



CHEMICAL AND BIOMOLECULAR  
ENGINEERING

2023-2024

# DOCTORAL & POSTDOCTORAL CANDIDATES

RESUME BOOKLET



UNIVERSITY OF DELAWARE  
ENGINEERING

150 ACADEMY STREET, COLBURN LAB, NEWARK DE 19716

January 2023

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 at the doctoral or post-doctoral level. 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 approximately 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), and the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL). Over just the past several months, UD has taken on a new leadership role in key workforce development efforts within the Biden-Harris administration's 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.che.udel.edu](http://www.che.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  
Alvin B. and Julie O. Stiles Professor and Department Chair

# ENCLOSED RESUMES

- *Erha G. Andini*
- *Matthew L. Becker*
- *Antara Bhowmick*
- *Soumitra Bhoyar*
- *Jason Conradt*
- *Michelle M. Gee*
- *Philip A. Gitman*
- *Tejas Goculdas*
- *Madan R. Gopal*
- *Erica A. Green*
- *Yagya Gupta*

- *Ali Kamali*
- *Nefeli Kamarinopoulou*
- *Soojin Kwon*
- *Thomas Leibiger*
- *Priyanka Nain*
- *Darien K. Nguyen*
- *Alexandra Oliveira*
- *Brian Paul*
- *Tessa Posey*
- *James D. Tang*
- *Akash Warty*

# Erha G. Andini

(717) 701-6856 | erha@udel.edu | www.linkedin.com/in/erhandini

## EDUCATION

### University of Delaware, Newark, DE

August 2020 – Present

Ph.D. Candidate, Chemical and Biomolecular Engineering

Advisor: Prof. Dionisios Vlachos

### The Pennsylvania State University, University Park, PA

January 2016 – December 2019

B.S., Chemical Engineering, *Cum Laude*

Cumulative GPA: 3.81/4.00

Dean's List All Semesters

## RESEARCH EXPERIENCE

### Dionisios Vlachos Research Group

Newark, DE

Graduate Research Assistant

December 2020 – Present

- Design of new chemistries from lignocellulosic biomass into valuable chemicals.
  - Created a novel strategy to synthesize bio-based neo acids with tailored molecular architecture from lignocellulosic biomass derivatives.
  - Advanced selective furan ring-opening without affecting carboxylic acid functionality.
- Close-loop recycling of mixed textile waste.
  - Conceptualized mixed textile recycling efforts, combining process engineering with techno economics for novel solutions.
  - Developed a process to separate the four main textiles (polyester, cotton, nylon, and spandex) in the fashion industry.

### Andrew Zydney Research Group

State College, PA

Undergraduate Research Assistant

May 2019 – December 2019

- Designed a biomimetic process of human kidney that allowed separation between albumin monomer and dimer serving as a preliminary step to find the state of molecular structure of albumin in human plasma.

### Scott Milner Research Group

State College, PA

Undergraduate Research Assistant

August 2017 – May 2019

- Championed a research project to design artificial pore molecules and copolymer membranes from scratch with little supervision.

## ENTREPRENEURIAL EXPERIENCE

### Innovation Delaware (InDE) Fellowship

August 2023 – Present

- Gain first-hand experience with the process of translating ideas, discoveries and inventions from the laboratory to the marketplace.
- Acquire valuable connections with individual leaders and support organizations comprising Delaware's innovation & entrepreneurship (I&E) ecosystem.

## SKILLS AND PROFICIENCIES

- Computational : Python, MATLAB, Aspen Plus, Minitab, Mathematica, MestReNova, ChemDraw, Origin, and Microsoft Office.
- Instrumentations : HPLC, GC-MS, LC-MS, NMR, IR, UV-Vis, TGA, DSC, XRD, SEM, and XRF.
- Languages : English and Bahasa Indonesia.

## INDUSTRIAL EXPERIENCE

### Schlumberger

Kanagawa, Japan

Process Development Intern

May 2017 – August 2017

- Generated MATLAB codes to determine the sensitivity of an H<sub>2</sub>S sensor with respect to the compositional changes of the fluid of interest.

## PATENTS

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- **Andini, E.**, Sadula, S., Vlachos, D. Chemical Recycling of Mixed Textile Waste, **U.S. Provisional Patent Application No.: 63/595,788** (filed 11/3/23).
- **Andini, E.**, Sadula, S., Vlachos, D. Neo Acids and Derivatives Thereof, **International Publication No.: WO2023/114459** (published 6/22/23).

## PUBLICATIONS

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- **Andini, E.**; Gantert, E.; Sadula, S.; Vlachos, D. Chemical Recycling of Mixed Textile Waste. (*In preparation*).
- **Andini, E.**; Bragger, J.; Sadula, S.; Vlachos, D. Production of Neo Acids from Biomass-Derived Monomers. *Green Chem.*, 2023, 25, 3493.
- Kali, R.; **Andini, E.**; Milner, S.T. Molecular dynamics simulation based design of biomimetic membrane with artificial water channels. *J. Membr. Sci.* 2021, 630, 119279.
- Li, Z.; Chen, T.S.; **Andini, E.**; Coffman, J.L.; Przybycien, T.; Zydney, A.L. Enhanced filtration performance using feed-and-bleed configuration for purification of antibody precipitates. *Biotechnol. Prog.* 2020, 37, e3082.

## SELECTED PRESENTATIONS

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- **AICHE 2023 | Orlando, FL:** Chemical Recycling of Mixed Textile Waste. (*oral presentation*).
- **AICHE 2023 | Orlando, FL:** Production of Neo Acids from Biomass-Derived Monomers. (*oral presentation*).
- **NAM 2023 | Providence, RI:** Production of Neo Acids from Biomass-Derived Monomers. (*oral presentation*).
- **GRC 2023 | Newry, ME:** Production of Neo Acids from Biomass-Derived Monomers. (poster presentation).
- **Catalysis Club of Philadelphia 2023 | Wilmington, DE:** Production of Neo Acids from Biomass-Derived Monomers. (poster presentation).
- **AICHE 2022 | Phoenix, AZ:** Production of Neo Acids from Biomass-Derived Monomers. (poster presentation).

## TEACHING EXPERIENCE

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### Graduate Teaching Assistant, UD Dept. of Chemical Engineering

- CHEG606: Introduction to Catalysis Spring 2023
- CHEG613: Topics in Energy and the Environment Fall 2022

## LEADERSHIP & OUTREACH

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### Lead Mentor, UD CBE EmPOWER

Jul. 2023 – Present

- Collaborate to develop and organize mental health-related events to assist students in all program years.

### Content Creator, Instagram and TikTok

February 2023 – Present

- Built an ever-growing community of students and professionals pursuing a degree/career in STEM who values health, wellness, and work-life balance (60K+ combined followers, ~75% women).

### Vice-President, UD Dept. of Chemical Engineering Graduate Student Body

August 2022 – 2023

- Served as one of the main CBE graduate representatives between Dept. Chair, Grad. Program Director, Grad. Services Coordinator, Grad. Admissions Chairs, and EmPOWER lead mentors.

### U.S. DOE EFRC Representative, Catalysis Center for Energy Innovation (CCEI)

Oct. 2021 – Oct. 2023

- Led, organized, and moderated a career panel attended by >200 graduate students, post-docs, and scientists from across the nation.

## HONORS & AWARDS

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- Tau Beta Pi Engineering Honors Society Member April 2018 – Present
- Center of Excellence in Industrial Biotechnology Fellowship May 2019 – August 2019

# MATTHEW L. BECKER

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Newark, DE 19711

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✉ [matt3@me.com](mailto:matt3@me.com)  
✉ [beckerml@udel.edu](mailto:beckerml@udel.edu)

## EDUCATION

- **University of Delaware**, Newark, DE August 2019 – *present*  
PhD, Chemical and Biomolecular Engineering  
Advisor: Abraham M. Lenhoff
- **The Pennsylvania State University**, University Park, PA August 2014 – May 2018  
BS, Chemical Engineering; BS, Economics  
Thesis: Purification, Crystallization, and Analysis of Various OmpF Mutants and Their Block Copolymer Aggregates for Use in the Production of Biomimetic Membranes

## RESEARCH EXPERIENCE

- **Analysis of Depth Filter Structure and Conditions Affecting Depth Filter Clarification**  
Doctoral Research, University of Delaware, Newark, DE October 2023 – *present*  
Principal Investigator: Abraham M. Lenhoff
  - Characterizing the internal structure of various commercially-relevant depth filters using X-ray computed tomography
  - Performing primary depth filtration on cell culture fluid while monitoring turbidity and pressure drop
  - Applying a pore network model to assess the porosity and other relevant characteristics of pertinent depth filters
- **Development of a VLP Purification Process by Continuous Affinity Precipitation**  
Doctoral Research, University of Delaware, Newark, DE October 2021 – September 2023  
Principal Investigator: Abraham M. Lenhoff
  - Evaluated viability of small-scale purification system using TFF and countercurrent dialysis with an eye toward eventual tech transfer
  - Assessed kinetics and transport of VLP/VLP-ligand binding, aggregating, and dissociating in the context of a continuous process
  - Implemented manual control setup to minimize protein losses and maximize yield of each of five separate steps
- **Characterization of the Binding Behavior of Host Cell Proteins to Monoclonal Antibodies**  
Doctoral Research, University of Delaware, Newark, DE June 2019 – September 2021  
Principal Investigator: Abraham M. Lenhoff
  - Investigated binding strength of three distinct HCPs to a library of seven industrial mAbs via fluorescence polarization
  - Utilized crosslinking-mass spectrometry to identify the binding sites of both mAb and HCP in mAb-HCP complexes
  - Applied atomistic molecular mechanics simulations to compute lowest energy configurations to identify mAb-HCP binding sites
- **Exploration of OmpF Proteins as Part of Block Copolymers for Use in Biomimetic Membranes**  
Undergraduate Research, The Pennsylvania State University, University Park, PA May 2016 – May 2018  
Principal Investigator: Manish Kumar
  - Developed and performed optimal method to ensure pure and high-yield OmpF samples
  - Analyzed the microscopic appearance of different ratios of various mutants of OmpF to polymer
- **Investigation of Process Condition Effects on Bacterial Polysaccharide Filtration**  
Undergraduate Research, The Pennsylvania State University, University Park, PA May 2015 – August 2015  
Principal Investigator: Andrew L. Zydney
  - Evaluated filtrate flux in TFF stirred cell for both polysaccharide solution and substitute dextran solution
  - Varied feed pressure conditions to determine optimal conditions for flux over time while avoiding significant membrane fouling

## SKILLS

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- **Separations processes:** Proficient in flocculation/centrifugation, depth filtration, tangential flow filtration/diafiltration, countercurrent dialysis, FPLC, precipitation and resolubilization, lyophilization/vacuum concentration
- **Assaying techniques:** Proficient in fluorescence and absorbance spectroscopy, fluorescence polarization, chemical crosslinking/mass spectrometry, hydrogen-deuterium exchange/mass spectrometry, SDS-PAGE, cryosectioning, X-ray computed tomography, dynamic light scattering
- **Software, programming, and data analysis:** Proficient in MATLAB, Mathematica, MINITAB, Vinci, MeroX, XlinkX, Dragonfly, Tomoshop, BASH scripting

## LEADERSHIP AND RECOGNITION

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- Chosen by fellow graduate students to be second year representative (2020) and co-president (2021) of Colburn Club for UD ChBE, organizing events and providing leadership
- Selected as EmPOWER mentor for UD ChBE in 2019-2021, helping to mentor incoming first-year students
- Received average evaluation score of 4.4/5.0 from students in three classes TA'ed as a graduate student
- PSU CoE Summer Research Experience for Undergraduates Award Recipient (2015)

## PUBLICATIONS (\* indicates co-first author; † indicates in preparation)

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1. †Tang, J. D.\*, Becker, M. L.\*, Lenhoff, A. M., Chen, W. Engineering of heterobifunctional biopolymers for continuous tunable binding and precipitation of Strep-tag fusion proteins
2. †Oh, Y. H.\*, Becker, M. L.\*, Mendola, K. M., Choe, L. H., Lee, K. H., Yigzaw, Y., Seay, A., Bill, J., Li, X., Roush, D. J., Cramer, S. M., Menegatti, S., Lenhoff, A. M. Factors affecting product association as a mechanism of host-cell protein persistence in bioprocessing.
3. Oh, Y. H., Becker, M. L., Mendola, K. M., Choe, L. H., Min, L., Lee, K. H., Yigzaw, Y., Seay, A., Bill, J., Li, X., Roush, D. J., Cramer, S. M., Menegatti, S., Lenhoff, A. M. (2023). Characterization and implications of host-cell protein aggregates in biopharmaceutical processing. *Biotechnology and Bioengineering*, 120, 1068-1080.

