Metal Oxides. *ACS Catalysis* **2022**, *12*(18), 11456-11471, https://doi.org/10.1021/acscatal.2c03398.

Scholarships, Awards, and Fellowships:

University of Delaware: NASA Delaware Space Grant Fellowship

Wayne State University: Warrior Award, Merit Scholars Alumni Award, Scholar's Day Award, Department of Chemistry Chair's Honors List, College of Engineering Dean's List, Athletic Director's Honor Roll

Relevant Coursework:

Introduction to Data and Systems Analysis; Modeling, Analysis, and Acquisition of Data; Kinetic Processes; Molecular Thermodynamics; Diffusive Transport Processes; Applied Thermodynamics; Electrochemical Processes; Advanced Scientific Communication; Advanced Topics in Energy; Chemical Interfaces and Surfaces; Analytical Spectroscopy; Semiconductor Materials Processing

Teaching Assistant:

CHEG 332: Chemical Engineering Kinetics & Reactor Design — Fall 2024

MATH 305: Applied Mathematics for Biomed, Chem and Biomol Engg — Spring 2024

Skills:

Software: Matlab, Excel, MiniTab, Aspen Plus, NX

Characterizations: Gas Chromatography, Mass Spectrometry, Scanning Electron Microscope, FTIR, UV-Vis, Electrochemical Impedance Spectroscopy, Thermogravimetric Analysis, X-ray Diffraction

Logan Yeager

lgnyeager@gmail.com ❖ (720)-934-2814 ❖ www.linkedin.com/in/loganyeager

PURPOSE

Experienced in leadership and scientific innovation, with a strong commitment to mentorship and community outreach, I strive to be a leader in the biopharmaceutical industry developing translational technologies that improve equitable access to essential medical therapies.

EDUCATION & AWARDS

Colorado School of Mines **2019 – 2022**

B.S. Chemical Engineering with a biological focus, Magna Cum Laude

Awards: Donald C. Dilley Scholarship Leadership Award, Selim Memorial Scholarship,
Relevant Activities: Peer Mentor; IFC Executive Delegate; Kappa Sigma Vice President, Recruitment Chair, Alumni Chair, and Executive Officer; iGEM; Teaching Assistant: Microfluidics; Student Selected Speaker for Spring 2022 Graduation Ceremony

University of Delaware **2022 – Present**

Ph.D. Chemical and Biomolecular Engineering

Awards: DVS AIChE Outstanding Graduate Student Award
Relevant Activities: EmPOWER Peer Mentor, MRSEC Science Outreach Volunteer, Teaching Assistant: Microbial and Mammalian Kinetics

RESEARCH EXPERIENCE

Dr. Chen & Dr. Sullivan Labs **Nov. 2022 – Present**

Graduate Research Assistant

- Engineer conditional disassembly mechanisms for protein nanocages and investigate cellular responses to engineered nanomaterials
  Relevant Skills: Protein Expression, Mammalian Cell Culture, DLS, Flow Cytometry, Molecular Cloning, Gel Electrophoresis

Dr. Marr Lab **Jan. 2021 – May 2022**

Undergraduate Research Assistant

- Study the propulsion of "Microwheels" at an air-water interface
  Relevant Skills: Automated Image Analysis Using ImageJ and Python, 3D Printing, SolidWorks, Microfluidic Construction

RELEVANT LEADERSHIP EXPERIENCE

University of Delaware CBE Department "Colburn Club" **Sep. 2024 – Sep. 2025**

President

- Manage a budget to ensure continuous department-wide events for social engagement and professional development
- Organize graduate student efforts for department recruitment efforts
- Organize monthly meetings to align officer initiatives with overall strategy

FELLOWSHIPS

Innovation Delaware (InDE) Fellowship **Aug. 2024 – May 2025**

- Construct and present a business plan at the UD's Limitless World Summit
- Fortify the skills to communicate the translational potential of protein nanoparticles as smarter cancer therapeutics

GAANN Inclusive Teaching Fellowship **2024 – 2025**

- Engage with inclusive teaching practices while also developing skills for effective science communication
- Conduct 3 mentored lectures for an undergraduate course

Leona and Leonard Anderson Fellowship **2023 – Present**

Grant Awarded to Construct Mural Entitled: "The Art of Engineering a Community"

PUBLICATIONS

*Indicates equal contribution

[1] B. A. Richards *, **L. P. Yeager** *, M. O. Sullivan, and W. Chen, "Leveraging endogenous MMPs for drug delivery in the cancer environment," *Expert Opin Drug Deliv*, vol. 22, no. 10, pp. 1527–1539, Oct. 2025, doi: 10.1080/17425247.2025.2531064.

[2] E. Wolvington, **L. Yeager**, Y. Gao, C. J. Zimmermann, and D. W. M. Marr, "Paddlebots: Translation of Rotating Colloidal Assemblies near an Air/Water Interface," *Langmuir*, vol. 39, no. 22, pp. 7846–7851, Jun. 2023, doi: 10.1021/acs.langmuir.3c00701.