## CONFERENCE PROCEEDINGS

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1. M. L. Becker, Y. Oh, K. M. Mendola, A. Seay, X. Li, D. J. Roush, S. M. Cramer, S. Menegatti, A. M. Lenhoff. Biophysical Characterization of Problematic Host Cell Proteins in Monoclonal Antibody Processing. *ACS BIOT*, August 2021.

**Antara Bhowmick**  
Ph.D. candidate in Department of Chemical and Biomolecular Engineering  
University of Delaware, Newark, DE 19711, USA.  
**Mobile:** + (1) 240 639 5629  
**Email:** [antara@udel.edu](mailto:antara@udel.edu)

## EDUCATION

**Ph.D. candidate in Chemical and Biomolecular Engineering** **January 2023-Present**  
University of Delaware, Newark  
Expected Graduation: December 2024

**Ph.D. student in Chemical and Biomolecular Engineering** **August 2020-December 2022**  
University of Maryland, College Park  
4.00/4.00 GPA

**Ph.D. student in Chemical Engineering** **August 2019-July 2020**  
Pennsylvania State University, State College  
3.50/4.00 GPA

**B.Sc. in Chemical Engineering** **May 2012-February 2017**  
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh  
3.67/4.00 GPA

## PROFESSIONAL EXPERIENCE: RESEARCH

**Graduate Research Assistant** **January 2021-Present**  
**Department of Chemical and Biomolecular Engineering, Newark, Delaware, USA**  
**Advisor:** Dr. Dongxia Liu  
**Project:** *Non oxidative alkane dehydrogenation over metal loaded zeolite catalysts in membrane reactor*

- Synthesized structure modified zeolite to understand the effect of framework composition on catalytic performance.
- Synthesized metal loaded zeolite catalysts both by post synthesis and in-situ metal encapsulation method.
- Studied the catalytic consequences of metal concentration and metal promoter effect on reaction over zeolite catalysts.
- Studied carbon molecular sieve membrane (CMS) reactor with metal loaded zeolite catalysts for both propane and ethane dehydrogenation reaction to determine catalytic performance.
- Studied the effect of reaction operating conditions on the CMS reactor membrane performance for ethane dehydrogenation reaction.
- Studied the kinetics and mechanisms of non-oxidative ethane conversion on Pt/multilamellar titanium silicalite-1 (S1) catalyst.
- Studied the kinetics and mechanisms of non-oxidative propane conversion on Pt-Zn/S1 catalyst.
- Studied the kinetics and mechanisms of non-oxidative ethane conversion on Co/Dealuminated beta (DeAl-BEA) catalyst.
- Studying effect of metal oxidation state, co-ordination number and local environment in the catalyst after synthesis, pre-reduction and reaction.
- Studying the significance of the operating conditions for scaling up the performance of CMS membrane reactor for propane dehydrogenation reaction.

**Graduate Research Assistant** **August 2019-July 2020**  
**Department of Chemical Engineering, State College, Pennsylvania, USA**  
**Advisor:** Dr. Ezgi Toraman  
**Project:** *Non-oxidative methane conversion to fuels and value-added chemicals*

- Synthesized metal loaded TiO<sub>2</sub> catalyst.
- Performed literature study to understand the state of art of the OCM and NOCM reactions and the characterization techniques of the catalysts.

**Graduate Research Assistant** **December 2017-December 2018**  
**Department of Chemical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh**  
**Advisor:** Dr. Syeda Sultana Razia  
**Project:** *Development of characteristics curves of packed bed for locally available low-cost adsorbents like activated carbon (AC) and activated alumina (AA) for silica removal.*

- Developed the entire experimental setup with three stage adsorption process.
- Measured the adsorbed colloidal silica on the product stream by sorption analyzer.



## PROFESSIONAL EXPERIENCE: TEACHING

### Teaching Assistant

August 2021-May 2022

Department of Chemical and Biomolecular Engineering, College Park, Maryland, USA

#### Courses:

1. Chemical and Biomolecular Engineering Laboratory
  - Prepared and tested laboratory set-ups
  - Prepared sample laboratory reports and graded students' reports
  - Taught discussion materials before each laboratory session.
2. Chemical and Biomolecular Engineering Thermodynamics II
  - Assisted professors in developing new course materials, led tutorial sessions, and taught course materials.
  - Helped prepare quizzes, homework, and mid-term examination.
  - Graded homework.

## PROFESSIONAL EXPERIENCE: INDUSTRY

### Assistant Engineer (chemical)

March 2018-October 2018

Rupantaratia Prakritik Gas Company, Dhaka, Bangladesh

**Project:** *Planning to install a new liquified natural gas (LNG) station*

- Visited an LPG plant producing LPG, motor sprit diesel, petrol from natural gas liquid (NGL) and a condensate handling plant to have a training on operation.
- Trained on transport system of liquefied natural gas permission, monitoring, sales and services of compressed natural gas (CNG) in Bangladesh and pollution and environmental safety of oil and gas industry.

## HONORS AND AWARDS

1. Won second prize at poster presentation at catalysis club of Philadelphia spring symposium, poster joint conference.
2. In undergraduate class, secured second position out of 62 students.
3. Dean's list award in junior class for outstanding academic result.
4. University merit scholarship in freshman class for outstanding academic result.
5. University stipend award for outstanding academic result in senior class.
6. Department scholarship for academic excellence at undergraduate level.
7. Department scholarship for academic excellence at graduate level.

## SKILLS

■ Gas-phase reactor systems ■ Tubular membrane reactor systems ■ Characterization skills such as X-ray Diffraction Pattern (XRD), Scanning Electron Microscope (SEM), Brunauer–Emmett–Teller (BET), Temperature-Programmed Desorption (TPD) and Chemisorption, Thermogravimetric Analysis (TGA), and X-ray Photoelectron Spectroscopy (XPS), Gas Chromatography (GC), Mass Spectrometry (MS).  
■ Programming language- MATLAB and Mathcad ■ Simulation and design tools- Aspen hysys and Visio

## PUBLICATIONS

### Journals: (\*represents first author)

1. L. Liu, **Antara Bhowmick\***, S. Cheng, B.H. Blazquez, Y. Pan, J. Zhang, Y. Zhang, Y. Shu, D. T. Tran, Y. Luo<sup>2</sup>, M. Ierapetritou, C. Zhang, D. Liu, "Alkane Dehydrogenation in Scalable and Electrifiable Carbon Membrane Reactor", Cell Reports Physical Science, 2023, 4, 101692.
2. **Antara Bhowmick\***, J. Zhang, E. Jahrman, K. Yu, A. Warty, S. Sourav, D. Vlachos, and D. Liu, " Non-oxidative Ethane Dehydrogenation over Cobalt in Dealuminated BEA Zeolite at Lattice Tetrahedral Sites "- manuscript in preparation.
3. Y. Pan, **Antara Bhowmick**, W. Wu, Y. Zhang, Y. Diao, A. Zheng, C. Zhang, R. Xie, Z. Liu, J. Meng, and D. Liu, "Titanium Silicalite-1 Nanosheet-Supported Platinum for Non-oxidative Ethane Dehydrogenation, ACS Catal. 2021, 11, 15, 9970–9985

### Book Chapter:

1. Y. Pan, **Antara Bhowmick\***, L. Liu, C. Zhang and D. Liu, "Non-oxidative Propane Dehydrogenation in Membrane Reactors, in book: SPR Catalysis, 2023- in press

### Review Papers:

1. **Antara Bhowmick\***, Y. pan, H. Koybasi, K. Li, N. Kher, D. Liu, "Membrane reactors for non-oxidative alkane dehydrogenations", manuscript under preparation.

### Poster Presentations:

1. **Antara Bhowmick**, L. Liu, C. Zhang, D. Liu, 'Development of a dual metal loaded zeolite catalyst and it's microkinetic model for non- oxidative propane dehydrogenation', Nanoporous materials and their applications, Gordon research conference, Andover, NH, USA, 2023.
2. **Antara Bhowmick**, L. Liu, C. Zhang, D. Liu, 'Development of a dual metal loaded zeolite catalyst for non-oxidative propane dehydrogenation', Catalysis Club of Philadelphia Spring Symposium- poster joint conference, Villanova University, PA, USA, 2023 (Won second prize).

## EDUCATION

- **The University of Delaware**, Newark, DE, USA 2019 - *present*  
 PhD student, Chemical and Biomolecular Engineering  
 Advisor: Dr. Abraham M. Lenhoff
- **The Johns Hopkins University**, Baltimore, MD, USA 2016 - 2018  
 Masters in Chemical and Biomolecular Engineering  
 Advisor: Dr. Daniele M. Gilkes
- **The Institute of Chemical Technology**, Mumbai, India 2010 - 2014  
 Bachelors in Chemical Engineering

## RESEARCH EXPERIENCE

- **mAb-HCP aggregates as vectors of HCP persistence in mAb manufacture** 2023 - *present*  
 Doctoral Research, The University of Delaware
  - Investigating mAb-HCP heteroaggregates as enablers of HCP persistence in CHO HCCF
  - Probing the relationship between cell productivity and downstream aggregate content
  - Identifying aggregate structural features using electron microscopy, capillary electrophoresis
- **Mechanistic modeling of Protein A chromatography** 2019 - *present*  
 Doctoral Research, The University of Delaware
  - Developed a model that accurately predicts chromatograms while requiring limited parameter estimation effort
  - Validated model predictions (DBC, pool volumes, peak profiles) under a variety of experimental conditions
- **Mitigating yield loss in protein A chromatography under high pH washes** 2020 - 2023  
 Doctoral Research, The University of Delaware
  - Engineered a novel protein A ligand that reduced high pH yield loss by  $\sim 20\%$
  - Identified mechanisms governing protein A-IgG1 dissociation at high pH
- **Image analysis in breast cancer** 2016 - 2018  
 Masters Thesis, The Johns Hopkins University
  - Developed image analysis assays for biological samples to elucidate the role of hypoxia in metastasis
  - Determined the role of the human protein beta-6-tubulin on cancer proliferation and chemoresistance

## WORK EXPERIENCE

- **Spark Therapeutics** May 2023 - August 2023  
 Technology Development Intern
  - Designed and implemented a novel purification scheme for protein IdeS; led to higher yield, reduced HCP content
  - Involved in process development for the chromatographic purification of AAVs
  - Improved mass photometry workflows for quantifying encapsidated nucleotide content in AAVs
- **Indiahikes** 2018 - 2019  
 Trek Leader
  - Led multi-day excursions in the Indian Himalayas at altitudes of  $\sim 12,000 - 16,000$  feet
  - Oversaw evacuations under blizzards, resolved high-altitude medical conditions in the field
- **Honeywell-UOP** 2014 - 2016  
 Design Engineer
  - Designed petrochemicals manufacturing equipment and simulations for commercial oil refineries
  - Led cross-functional meetings with customers and internal experts to ensure quality and timely deliverables
  - Obtained the Six-Sigma Green Belt certification under Honeywell

## SKILLS

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- **Mentorship:** Currently managing 3 undergraduate researchers
  - Undergrad #1: Delegated capillary electrophoresis method-development to build lab competency
  - Undergrad #2: Leveraged their prior experience with electron microscopy to add value to existing projects
  - Undergrad #3: Developed chromatography / modeling skills in line with their professional goals
  - Provided resources, led technical discussions and introduced co-mentors as required
- **Chromatography:** Proficient in using FPLC / HPLC / UPLC systems and multiple chromatographic modes (affinity, ion-exchange, size-exclusion, HIC) for preparative and analytical chromatography of biomolecules
- **Biophysics:** Capillary and gel electrophoresis, dynamic light scattering, bilayer interferometry, circular dichroism spectroscopy, surface plasmon resonance
- **Cell culture:** Bacterial / mammalian cell culture, genetic manipulation and protein expression in *E. coli*
- **Software and programming:** Proficient in chromatography modeling using CADET (Chromatography analysis and design toolkit) and in Python, MATLAB, AWK, BASH.

## PUBLICATIONS

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1. S. Bhoyar et al. Predictive mechanistic modeling of loading and elution in protein A chromatography. *Under peer review*
2. S. Bhoyar et al. Engineering protein A ligands to mitigate antibody loss during high-pH washes in protein A chromatography. *J. Chrom. A*, 1696, 463962, **2023**
3. H. L. Rocha et al. (including S. Bhoyar). A persistent invasive phenotype in post-hypoxic tumor cells is revealed by fate mapping and computational modeling *iScience*, 24 (9), **2021**
4. S. Bhoyar, et al. A software tool for the quantification of metastatic colony growth dynamics and size distributions in vitro and in vivo. *PloS one*, 13 (12), **2018**

## CONFERENCES

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1. S. Bhoyar et al. [Poster] Predictive mechanistic modeling of loading and elution in protein A chromatography. *Merck Rising Stars in Measurement Sciences*, Nov 16-17, **2023**
2. S. Bhoyar et al. Mechanistic and predictive modeling of protein A chromatography. *ACS BIOT*, Aug 13-17, **2023**
  - Recipient of a University of Delaware travel award
3. S. Bhoyar et al. Yield loss during high pH wash in mAb manufacture. *PREP*, May 15-18, **2022**
4. S. Bhoyar et al. Determinants of capacity of Fc-based antibody structures in protein A chromatography. *ACS BIOT*, Aug 22-26, **2021**
5. I. Godet, J. Ju, S. Bhoyar et al. Hypoxia-reporter construct helps to uncover the metastatic process. *EACR Seed and Soil: In Vivo Models of Metastasis*, Nov 27-29, **2017**

## LEADERSHIP AND AWARDS

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- Lead Mentor of EmPOWER, the departmental peer-mentorship group at the University of Delaware, **2022**
  - Identified issues faced historically by international graduate students in the department
  - Resolved the above in collaboration with the department and university administration
- Vice-President of Colburn Club, the departmental graduate student organization at the University of Delaware, **2021**
  - Organized graduate recruitment events with ~ 60 participants
- Awarded the Schipper fellowship at the University of Delaware, **2020**
- Awarded the Bravo award by Honeywell-UOP for excellence in technical work, **2016**

# Jason Conradt

971.998.4334 | conradtj@udel.com

## EDUCATION

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<b>University of Delaware</b> , Ph. D. in Chemical Engineering	<i>Expected 2025</i> <b>GPA: 3.4</b>
<b>Oregon State University</b> , B.S. in Chemical Engineering	<i>Received 2019</i> <b>GPA: 3.7</b>

## PROFESSIONAL EXPERIENCE

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<b>PhD Candidate</b> , Eric M. Furst Group at the University of Delaware	<i>January 2020 to Present</i>
<ul style="list-style-type: none"><li>Coordinated experiments exploring the self-assembly of paramagnetic colloids directed by toggled magnetic fields on the International Space Station.</li><li>Developed Helmholtz coil apparatus for confocal microscopes to two-dimensional self-assembly.</li><li>Created programmatic workflow to analyze the kinetics, structure, and dynamics of assembling colloids in real and Fourier space observed through video microscopy.</li><li>Wrote algorithm and trained a neural network for object tracking and segmentation to analyze colloidal aggregation kinetics and terminal state dynamics.</li><li>Developed Monte Carlo simulation to replicate suspension-scale magnetic aggregate distributions</li></ul>	
<b>Production Engineer</b> , W.R. Grace	<i>August 2019 to August 2020</i>
<ul style="list-style-type: none"><li>Managed cross-functional team in designing and installing a hydrogen pressure relief and ventilation system to ready a reactor set for high-pressure hydrogenations.</li><li>Developed and implemented control schemes for distillation columns and plant glycol distribution.</li><li>Coordinated process startup for a cocatalyst, directing facilities and contractors in the return-to-service of over a dozen unit operations, aided in the training of operations staff.</li><li>Maintained, revised, and created QA/QC documentation and SOPs to ensure compliance with internal and external quality, safety, and efficiency standards.</li></ul>	
<b>Internship: R&amp;D Chemistry, Catalysis</b> , W.R. Grace	<i>March 2019 to August 2019</i>
<ul style="list-style-type: none"><li>Developed two-step organic synthesis pathway for proprietary arylamine, starting from literature and advancing to the process development phase for plant implementation.</li><li>Successfully demonstrated alternative synthetic route for proprietary borate cocatalyst.</li><li>Performed and interpreted NMR measurements for R&amp;D and plant production chemistries.</li></ul>	
<b>Internship: Process Engineering</b> , TTM Technologies	<i>July 2019 to September 2018</i>
<ul style="list-style-type: none"><li>Coordinated the implementation of nickel-exclusive chemical etchant for buried resistor development, creating a work plan and optimizing process through trial runs.</li><li>Developed multivariate statistical model to predict etch times on copper etching module</li></ul>	
<b>Internship: Process Technology Development</b> , E&J Gallo Winery	<i>July 2017 to December 2017</i>
<ul style="list-style-type: none"><li>Performed bench-scale exploratory multi-vessel distillation and esterification of heavy alcohol mixture</li><li>Developed winemaking tool combining reactive processes with membrane and adsorption separation techniques. Performed scale-up calculations to transfer process to pilot plant.</li></ul>	
<b>Undergraduate Researcher</b> , Travis Walker Group at Oregon State University	<i>May 2016 to July 2017</i>
<ul style="list-style-type: none"><li>Designed experiment and computational analysis method to isolate the effect of weak viscoelasticity on fine particle removal from silicon substrates.</li><li>Used bulk and extensional rheology techniques to measure zero-shear viscosity and extensional relaxation time in water-like viscoelastic fluids.</li></ul>	

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**TEACHING EXPERIENCE**

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**Teaching Fellow**, University of Delaware *January 2023 to May 2023*  
CHEG 112: Introduction to Chemical Engineering

**Teaching Assistant**, University of Delaware *January 2022 to May 2022*  
CHEG667: Process Simulation *& September 2022 to December 2022*  
CHEG231: Chemical Engineering Thermodynamics I

**Learning Assistant**, Oregon State University *January 2018 to March 2018*  
Transport Phenomena II: Heat Transfer

**Learning Assistant**, Oregon State University *March 2018 to June 2018*  
Transport Phenomena III: Laboratory

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**AWARDS & FELLOWSHIPS**

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T.W. Fraser Russell Department Teaching Fellowship	2023
GAANN Inclusive Teaching in Chemical Engineering Fellowship (x2)	2022 & 2023
Morton and Donna Collins Chemical Engineering Fellowship	2021
1 <sup>st</sup> Place, AIChE PNW Undergraduate Research Poster Competition	2017

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**POSTERS, PUBLICATIONS, & PRESENTATIONS**

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1. J. Conradt, E.M. Furst. "Dissipative Self-Assembly of Paramagnetic Suspensions in Microgravity." 20th Gordon Research Conference on Colloidal, Macromolecular, and Polyelectrolyte Solutions, November 5, 2022, Ventura CA, USA (Poster Presentation)
2. J. Conradt, E.M. Furst. "Dissipative Self-Assembly of Paramagnetic Suspensions in Microgravity." 96th ACS Colloid and Surface Science Symposium, July 11th, 2022, Golden CO, USA (Oral Presentation)
3. J. Conradt. "Process Hazard Analysis in Specialty Chemicals Manufacturing." Chemical Process Safety (CHEG320) at Oregon State University, December 2<sup>nd</sup>, 2019, Corvallis OR, USA (Guest Lecture)
4. R. Cashen, J. Conradt, T. Walker. "Effect of Low-viscosity Non-Newtonian Fluids on Particle Removal in Post-CMP Rinse Processes." AIChE PNW Research Conference, March 22<sup>nd</sup>, 2017, Corvallis OR, USA (Poster Presentation)

# MICHELLE M. GEE

Newark, DE | 508.333.8255 | mmgee@udel.edu

## SUMMARY

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- Three years of experience in developing, validating, and analyzing computational models of biological systems
- Skilled in synthesizing large quantities of data into predictive computational models
- Proven ability to work in teams and communicate effectively

## EDUCATION

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**University of Delaware**, Newark, DE

**Ph.D., Chemical Engineering**

2025 (expected)

- Thesis: "Modeling and analysis of neural circuits underlying cardiovascular control" under the supervision of Prof. Lenhoff, Prof. Vadigepalli (Thomas Jefferson University), and the late Prof. Ogunnaike
- GPA: 3.67/4.00

**Tufts University**, Medford, MA

**B.Sc., Chemical Engineering**

2020

- Minor: Engineering Management
- GPA: 3.77/4.00 (Magna Cum Laude), Dean's List all semesters

## AWARDS

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**Robert L. Pigford Teaching Assistant Award** (2023). This award is given to six graduate students out of 100 students for excellence in teaching. **Best Poster** (2022). Awarded at the Foundations of Systems Biology in Engineering Conference to four presenters out of forty. **Finalist—Best Poster** (2021). Five finalists were selected out of 100 for the American Institute of Chemical Engineers Annual Meeting, Computing and Systems Technology Division poster session. **National Science Foundation Graduate Research Fellow** (2020). **University of Delaware Pigford Fellow** (2020).