Ming Hung Yen

Graduate Candidate of Chemical & Biomolecular Engineering • University of Delaware
Mobile: (302)-252-5684 • mhyen@udel.edu
Linkedin: http://www.linkedin.com/in/ming-hung-yen

Education

University of Delaware (UD), Newark, Delaware Sept. 2021 – Current

- Graduate Candidate in Chemical & Biomolecular Engineering
- Research area: synthetic biology, protein engineering
- Advisor: Kevin V. Solomon

National Tsing Hua University (NTHU), Hsinchu, Taiwan Sept. 2016 – June 2020

- Bachelor of Science in Chemical Engineering
- Research area: advancing health care, biochemical and biomolecular engineering for clinical application
- Advisor: Jen Huang, Huang

Research Experience

Chemical & Biomolecular Engineering Department, UD Aug. 2021 – Current

Graduate Candidate

Project: Microbial Foundry for Scalable ssDNA Production

- Performing densitometry, fluorescence hybridization, and qPCR for ssDNA quantification
- Purifying samples using anion exchange column, FPLC, gel electrophoresis, and magnetic bead-based methods
- Engineering *E. coli* strains and designing plasmids to optimize ssDNA production efficiency

Project: Elastin-like Protein Condensate and Dynamic Control

- Designing and analyzing fusion proteins via AlphaFold, PyMol, and Polyacrylamide gel electrophoresis
- Purifying protein samples through sonication, FPLC, dialysis, and Inverse Transition Cycling (ITC)
- Utilizing plate readers and MATLAB for dynamic data collection and plotting

Chemical Engineering Department, NTHU Aug. 2020 – Jan. 2021

Research Assistant

- Assisted faculty with experimental design, lab work, and resource acquisition to support ongoing projects
- Collaborated with Hsinchu Mackay Memorial Hospital
  (Topic: Development of Multi-antibiotic Susceptibility Testing Chip for Real-time Clinical Diagnosis)
- Maintained and operated instruments, conducted literature reviews, and coordinated with external labs
- Evaluated and provided feedback on individual performance at poster/presentation competition organized by ChemE Department

Chemical Engineering Department, NTHU Jan. 2019 – July 2020

Undergraduate researcher

Project: Multi-antibiotic Susceptibility Power-Free Testing Chip for Real-time Drug Screening

- Designed and modeled 3D microfluidic lab-on-chip using SolidWorks
- Fabricated and assembled devices with laser cutting and PET substrates

- Developed and optimized lyophilization protocols for antibiotics and colormetric reporters to enable on-chip drug screening

iGEM (International Genetically Engineered Machine), NTHU May. 2020 – Nov. 2021

Wet Lab Leader

- Directed the execution of plasmid construction, cloning , and experimental design; organized and documented results for reproducibility
- Collaborated with dry lab and human practice teams to ensure clear communication
- Delivered presentations to diverse audiences, including junior high students, college freshmen from three departments, and academic faculty to promote outreach and engagement

Award

- 3rd place for the poster competition at 2020 Annual Meeting of the Taiwan Filtration and Separations Society conference
- Excellent work for a poster/presentation competition in the Chemical Engineering department
- Silver medal in the iGEM competition 2020

Conference

Oral presentation (*speaker)

- **Ming Hung Yen***, Kevin V. Solomon, "Microbial Foundry for Scalable ssDNA Production", American Chemical Society, San Diego, Mar. 2025

Poster Presentation (*speaker, undergraduate)

- Zoe Pecson*, **Ming Hung Yen**, Kevin V. Solomon, "Chemically Controlled Dimerization of Elastin-Like Polypeptides in *E. Coli*", Summer Research Poster Presentation, Newark, Aug. 2025
- **Ming Hung Yen***, Kevin V. Solomon, "Microbial Foundry for Scalable ssDNA Production", Synthetic Biology: Engineering, Evolution & Design, Atlanta, Jun. 2024
- **Ming Hung Yen***, Kevin V. Solomon, "Microbial Foundry for Scalable ssDNA Production", Engineering Biology Research Consortium, Chicago, Jun. 2023
- **Ming Hung Yen***, Jen Huang, Huang, "Novel development of Multi-antibiotic Susceptibility Power-Free Testing Chip for Real-time Drug Screening", Taiwan Institute of Chemical Engineers meeting, Oct. 2020
- **Ming Hung Yen***, Dr. Chien-Yu Lin, Jen Huang, Huang "Antibiotic Susceptibility Testing Chip for Real Time Multi-Drug Diagnosis," Symposium and Annual Meeting of Chinese Taipei Society for Biomaterials and Controlled Release, Aug. 2020
- **Ming Hung Yen***, Jen Huang, Huang, "Development of Multi-antibiotic Susceptibility Testing Chip for Real-time Clinical Diagnosis," Annual Meeting of the Taiwan Filtration and Separations Society conference, Taipei, Aug. 2020
- **Ming Hung Yen***, Jen Huang, Huang, "Development of Antibiotic Susceptibility Testing Chip," Taiwan Institute of Chemical Engineers annual meeting, Nov. 2019

Professional Memberships

American Chemical Society (ACS)

Engineering Biology Research Consortium (EBRC)

CHEMICAL & BIOMOLECULAR ENGINEERING

UNIVERSITY OF DELAWARE
ENGINEERING