## SKILLS

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**Computer:** MATLAB/Simulink, high performance computing, Adobe Illustrator

**Analytical:** Modeling of biological systems, parameter estimation, sensitivity analysis, data dimensionality reduction

## RESEARCH AND EXPERIENCE

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**Lenhoff/Vadigepalli Research Group — University of Delaware, Newark, DE**

*Graduate Research Assistant*

2020-Present

- Developed a computational model of neural control networks regulating cardiac physiology
- Hypothesized alternative models of neural adaptation following heart attack then developed and tested alternative models
- Models suggest that adaptations in sensory neurons lead to increased risk for heart failure, which is supported by experimental evidence
- Incorporated physiological effects of nerve stimulation medical device
- Collaborated with other engineers to extend model to represent atrial fibrillation

- First author of 2 peer-reviewed publications; contributed to 1 peer-reviewed publication

#### **Kaplan Research Group — Tufts University, Medford, MA**

*Undergraduate Research Assistant*

2017-2020

- Improved engineered model of intestine by adding crypt and villi features using 3D printing
- Engineered biochemical gradient of proteins to control intestinal organoid differentiation
- Received high honors for senior thesis titled "Engineering a biochemical gradient in 3D small intestinal model with topographical features"
- Contributed to 2 peer-reviewed publications

#### **Naval Nuclear Laboratory — West Mifflin, PA**

*Technical Intern*

May-August 2019

- Performed cost-benefit analysis of bringing bioassay program in-house
- Researched new bioassay methods and calculated instrument background and sensitivity

#### **Pham Research Group — University of Kentucky, Lexington, KY**

*Research Experience for Undergraduates Student*

May-August 2018

- Created a soft actuator with a response time of 10 milliseconds
- Designed image analysis pipeline for calculating actuator velocity from high-speed video

#### **Alden: A Verdantas Company — Holden, MA**

*Intern*

May-August 2017

- Lead test executor to analyze pressure drop due to filter fouling for a nuclear power plant emergency core cooling system
- Wrote test plan, collected, and analyzed data to validate computational model predicting water hammer in pipes that can lead to damage
- Designed sensor to measure valve closing time

#### **Amiji Research Group — Northeastern University, Boston, MA**

*Young Scholars Program Student*

May-August 2015

- Tested a nanoparticle-based delivery system for anti-inflammatory gene therapy
- Collected and analyzed quantitative polymerase chain reaction (qPCR) data for inflammatory markers to evaluate treatment efficacy

### **LEADERSHIP EXPERIENCE**

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#### **Women in Engineering — University of Delaware, Newark, DE**

*Chemical Engineering Representative*

2022-Present

- Organized graduate-undergraduate student mentoring program for 40 students
- Recruited speakers for graduate student panel

#### **Engineers Without Borders — Tufts University, Medford, MA**

*Project Leader*

2018-2019

- Aimed to design and build water tower to provide water to 200-person community in Nicaragua
- Lead weekly meetings and set weekly goals for 3 student teams
- Coordinated communication with community and NGO
- Recruited 12 new team members and increased freshman retention by 350%

#### **Society of Women Engineers — Tufts University, Medford, MA**

*Secretary*

2016-2020

- Organized a crowdfunding campaign and applied for funding to raise ~\$8000 to fund professional development opportunities
- Arranged flights and accommodations for 20 students to attend conference for recruitment fair

**EDUCATION**

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**University of Delaware****Newark, DE***Doctor of Philosophy, Chemical Engineering, GPA: 3.87/4.00**August 2020 – August 2025 (expected)*

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

Thesis Project: “Engineering *Yarrowia lipolytica* for methanol assimilation and the stable production of isoprenoids”**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 &amp; Mathematics

**PROFESSIONAL EXPERIENCE**

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**Department of Chemical and Biomolecular Engineering, University of Delaware****Newark, DE**Graduate Research Assistant, *Mark Blenner Lab**January 2021 – Present*

- Supervised two undergraduate students and utilize yeast engineering toolkits to study synthetic methylotrophy in *Y. lipolytica*
- Implement system biology principles to study and correct beta-carotene titer instability in an engineered *Y. lipolytica* strain

**Department of Chemical and Biomolecular Engineering, University of Connecticut****Storrs, CT**Undergraduate Research Assistant, *Luyi Sun Lab**May 2017 – May 2020*

- Research multi-stimuli responsive photochromic materials and their application to rewritable paper and encryption devices
- Perform experiments and analyze results to understand the material’s photochromic mechanism and to control its properties
- Utilize SolidWorks to develop 3D masks that have been used for photochromic samples in a research paper

**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 (ML) 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
- Analyzed correlations/model predictions and presented findings in a final poster presentation

**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 utilizing the dataflow programming language, Pipeline Pilot, and the data visualization/analytics software, Spotfire, to ensure that data is falling within critical process parameters (CPPs)
- Mitigated risk to multi-million dollar batches by allowing users to make process deviations if data is trending toward CPPs

**WickAway LLC****Storrs, CT**

Chief Operating Officer

*April 2017 - June 2019*

- Utilized SolidWorks to prototype an electromechanical device that automatically extinguishes the flame of a candle
- Applied thermodynamic and heat transfer concepts to find efficient heat-resistant materials for the closing mechanism

**TEACHING AND LEADERSHIP EXPERIENCE**

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**GAANN Fellowship Inclusive Teaching Experience****Newark, DE****Guest Lecturer**, Undergraduate Reaction Kinetics and Reactor Design*September 2022 – May 2023*

- Planned lectures, presented material, designed relevant homework/exam problems, and led office hours to aid in student understanding of the core material

**Colburn Club Outreach Program****Newark, DE**

Student Mentor/Tutor

*January 2021 – January 2022*

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

**PUBLICATIONS AND CONFERENCES**

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Gitman, Philip et al. (2022, Nov 13) “Understanding Cellular Heterogeneity in *Yarrowia lipolytica* Engineered for  $\beta$ -Carotene Production.” [Poster] American Institute of Chemical Engineers, Phoenix, AZ

Oyedemi, Oluwafemi et al. “Understanding the Impact of Lignocellulosic Biomass Variability on the Size Reduction Process: A Review.” ACS Sustainable Chemistry &amp; Engineering 8 (2020): 2327-2343.

Smith, Andrew T et al. “Multi-color Reversible Photochromisms via Tunable Light-Dependent Responses.” (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).



# Tejas Goculdas

PhD Candidate | Chemical & Biomolecular Engineering | University of Delaware

Email: goculdas@udel.edu

Phone: +1 6085040710

## EDUCATION

**University of Delaware (UD)**, Newark, DE  
Ph.D. in Chemical & Biomolecular Engineering

2020 - Present

**University of Wisconsin Madison**, Madison, WI.  
BS in Chemical Engineering

2016 - 2020

## RESEARCH EXPERIENCE

**UD | Graduate Research Assistant | Prof. Dionisios G. Vlachos**

2020 - Present

- Identified novel mechanisms for highly selective cross-ketonization of fatty acids and biomass-derived furans over earth-abundant catalysts and leveraged this finding to enhance productivity by an order of magnitude.
- Designed a microflow reactor and optimized the production for continuous solventless self-ketonization of fatty acids with minimal downstream separations.
- Successfully scaled up the continuous self-ketonization of lauric acid to a kilogram scale, achieving a 20x higher throughput than existing processes; the intensified process significantly impacted bio lubricant production economics, reducing the manufacturing cost (MSP) by approximately 50%.
- Established a novel route to produce carbamate insecticides with a distinctive combination of potency and reduced ecotoxicity due to their biobased design and comparatively low manufacturing cost (MSP).
- Optimized the synthesis of long-chain oxygenates over novel UiO-66 metal-organic frameworks in collaboration with Prof. Eric Bloc.
- Designed experiments to elucidate reaction pathways assisted by ground-breaking active learning software in collaboration with Dr. Maximillian Cohen.

**University of Wisconsin Madison – Madison, WI | Research Assistant | Prof. George Huber**

2018 - 2020

### Lactose Hydrolysis

- Designed and set up reactions to hydrolyze lactose to glucose and galactose with homogenous and heterogenous catalysts.
- Investigated a bio-inspired catalyst 3,3 APA to hydrolyze lactose at low pH and temperature.

## PROFESSIONAL EXPERIENCE

**SUEZ Water Technologies Seattle, WA | Process Engineering Intern**

Summer 2018, 2019

- Devised and optimized mass and energy balances on evaporation and crystallization processes to upgrade the process group's MEB Catalogue using VBA to achieve discharge objectives.
- Modelled EVAP and XZLR thermal processes for clients in a pilot plant under PSM guidelines.
- Managed chemical R&D for the waste stream data collected from FGD plants and refineries.
- Designed experiments to determine possible fouling, pH, conductivity, and TSS levels during purification.
- Led a collaboration between Process Engineering and Marketing to facilitate the organic growth of SUEZ into the treatment of hazardous waste from Oil Refining.

## TECHNICAL SKILLS

- |  |  |
|--|--|
| – Catalyst Synthesis: Impregnation, Co-precipitation | – Scanning Electron Microscopy, EDX                      |
| – Liquid & Gas Chromatography                        | – X-ray Diffraction & Small-Angle X-Ray Scattering       |
| – Fourier Transform Infrared Spectroscopy            | – Micro and High-pressure Flow Reactors                  |
| – Nuclear Magnetic Resonance Spectroscopy            | – High Purity Separation using Silica Gel Chromatography |
| – UV-Vis   |  |
| – ASPEN Plus   |  |

## LEADERSHIP

- **Mentor**, EmPOWER, University of Delaware, a graduate student organization that serves as a low-barrier peer support group to promote mental health in graduate school, 2022-Present

- Elected Co-Chair, Gordon Research Conference, Newry, ME, 2023
- International Student Representative, Colburn Club, University of Delaware, 2022

## TEACHING AND MENTORSHIP EXPERIENCE

### UD | Graduate Teaching Assistant

- CHEG 810 – Graduate Thermodynamics
- CHEG 112 – Introduction to Chemical Engineering

### UD | Undergraduate Research Mentorship

- Mr. Maximus Ramirez, 2022-Present
- Mr. Mahdi Al Ismail, 2023

## PEER-REVIEWED PUBLICATIONS

1. Z. Wang, Y. Hsiao, **T. Goculdas**, W. Fan, and D. G. Vlachos, "Cycloaddition-dehydration continuous flow chemistry for renewable para-xylene production from 2,5-dimethylfuran and ethylene over phosphorous-decorated zeolite beta", *Green Chem.*, Submitted.
2. **T. Goculdas**, M. Ramirez, S. Sadula, D. G. Vlachos, "Tailored Catalytic Synthesis of Bio-Derived Carbamate Insecticides," In preparation.
3. **T. Goculdas**, Z. Liu, A. Nanduri, S. Sadula, W. Zheng, B. Saha, M. Ierapetritou, D. G. Vlachos, "Economic Evaluation of Process Intensified Lauric Acid self ketonization on Bio-lubricant Production," In preparation.
4. **T. Goculdas**, S. Deshpande, W. Zheng, R. J. Gorte, S. Sadula, and D. G. Vlachos, "Highly selective cross ketonization of renewable acids over magnesium oxide," *Green Chem.*, 2023, **25**, 614–626.
5. **T. Goculdas**<sup>#</sup>, K. Korathotage<sup>#</sup>, C. Montone, S. Sadula, E. D. Bloch, D. G. Vlachos, "Synthesis of Long Chain Oxygenates via Aldol Condensation of Furfural and Acetone over Metal-Organic Frameworks," *ACS Appl Mater Interfaces*, Accepted, 2023.
6. M. Cohen\*, **T. Goculdas**\* and D. G. Vlachos, "Active learning of chemical reaction networks via probabilistic graphical models and Boolean reaction circuits," *React. Chem. Eng.*, 2022, **8**, 824–837.
7. M. J. Lindsay, M. S. Molitor, **T. Goculdas**, J. Zhao, J. R. Featherman, M. Li, J. B. Miller, S. Avraamidou, S. A. Rankin, J. A. Dumesic and G. W. Huber, "Production of glucose-galactose syrup and milk minerals from Greek yogurt acid whey ", *Green Chem.*, 2022, **24**, 8538–8551.

## PRESENTATIONS

### Oral

1. American Institute of Chemical Engineering, November 5<sup>th</sup>-10<sup>th</sup>, 2023, Orlando, FL: 16min duration "Synthesis of Renewable Insecticides Possessing Tailored Functional Groups."
2. North American Catalysis Society, June 8<sup>th</sup>-13<sup>th</sup>, 2023, Providence, RI: 18min duration, "Highly Selective Cross Ketonization of Renewable Acids over Magnesium Oxide."
3. American Institute of Chemical Engineering, November 13<sup>th</sup>-18<sup>th</sup>, 2022, Phoenix, AR: 18min duration, "Cross-Ketonization of Biomass-Derived Furans and Fatty Acids for Renewable Surfactants."

### Poster

1. American Institute of Chemical Engineering, November 5<sup>th</sup>-10<sup>th</sup>, 2023, Orlando, FL: "2-Tricosanone Production from Lauric Acid for the Synthesis of Cellulosic Base Oils."
2. Gordon Research Conference, Biomass to Biobased Chemicals, May 28<sup>th</sup>-June 2<sup>nd</sup>, 2023, Newry, ME: "Highly Selective Cross Ketonization of Renewable Acids over Magnesium Oxide."

3. Catalysis Club of Philadelphia, May 24<sup>th</sup>, 2023, Villanova, PA: *“Highly Selective Cross Ketonization of Renewable Acids over Magnesium Oxide.”*

# Madan R. Gopal

Location: Newark, DE, USA

Email: [mgopal@udel.edu](mailto:mgopal@udel.edu) | [LinkedIn](#) | [Google Scholar](#) | Mobile: 512-413-7811

U.S. Citizen

## EDUCATION

### University of Delaware

*Ph.D. in Chemical and Biomolecular Engineering*

Newark, DE, USA

Aug 2020 - Current

### University of Texas at Austin

*B.S. in Chemical Engineering*

Austin, TX, USA

Aug 2014 - May 2018

## EXPERIENCE

### Graduate Student and Researcher

*Dept. of Chemical and Biomolecular Engineering, University of Delaware*

Aug 2020 – Present

Newark, DE, USA

- Thesis Project: Development of enzymatic cascades for valorization of waste plastic-derived carboxylic acids
- Expertise in applications of enzymes such as carboxylic acid reductases, transaminases, PET hydrolases, and enzymatic cofactor regeneration platforms for small molecule chemistry
- Highly skilled in molecular biology, protein purification, enzyme assay development and analytical techniques
- Teaching Assistant: Fall 2022 – Undergraduate Fluid Mechanics, Spring 2022 – Metabolic Engineering
- Outreach: Colburn Club (ChBE Graduate Student Organization) AIChE Liaison (2020-2022)

### PhD Intern, Biocatalysis and Protein Engineering

*Pfizer R&D*

May 2023 – Aug 2023

Groton, CT, USA

- Development of multistep chemoenzymatic reactions for small-molecule synthesis
- Demonstration and application of enzymatic ATP regeneration
- Rational protein engineering and high-throughput screening of an emerging biocatalyst class
- Organic synthesis, isolation, purification, and analysis (UPLC-MS, TLC, 1H NMR) of small molecules

### Rotational Program Engineer

*Merck*

July 2018 – July 2020

West Point, PA, USA

- Rotation 3: Performed automation change control, worked with vendors to upgrade existing DeltaV systems, and provided process control support for the Varicella vaccine franchise. (Jan 2020 – July 2020)
- Rotation 2: Developed computational fluid dynamics models of pharmaceutical unit operations to derisk clinical-scale manufacturing of VAXNEUVANCE for FDA filing efforts. (Jan 2019 – Dec 2019)
- Rotation 1: Wrote and implemented data pipelines in R for detection and correction of RNA Seq batch effects from clinical samples. (July 2018 – Dec 2018)

### Strain Development Intern

*Dupont Industrial Biosciences (Genencor)*

May 2017 – Aug 2017

Palo Alto, CA, USA

- Developed modified *T.reesei* mutants for use in droplet-based cell sorting protocols
- Characterized enzyme trafficking through the secretory pathway using confocal fluorescence microscopy
- Observed large-scale fungal fermentation for production of industrially-relevant enzymes

### Undergraduate Researcher, Alper Lab

*Dept. of Chemical Engineering, University of Texas at Austin*

Jan 2015 – May 2018

Austin, Texas, USA

- Assisted graduate student in rational development of strong synthetic terminators in *S. cerevisiae*
- Assisted graduate student in studying T7 polymerase as a tool for CRISPR-Cas9 guide RNA transcription in multiple yeast hosts

## PUBLICATIONS

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- **M. R. Gopal**, R. M. Dickey, N. D. Butler, M. R. Talley, D. T. Nakamura, A. Mohapatra, M. P. Watson, W. Chen, A. M. Kunjapur (2023). Reductive Enzyme Cascades for Valorization of PET Deconstruction Products. *ACS Catalysis* 2023, 13, 7, 4778–4789
- N. J. Morse, J. M. Wagner, K.B. Reed, **M. R. Gopal**, L. H. Lauffer, H. S. Alper (2018). T7 Polymerase Expression of Guide RNAs *in vivo* Allows Exportable CRISPR-Cas9 Editing in Multiple Yeast Hosts. *ACS Synthetic Biology*, 7(4), 1075-1084.
- N. J. Morse, **M. R. Gopal**, J. M. Wagner, H. S. Alper (2017). Yeast Terminator Function can be Modulated and Designed on the Basis of Predictions of Nucleosome Occupancy. *ACS Synthetic Biology*, 6(11), 2086-2095.

## POSTERS AND CONFERENCE PRESENTATIONS

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- **M. R. Gopal**, R. M. Dickey, N. D. Butler, M. R. Talley, M. P. Watson, W. Chen, and A. M. Kunjapur. Reductive Enzyme Cascades for Valorization of PET Deconstruction Products. *SIMB 45th Symposium on Biomaterials, Fuels and Chemicals, Accepted Oral Presentation, May 2023.*
- S. R. Anderson, N. D. Butler, **M. R. Gopal**, A. M. Kunjapur. Enhanced Nitro Group Stabilization by Engineering the *E. coli* NARKOS Strain. *12th International Conference on Biomolecular Engineering, Poster Session, Jan 2023.*
- **M. R. Gopal**, R. M. Dickey, N. D. Butler, M. R. Talley, M. P. Watson, W. Chen, and A. M. Kunjapur. Reductive Enzyme Cascades for Valorization of PET Deconstruction Products. *2022 AIChE Annual Meeting, Oral Presentation, Nov 2022.*
- **M. R. Gopal**, R. M. Dickey, N. D. Butler, M. R. Talley, M. P. Watson, W. Chen, and A. M. Kunjapur. Reductive Enzyme Cascades for Valorization of PET Depolymerization Products Guided by the Specificity of Carboxylic Acid Reductases. *2022 Synthetic Biology: Engineering, Evolution Design, Poster Session, May 2022.*

## COMMUNITY OUTREACH AND VOLUNTEERING

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- Mentor and computer science curriculum instructor for UTeach (2017-2018)
- New-hire mentor for the 2019 start class of the Merck Emerging Talent Rotational Program (2019)
- Mentor and math instructor for Serviam Academy (2020-2021)
- Colburn Club (Graduate ChBE Organization) AIChE Liaison (2020-2022)

# ERICA A. GREEN

eagreen1338@gmail.com | (203) 512-8676 | [linkedin.com/in/erica-a-green/](https://www.linkedin.com/in/erica-a-green/)

## EDUCATION

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### University of Delaware, Newark, DE (2018 – Present)

Ph.D. Candidate, Chemical and Biomolecular Engineering

Projected graduation: May 2024

### Carnegie Mellon University, Pittsburgh, PA (2011 – 2015)

B.S. Chemical Engineering Additional Major in Biomedical Engineering

Graduated: May 2015

## INDUSTRY & RESEARCH EXPERIENCE

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### Doctoral Researcher, Kelvin H. Lee Lab

University of Delaware, Newark, DE

August 2018 – Present

Thesis: Development of cell lines, processes, and analytical methods for production and characterization of viral vectors and proteins

- Project: Design and generate stable HEK293-derived rAAV producer cell lines
  - Developed a HEK293 cell line capable of recombinase-mediated cassette exchange (RMCE) using CRISPR/Cas9 to systematically test stable expression constructs containing inducible promoters and genes for rAAV production
  - Establishing transposase-mediated cell line development workflows to generate rAAV producer cells
- Project: Develop rAAV characterization methods and generate rAAV reference material
  - Measured vector genome titer using quantitative and droplet digital polymerase chain reaction (qPCR, ddPCR) and analyzed infectious titer via in vitro transduction followed by flow cytometry to support rAAV platform development for an academic-industry consortium
  - Developing capsid titer quantification methods with bio-layer interferometry (BLI) for cell line and process development
- Project: Establish upstream and downstream bioprocesses for SARS-CoV-2 receptor binding domain (RBD) production
  - Developed transient transfection and stable fed-batch HEK293-based upstream processes and a downstream purification scheme for RBD production
  - Quantified protein yields using BLI and enzyme-linked immunosorbent assay (ELISA)
  - Led transfer of end-to-end process to industrial collaborator

### Associate Specialist, Engineering, Merck & Co

#### Manufacturing Leadership Development Rotational Program

Biologics Integrated Process Team, Brinny, Ireland

September 2017 – August 2018

- Provided quality support for validation activities during installation of new fermentation, harvest, and purification equipment for biologics manufacturing
- Reviewed documents for supplier management and new product contact material introduction during vaccine process qualification

Center for Materials Science & Engineering, Rahway, NJ

August 2016 – September 2017

- Characterized drug product formulation powders to support small molecule drug product development
- Carried out risk assessments and authored regulatory filing sections on raw materials and physical product stability

Measles, Mumps, and Rubella Vaccine Technical Operations, West Point, PA

August 2015 – August 2016

- Increased overall manufacturing process yield by implementing change controls that reduced sample volumes taken for quality testing
- Performed continuous improvement projects through process and instrument validation, documentation updates, and participation in the shop floor Aseptic Observer program

## PUBLICATIONS AND PRESENTATIONS

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- Fu, Q\*, **Green, E.A.\***, Ndhairo, N\*, Leibiger, T.M., Polanco, A, Lee, K.H., Betenbaugh, M, Yoon, S, McNally, D. Identification of media components and transfection conditions optimal for transient rAAV production via development of an open source rAAV manufacturing platform. *In preparation*. (\*indicates equal contributions)
- **Green, E.A.**, Lee, K.H. Investigation of inducible gene cassette configurations and expression levels for stable rAAV production in a recombinase mediated cassette exchange capable cell line. *Proceedings of the Biochemical Technology Division of the American Chemical Society*, San Francisco, CA, August 13-17, 2023.
- Fu, Q, Lee, Y.S., **Green, E.A.**, Wang, Y, Park, S.Y., Polanco, A, Lee, K.H., Betenbaugh, M, McNally, D, Yoon, S. Design space determination to optimize DNA complexation and full capsid formation in transient rAAV manufacturing. *Biotechnology and Bioengineering*, 120,11, 3148-3162 (2023).
- **Green, E.A.**, Hamaker, N.K. & Lee, K.H. Comparison of vector elements and process conditions in transient and stable suspension HEK293 platforms using SARS-CoV-2 receptor binding domain as a model protein. *BMC Biotechnology*, 23, 7 (2023).
- **Green, E.A.**, Lee, K.H. Analytical methods to characterize recombinant adeno-associated virus vectors and the benefit of standardization and reference materials. *Current Opinion in Biotechnology*, 65–76 (2021).

## SKILLS

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- Plasmid design and molecular cloning
- Mammalian cell culture, clonal cell line development and characterization
- Transient and stable process development, recombinant protein and viral vector production
- Analytical method development at the DNA (qPCR, ddPCR), protein (BLI, ELISA, SDS-PAGE), and cellular (flow cytometry) levels
- Design of experiments methodology
- Python for exploratory data analysis, data visualization, and statistical analysis

## HONORS & FELLOWSHIPS

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### *University of Delaware*

- Robert L. Pigford Teaching Assistant Award 2022
- Phillip and Ruth Evans Chemical Engineering Fellowship 2021 – 2022
- Chemistry-Biology Interface (CBI) Program Fellowship 2018 – 2020
- Robert L. Pigford Fellowship 2018 – 2019

### *Carnegie Mellon University*

- College of Engineering Research Honors 2015
- University Honors (>3.5 GPA) 2015
- Tau Beta Pi Engineering Honor Society 2014

## LEADERSHIP & OUTREACH

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### **Colburn Club: Chemical Engineering Graduate Student Association** Fall 2018 – 2022

- Planned social events, graduate student recruitment, and internal research symposia as First, Second, Third (Vice President), and Fourth Year Representative

### **Teaching Assistantships**

- University of Delaware: Experimental Methods in Biomolecular Engineering Spring 2021
- University of Delaware: Chemical Engineering Lab I Spring 2020

### **Society of Women Engineers**

- Society Outreach Committee Member & Lead Summer 2017 – Fall 2019
- K-12 Outreach Chair, New Jersey Section Summer 2016 – 2017
- Meeting Logistics Coordinator & Scholarship Chair, Philadelphia Section Summer 2015 – 2016

## EDUCATION

### Ph.D. in Chemical Engineering

Aug'19 - present

Department of Chemical and Biomolecular Engineering  
University of Delaware (UD), Delaware, U.S.A.

### Bachelor of Technology- Chemical Engineering

Aug'15 – Jun'19

University School of Chemical Technology  
Guru Gobind Singh Indraprastha University (GGSIPU), Delhi, India

## RESEARCH EXPERIENCE

### UD, Graduate Researcher

Jan'20 - present

Advisor: Prof. Dionisios G. Vlachos

Expertise in separations (extraction and adsorption using molecular imprinted polymers), waste stream valorization (food waste, lignin), and circular economy.

- Developed a comprehensive solvent selection framework using thermodynamic models (COSMO-RS and HSPiP) to extract value-added chemicals from food waste and demonstrated its experimental efficiency.
- Designed and implemented a novel purification technique using biobased molecular imprinted polymers, separating high-value phenolic compounds extracted from food waste.
- Microwave-assisted extraction of value-added phenolic compounds from mixed food waste.
- Analyzed lignin structure during various phenophases to facilitate successful lignin depolymerization.

### Simulation (COSMO-RS & HSPiP) and Techno-Economic Analysis

- Performed COSMO-RS simulations to evaluate 2000+ solvents for phenolic extraction, informing experimental design and understanding molecular interactions.
- Designed green solvent mixtures and molecular imprinted polymers by screening 30 functional monomers using HSPiP.
- Analyzed the techno-economic and environmental advantages of the proposed separation method using molecular imprinted polymer.

### GGSIPU, Undergraduate Researcher

Sept'18 – May'19

Advisor: Prof. Aradhana Srivastava and Prof. Leena Khanna

- Investigated the synthesis of dimethyl terephthalate from a biomass-derived platform molecule via retro-Diels alder reaction using Density Functional Theory.
- Devised a biomass-based multistep reaction to synthesize dimethyl terephthalate and experimentally investigated the first reaction step.

### Washington University in St. Louis, Research Intern

Jun'18 – Aug'18

Advisor: Prof. Vijay Ramani

- Investigated the performance of antimony-doped tin oxide supports treated with varying amounts of carbon and silica for Proton Exchange Membrane Fuel Cells (PEMFCs).
- Studied the support microstructure using transmission electron microscopy (TEM), scanning electron microscopy (SEM), and the Brunauer-Emmet-Teller (BET) analyzer.
- Evaluated the electrochemical performance of the synthesized supports using the Rotating Disk Electrode.

### Indian Institute of Technology- Delhi (IIT-D), Research Intern

Jan'18 to Mar'18

Advisor: Prof. M. Ali Haider

- Performed Density Functional Theory calculations to optimize the retro-Diels alder reaction of 2-pyrone obtained from biomass fermentation to commercially valuable aromatic compounds.

## TECHNICAL SKILLS

**Experimental:** Liquid and gas chromatography, Mass spectrometry, Thermogravimetric analysis, SEM/Energy Dispersive X-Ray analysis, UV-Vis Spectroscopy, FTIR Spectroscopy, BET surface area, Microwave reactor, Material synthesis, Extraction from biomass and food waste, Dielectrometry



## LEADERSHIP EXPERIENCE

<b>President</b> , Indian Graduate Student Association, UD	May'22 – Apr'23
<b>Department representative</b> , Women in Engineering group, UD	May'20 – May'23
<b>Lead Mentor</b> , EmPOWER mental health and peer-support Group, UD	May'22 – May'23
<b>Academic School Representative</b> , Department of Chemical Technology, GGSIPU	Aug'18 – May'19
<b>Vice President</b> , Publication Club, GGSIPU	Aug'18 – May'19
<b>Editor-in-chief</b> , Publication Club, GGSIPU	Aug'17 – May'18

## MENTORSHIP EXPERIENCE

<b>Mentored</b> 1 undergraduate researcher at UD: Brian Barrett	Nov'21 – May'23
<b>EmPOWER Student Mentor</b> , mental health and peer-support Group at UD	May'21 – Aug'22
<b>Graduate Teaching Assistant</b> , CHEG432 Chemical Process Analysis and CHEG614/814 Special Topics in Energy	Jan'22- May'22

## PATENTS AND PEER-REVIEWED PUBLICATIONS

- Gupta, Y., Barrett, B., Vlachos, D. G., Microwave-Assisted Extraction of Value-Added Chemicals from Complex Food Waste Feedstocks. (Under Preparation), 2023
- Gupta, Y., Beckett, L. E., Sadula, S., Vargheese, V., Korley, L. T., Vlachos, D. G., Bio-based Molecular Imprinted Polymers for Separation and Purification of Chlorogenic acid Extracted from Food Waste. [Special Issue, Separation and Purification Technology](#), 2023,124857
- Gupta, Y., Bhattacharyya, S., & Vlachos, D. G. Extraction of valuable chemicals from food waste via computational solvent screening and experiments. [Separation and Purification Technology](#), 316 (2023), 123719
- Gupta, Y., Beckett, L. E., Sadula, S., Vlachos, D. G., Korley, L. T., *Bio-Based Polymers for the Purification of High Commercial Value Chemicals from Plants, Food Waste and Non-Food Biomass*. [U. S. Patent 63/417,369](#) filed October 19, 2022. Provisional patent. ([Filed for U.S. Utility Patent](#))
- Luo, Y., O'Dea, R.M., Gupta, Y., Chang, J., Sadula, S., Soh, L.P., Robbins, A.M., Levia, D.F., Vlachos, D. G., Epps III, T.H. and Ierapetritou, M., A Life Cycle Greenhouse Gas Model of a Yellow Poplar Forest Residue Reductive Catalytic Fractionation Biorefinery. [Environmental Engineering Science](#), 39, no. 10 (2022), 821-833
- Ebikade, E.O., Sadula, S., Gupta, Y., and Vlachos, D. G. A Review of Thermal and Thermocatalytic Valorization of Food Waste. [Green Chemistry](#), 23, no. 8 (2021), 2806-2833

## AWARDS AND HONORS

Elected as the <b>chair of Gordon Research Seminar</b> on Chemical Separations, 2024	2022
<b>Travel Award</b> , Gordon Research Conference on Chemical Separations	2022
Awarded <b>1st prize in the 7th Annual DENIN research poster competition</b> , Delaware Environmental Institute (DEI)	2022
Awarded the <b>gold medal for academic excellence</b> , GGSIPU	2019
Received recognition for holding <b>department rank 1</b> consistently for four years, GGSIPU	2019
Received <b>Best Innovation Award</b> in Chem-E-car competition, IIT-BHU	2017

## CONFERENCE PRESENTATIONS

"Separation and Purification of High-Value Chemicals Extracted from Food Waste," American Institute of Chemical Engineers (AIChE) Annual Meeting, <i>oral presentation</i> , Phoenix, U.S.A.	Nov'22
"Separation and Purification of High-Value Chemicals Extracted from Food Waste," Gordon Research Conference/ Seminar on Chemical Separations, <i>poster presentation</i> , Ventura, U.S.A	Oct'22
"Solvent Optimization for Extraction of High Commercial Value Chemicals from Food Waste," 27th North American Catalysis Society Meeting, poster presentation, New York City, USA	May'22
"Solvent Optimization for Extraction of High Commercial Value Chemicals from Food Waste," AIChE Annual Meeting, oral presentation, Boston, USA	Nov'21
"Solvent Optimization for Extraction of High Commercial Value Chemicals from Food Waste," 25th Annual Green Chemistry and Engineering Conference, oral presentation, Virtual	Jun'21
"Synthesis of Carbon Free Fuel Cell Catalyst Supports," AIChE Annual Meeting, poster presentation, Pittsburgh, U.S.A.	Oct'18
"E-Waste to Z-waste," AIChE Annual Meeting, poster presentation, Minneapolis, U.S.A.	Oct'17

# Ali Kamali

Email: [Kamali@udel.edu](mailto:Kamali@udel.edu) | LinkedIn: <http://www.linkedin.com/in/ali-kml>

Google Scholar: <https://tinyurl.com/muvyczr> | Phone: 240-602-3068

## Education

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### University of Delaware

Ph.D. Candidate in Chemical and Biomolecular Engineering, GPA 4/4 Jan 2023 - Anticipated Dec 2024  
Advisor: Prof. Dongxia Liu

Newark, DE

### University of Maryland

Ph.D. Student in Chemical and Biomolecular Engineering, GPA 3.77/4  
Advisor: Prof. Dongxia Liu

College Park, MD  
Aug 2019 - Dec 2022

### University of Tehran

M.Sc. in Chemical Engineering

Iran  
Aug 2016 - July 2019

### Amirkabir University of Technology

B.Sc. in Chemical Engineering

Iran  
Aug 2012 - May 2016

## Experience

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### Graduate Research Assistant

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

Jan 2023 - Present

- Develop novel defected metaloxide catalysts (Pt/MO<sub>x</sub>) prepared at harsh conditions with better performance in hydrogenation reaction.
- Polymer plastics waste (PPW) upcycling to value added products by 2D materials.

### Graduate Research Assistant

Department of Chemical and Biomolecular Engineering, University of Maryland, College Park, MD

Aug 2019 - Dec 2022

- Developed a novel defected ceria (Pt/CeO<sub>2-x</sub>) prepared at harsh conditions with better performance in hydrogenation reaction.
- Designed a defective titania (Pt/TiO<sub>2</sub>) with laser engraving for selective hydrogenation reaction.
- Implemented 2D materials in hydrogenation reaction with impressive activity.

### Graduate Research Assistant

Department of Chemical Engineering, University of Tehran

Aug 2016 - July 2019

- Constructed the pyrolyzer-reformer setup in lab scale to study biomass conversion.
- Fabricated different metals loaded on zeolite for bio-oil production through catalytic pyrolysis reaction and studied optimum condition through design of experiments (DOE).
- Mentored #2 graduate students to establish design of experiments for biomass conversion reaction.
- Improved adsorption technologies: modified waste-derived nanoporous materials for pollutant removal and water purification.

### Graduate Teaching Assistant

Department of Chemical and Biomolecular Engineering, University of Maryland - College Park

Aug 2020 - May 2021

- Teaching Assistant for CHBE 444: Process Engineering Economics and Design I (Undergraduate level)  
(Instructor: Prof. Ganesh Sriram) Fall 2020
  - Educated #58 undergraduate students to use Aspen Plus and assisted students to simulate industrial chemical process.
- Teaching Assistant for ENCH 640: Advanced Chemical Reaction Kinetics (Graduate level)  
(Instructor: Prof. Dongxia Liu) Spring 2021
  - Held office hours to address students' questions, grade assignments, quizzes, and exams.

## Honors and Affiliations

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- **Member of Center for Plastics Innovation (CPI)** Aug 2023 - Present  
Working on polymer plastics waste (PPW) upcycling ([cpi.udel.edu](http://cpi.udel.edu))
- **Member of Catalysis Center for Energy Innovation (CCEI)** Aug 2020 - July 2023  
Collaborated with different multi-institutional research team nationwide ([ccei.udel.edu](http://ccei.udel.edu))
- **Received Kokes Award (NAM 28)** March 2023  
The 28<sup>th</sup> North American Catalysis Society Meeting
- **Outstanding Teaching Assistant** Fall 2021  
Recognized by the Chemical and Biomolecular Engineering Department, University of Maryland - College Park, for teaching assistant service, year of 2020-2021.

## Presentation

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- **Kamali, A.;** Liu, D. Defective Ceria Created by Oxy-hydrogen Flame and Its Influences on Pt Dispersion, Pt-Ceria Interaction and Catalytic Hydrogenation. *NAM 28, June 18-23, 2023, **Presentation.***

## Publications

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- **Kamali, A.;** et al. Defective Metal Oxides Created by Oxy-hydrogen Flame: Effect of Different Reducibility on Catalytic Hydrogenation and Pt-MO<sub>x</sub> Interaction. *[In preparation]*
- Zhang, Y.; Zhang, W.; Tran, D.; Baker, D.; Zhang, S.; Wang, T.; Ashfaq, A.; Gonzalez-Lopez, L.; **Kamali, A.;** et al. Laser-Engraved Defects in TiO<sub>2</sub> Support: Enhancing Reducibility and Redox Capability of Pt/TiO<sub>2</sub> Catalyst for Reactive and Selective Hydrogenation. *Under review, Molecular Catalysis.*
- **Kamali, A.;** et al. Defective Ceria Created by Oxy-hydrogen Flame and Its Influences on Pt Dispersion, Pt-Ceria Interaction and Catalytic Hydrogenation. *Molecular Catalysis, 2023.*
- Little, J.; Sun, J.; **Kamali, A.;** et al. Noble Metal Ion-Directed Assembly of 2D Materials for Heterostructured Catalysts and Metallic Micro-Texturing. *Advanced Functional Materials, 2023.*
- Tehrani, N.; Alivand, M.; **Kamali, A.;** et al. Seed-mediated synthesis of a modified micro-mesoporous MIL-101(Cr) for improved benzene and toluene adsorption at room conditions. *Journal of Environmental Chemical Engineering, 2023.*
- **Kamali, A.;** et al. Optimized catalytic pyrolysis of refinery waste sludge to yield clean high quality oil products. *Fuel, 2022.*
- Alivand, M.; Najmi, M.; Tehrani, N.; **Kamali, A.;** et al. Tuning the surface chemistry and porosity of waste-derived nanoporous materials toward exceptional performance in antibiotic adsorption: Experimental and DFT studies. *Chemical Engineering Journal, 2019.*

## Technical Skills

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**Material Characterizations:** UV-VIS, TEM, SEM, BET, TGA, XRD, XPS, FT-IR, Raman, EPR.

**Laboratory Skills:** Material Synthesis and Characterization, Polymer Upcycling, Defects Engineering, Photocatalysis, Hydrogenation, Chemisorption Analyses, Process Simulation, Techno-Economic Analysis.

**Software:** Aspen Plus, Aspen HYSYS, Origin, Design Expert.

**Familiar with:** GPC, DSC, SAXS, MATLAB

# Nefeli Kamarinopoulou

Ph.D. Candidate | Chemical & Biomolecular Engineering | University of Delaware

Phone: (302) 345-7593 | Email: [nefeli@udel.edu](mailto:nefeli@udel.edu) | LinkedIn: [in/nkamarinopoulou](#)

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## Education

University of Delaware (UD), Newark, DE Ph.D. in Chemical Engineering	2020-2025
National Technical University of Athens (NTUA), Athens, Greece Integrated BS & MS in Chemical Engineering	2014-2019

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## Research Experience

UD   Graduate Research Assistant   <b>Dr. Dionisios G. Vlachos</b>	Jan. 2021 – Present
<ul style="list-style-type: none"><li>Researching non-thermal plasma and resistive heating for electrification of industrial processes including nitrogen fixation, hydrogen cyanide synthesis, in-situ hydrogen production and methane non-oxidative coupling.</li><li>Collaborated with Research Unit Plasma Technology (RUPT) at Ghent and Chimie des Interactions Plasma-Surface (ChIPS) at Mons, and showed the detrimental effect of water presence on energy efficiency of plasma-assisted nitrogen fixation<sup>1</sup>.</li><li>Demonstrated electrified, direct, catalyst-free and selective hydrogen cyanide formation for the first time via novel route of non-thermal N<sub>2</sub>/CH<sub>4</sub> plasma<sup>2</sup>.</li><li>Developed a pioneering modelling approach to gas phase plasma chemistry and showed that significantly reducing the number of active species to only neutral radicals can replicate experimental trends semi-quantitatively<sup>2</sup>.</li></ul>	
UD   Research Assistant   <b>Dr. Dionisios G. Vlachos</b>	Jan. 2020 – Jul. 2020
<ul style="list-style-type: none"><li>Conducted research on zeolite catalysts for biomass conversion in batch and flow reactors in collaboration with industry partner GORE.</li><li>Gained competencies with high performance liquid chromatography (HPLC), microfluidics, and computational fluid dynamics (CFD).</li></ul>	
NTUA   Undergraduate Research Assistant   <b>Dr. Antonis Karantonis</b>	Feb. 2019 – Sep. 2019
<ul style="list-style-type: none"><li>Investigated the viability of prospective underground high voltage direct current (HVDC) network.</li><li>Determined that low-cost copper grounding electrodes would not be viable for long term use in the proposed soil conditions, and that alternate propositions should be made.</li></ul>	

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## Awards

UD   ISCRE 27 Travel Award	Jun. 2023
UD   Schipper Fellowship	Jan. 2021-Aug. 2021
NTUA   Agoniston Polytechniou November 1973	Sep. 2014

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## Technical skills

- Non-thermal Plasma Chemistry & Instrumentation	- UV-Vis Spectroscopy
- Microkinetic modelling (CHEMKIN)	- Continuous flow reactors/microreactors
- Liquid, Gas & Ion Chromatography	- Electrochemical techniques
- Mass Spectrometry	- MATLAB
	- XRD, XRF, SEM, TEM

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## Leadership Experience

UD   Vlachos Lab	Sep. 2021-Present
<ul style="list-style-type: none"><li>Assisted in general management of research group (50 people)</li><li>Organized career development events for research group</li><li>Safety committee member – oversaw safety in secondary lab location and launched annual ChemInventory audits</li></ul>	
UD   Colburn Club International student representative	Sep. 2022-Aug. 2023
<ul style="list-style-type: none"><li>Arranged career panels and information sessions for current and incoming CBE graduate students</li></ul>	
CCP   Director of Sponsorship of Catalysis Club of Philadelphia (CCP)	Aug. 2023-Present

- Secured funds to facilitate monthly CCP meetings and Spring Symposium for season 2023-2024.

## Teaching Experience

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UD | Graduate Teaching Assistant

Feb. 2022 – Dec. 2022

MATH 305 - Applied Mathematics for Biomedical, Chemical and Biomolecular Engineers

- Led laboratory section aimed at teaching MATLAB computational software for solving engineering problems to undergraduate biomedical, chemical and biomolecular engineering students.

CHEG 341 - Fluid Mechanics

- Created homework rubrics, graded homework and held office hours aimed at aiding undergraduate chemical engineering students in learning theory of flow of incompressible viscous and non-viscous fluids, turbulent and laminar flow and applications in chemical processing.

## Presentations

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ISCRE 2023 | Quebec, Canada | Oral Presentation

- “Direct HCN synthesis via plasma-assisted conversion of methane and nitrogen”

AICHe 2023 | Orlando, Florida | Oral Presentation

- “Direct HCN synthesis via plasma-assisted conversion of methane and nitrogen”

## Peer-Reviewed Publications

(\* indicates equal contribution)

1. Gromov M. \*, **Kamarinopoulou N. \***, De Geyter N., Morent R., Snyders R., Vlachos D., Dimitrakellis P., Nikiforov A., “Plasma-assisted nitrogen fixation: the effect of water presence”, *Green Chem.* 24 (2022) 9677
2. **Kamarinopoulou N.**, Wittreich G., Vlachos D., “Direct HCN synthesis via plasma-assisted conversion of methane and nitrogen”, *Sci. Adv.* (submitted)
3. **Kamarinopoulou N.**, Dimitrakellis P., Vlachos D., “Sustainable nitrogen-based fertilizer production via plasma-assisted nitrogen fixation”, (in preparation)
4. **Kamarinopoulou N.**, Vlachos D., “Dynamic electrification of ammonia decomposition for hydrogen production”, (in preparation)

## SOOJIN KWON, Ph.D.

skwon@udel.edu | +1 984-285-9554

Newark, DE 19702 | <http://linkedin.com/in/skwon6>

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### Research Experience

#### University of Delaware, Department of Chemical & Biomolecular Engineering

Newark, DE

*Postdoctoral Researcher*

May. 2023 – present

- Studying deconstruction of municipal solid wastes
- Studying depolymerization of polyurea

#### NC State University, Department of Forest Biomaterials

Raleigh, NC

*Postdoctoral Researcher*

Sep. 2022 – April. 2023

- Investigated molecular parameters of bio-based materials affecting their biodegradation, regarding chemical structures and enzymatic degradation
- Participated in writing a research proposal for grant, NWI Core Research project (PI: Professor Richard Venditti, project number not assigned yet), \$150,000

#### The Nonwovens Institute / NC State University, Department of Forest Biomaterials

Raleigh, NC

*Research Assistant*

Aug. 2019 – Aug. 2022

- Examined aquatic biodegradation of bio-based polymers and polymer blends and investigated key factors affecting their biodegradation
- Investigated polymer blending and melt-spinning with bio-based polymers
- Studied microfiber shedding from nonwoven materials in water and air environments

#### Seoul National University, Department of Environmental Materials Science

Seoul, Korea

*Research Assistant*

Sep. 2017 – Aug. 2019

- Investigated coating with inorganic particles and latex, regarding coating structures and drying kinetics of coatings
- Studied latex particle swelling and binder migration with chemically modified hydrophilic latex

### Education

Ph.D., Forest Biomaterials | North Carolina State University

Aug. 2022

M.S., Environmental Materials Science | Seoul National University

Aug. 2019

B.S., Environmental Materials Science | Seoul National University

Feb. 2017

### Awards

- Irving S. and Helen Haft Goldstein Graduate Fellowship, \$3,000 2021 – 2022

### First Author Publications

- **Soojin Kwon**, Marielis C. Zambrano, Richard A. Venditti, Joel J. Pawlak. (2023). Aerobic aquatic biodegradation of bio-based and biodegradable polymers: Kinetic modeling and key factors for biodegradability. *International Biodeterioration & Biodegradation*, 185, 105671.
- **Soojin Kwon**, Marielis C. Zambrano, Joel J. Pawlak, Ericka Ford, Richard A. Venditti. "Aquatic biodegradation of poly( $\beta$ -hydroxybutyrate) and polypropylene blends with compatibilizer and the generation of micro- and nano-plastics on biodegradation" *Journal of Polymers and the Environment* (2023).
- Zhenghui Shen, **Soojin Kwon**, Hak Lae Lee, Martti Toivakka, Kyudeok Oh. "Preparation and application of composite phase change materials stabilized by cellulose nanofibril-based foams for thermal energy storage. " *International Journal of Biological Macromolecules* 222, 3001-3013 (2022). (*co-first author*).
- **Soojin Kwon**, Marielis C. Zambrano, Richard A. Venditti, Ryen Frazier, Franklin Zambrano, Ronalds W.

Gonzalez, Joel J. Pawlak. "Waterborne and Airborne Microfibers Shed from Non-Woven Materials in Water and Air Environments." *Environmental Science and Pollution Research* (2022). (Under review)

- **Soojin Kwon**, Marielis C. Zambrano, Joel J. Pawlak, Richard A. Venditti. "Effect of lignocellulosic fiber composition on the aquatic biodegradation of wood pulps and the isolated cellulose, hemicellulose and lignin components: kinetic modelling of the biodegradation process." *Cellulose* (2021).
- **Soojin Kwon**, Kyudeok Oh, Sang Jin Shin, Hak Lae Lee, "Effects of Hydroxyethyl Methacrylate Comonomer in Styrene/Acrylate Latex on Coating Structure and Printability", *Progress in Organic Coatings*, 147, 105862 (2020).
- **Soojin Kwon**, Kyudeok Oh, Sang Jin Shin, Hak Lae Lee, "Structure changes of coating layer by styrene/acrylate latex with hydroxyethyl methacrylate", *ACS Omega*, 4(19), 18405-18412 (2019).

### Work in Progress

- **Soojin Kwon**, Marielis C. Zambrano, Joel J. Pawlak, Ericka Ford, Richard A. Venditti. "Aquatic biodegradation of poly( $\beta$ -hydroxybutyrate) in blends with polylactic acid and maleic anhydride compatibilizer." (Submitted).

### Conference Presentations

#### Oral presentation

- **Soojin Kwon**, Marielis C. Zambrano, Joel J. Pawlak, Richard A. Venditti, "Effect of paper-making additives on biodegradation of lignocellulosic fibers." *Fall conference of KTAPPI, 2022, October, Jinju, Korea*.
- **Soojin Kwon**, Joel J. Pawlak, Marielis C. Zambrano, Ericka Ford, Richard A. Venditti, "Impact of Polylactic acid (PLA) on the Aquatic Aerobic Biodegradation of Polyhydroxy butyrate (PHB) in Polymer Blended Fibers." *The Fiber Society 2022 Fall Meeting and Technical Conference, 2022, Oct 19 – Oct 21, Raleigh, North Carolina, USA*.
- **Soojin Kwon**, Marielis C. Zambrano, Joel J. Pawlak, Ryan Fraizer, Franklin Zambrano, Ronalds W. Gonzalez, Richard A. Venditti, "Microparticles entering the air and water environment from nonwoven products: methodology development and initial findings." *27th Bio-Environmental Polymer Society Meeting, June 23-25 (virtual)*.
- **Soojin Kwon**, Marielis C. Zambrano, Joel J. Pawlak, Richard A. Venditti, "Aquatic biodegradation of wood fibers and biopolymers." *ACS spring 2021 (virtual)*
- **Soojin Kwon**, Kyudeok Oh, and Hak Lae Lee, "Effects of Styrene Acrylate/2-Hydroxyethyl acrylate latex on coated paper property." *Spring conference of KTAPPI, 2019, Apr. 25 – 26, Chuncheon, Korea*.
- **Soojin Kwon**, Kyudeok Oh, Jee-Hong Lee, and Hak Lae Lee, "Effects of HEMA content on SA latex property and its effect on coating structure." *Pan pacific fibre value chain conference, 2018, Dec. 4-7, Rotorua, New Zealand*.
- **Soojin Kwon**, Kyudeok Oh, Jee-Hong Lee, and Hak Lae Lee, "Effects of Styrene Acrylate/2-Hydroxyethyl acrylate latex on coating structure." *Fall conference of KTAPPI, 2018, Oct. 25 – 26, Jinju, Korea*.

### Skills & Additional Experiences

*Technical:* DSC, TGA, GCMS, GPC, SEM, ToF-SIMS, TEM, CLSM, Rheology, Drying dynamics (MW-DWS), UTM, Mercury Porosimeter.

*Experimental:* Depolymerization, Aquatic biodegradation, Polymer blending & melt-spinning, Inorganic & polymer coating.

*Leadership:* Secretary of Forest Biomaterials Graduate Student Association, Instrument lead of Forest Biomaterials Analytical Testing

# Thomas Leibiger

## Current Address:

537 Buckeye Lane  
West Chester PA, 19382

## Contact information:

tleibige@udel.edu  
207-347-0137

**Summary** – Team-focused and driven PhD candidate with three years of industry experience in biopharmaceutical downstream process development. Demonstrated ability to impact projects through organization, leadership, and attention to detail.

## EDUCATION

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**University of Delaware, College of Engineering** (Newark, DE) (2020 – Current)

4<sup>th</sup> year PhD candidate in Chemical and Biomolecular Engineering – Kelvin H. Lee lab

- Research areas include adeno-associated virus (AAV) vector production and characterization for gene therapy applications, mass spectrometry for protein analysis, and downstream bioprocessing

**Villanova University, College of Engineering** (Villanova, PA)

Master of Science in Biochemical Engineering (2017 – 2018)

- GPA: 3.83/4.00 – magna cum laude

Bachelor of Science in Chemical Engineering

(2013 – 2017)

- GPA: 3.73/4.00 – cum laude, OXE Chemical Engineering Honor Society

- Minors in Bioengineering and Chemistry

## WORK and RESEARCH EXPERIENCE

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**University of Delaware, PhD Candidate – Chemical and Biomolecular Engineering, Kelvin H. Lee lab**

(Newark, DE) (2020 – Current)

- Established laboratory protocols for AAV serotypes 2, 5, 8, and 9 production, purification, and analytics including optimization of a three-plasmid transfection process in suspension HEK293 cells, affinity chromatography for virus purification, and transmission electron microscopy (TEM) and analytical ultracentrifugation (AUC) for measurement of vector genome packaging (full/empty)
- Researching process-related impurity retention and clearance in AAV vector production and purification using tandem mass spectrometry (LC-MS/MS) proteomic methods
- Studying the impact of AAV serotype, processing conditions, and cell culture harvest strategy on host cell protein (HCP) levels with the goal of identifying HCP retention mechanisms to better inform AAV downstream process development
- Collaborating on projects characterizing monoclonal antibody glycosylation profiles, establishing platform analytical methods for measuring AAV vector genome titer and full/empty genome ratio, and optimizing HEK293 cell culture media-components for improved AAV production and viral genome packaging

**GlaxoSmithKline, Downstream Process Development – Associate Scientist**

(Upper Merion, PA)

(January 2018 – July 2020)

- Worked on protein purification process development, characterization, and technology transfer of Phase I-III biopharmaceuticals with focus on yield, product quality, and process robustness
- Key responsibilities included design and execution of scale-down laboratory experiments, data analysis and interpretation of results, and detailing of key information in electronic laboratory notebooks
- Served as the lead of Protein A affinity chromatography process development for a phase III monoclonal antibody being transferred to a 15,000 L commercial manufacturing facility for large-scale production
- Contributed to a wide range of unit operation development including depth filtration, centrifugation, flocculation, affinity chromatography, ion-exchange chromatography, hydrophobic interaction chromatography and viral clearance validation across early and late phase project



# Thomas Leibiger

## Current Address:

537 Buckeye Lane  
West Chester PA, 19382

## Contact information:

tleibige@udel.edu  
207-347-0137

## **GlaxoSmithKline, Downstream Process Development – Co-op**

(Upper Merion, PA)

*(June 2017 – December 2017)*

- Investigated disulfide bond reduction mitigation strategies for monoclonal antibodies across harvest and the downstream process including dissolved oxygen, temperature, pH, and time-dependent impacts
- Developed a small-scale model to screen reduction propensity and evaluated control strategies for harvest and purification of IgG1, IgG2, and IgG4 monoclonal antibodies

## **Bristol-Myers Squibb, Upstream Process Development – Intern**

(Bloomsbury, NJ)

*(June 2016 – August 2016)*

- Worked within the Upstream Process Development team to evaluate and optimize a continuous feeding strategy for a CHO cell line using the AMBR250 automated bioreactor system
- Performed studies analyzing the stability of a platform feed for a CHO cell line based on cell-growth profiles and monoclonal antibody specific productivity

## **TECHNIQUES and SKILLS**

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### **Upstream Bioprocessing**

- Mammalian cell culture at well-plate, shake flask, and bioreactor scale
- Transient and stable cell culture process development, recombinant protein and viral vector production
- AMBR15 and AMBR250 high-throughput bioreactor systems

### **Downstream Bioprocessing**

- Protein purification techniques including AKTA (Avant, Pure, Explorer, Purifier) operation and use of UNICORN software
- Affinity, ion-exchange, hydrophobic interaction chromatography process development, process characterization, and scale-up
- Depth filtration, membrane filtration, flocculation, and centrifugation process development, process characterization, and scale-up

### **Analytics**

- Waters BioAccord LC-MS including intact protein, peptide mapping, and multi-attribute monitoring for monoclonal antibody and viral vector product quality analysis
- Quantitative and digital droplet PCR, analytical ultracentrifugation, transmission electron microscopy, Octet bio-layer interferometry

## **ADDITIONAL EXPERIENCE, LEADERSHIP ROLES, and VOLUNTEER WORK**

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### **ACS BIOT Mid-Atlantic Student Chapter President**

*(2023-current)*

- Lead a Student Chapter of passionate graduate students focused on engaging with academic and industry professionals working in biotechnology across the Mid-Atlantic region
- Responsibilities include running regular meetings, planning in-person and virtual events, organizing mentorship programs, and representing the Student Chapter at national meetings

### **Chemical and Biomolecular Engineering EmPOWER mentor**

*(2022-current)*

- Volunteer as a mentor to promote mental wellbeing and community support for first-year PhD students in Chemical and Biomolecular Engineering

### **Additional Activities and Awards**

- Phillip and Ruth Evans Chemical Engineering Fellow *(2023)*
- Science, Technology, Agriculture, and Research (STAR) campus representative *(2022-2023)*
- Nationally licensed Emergency Medical Technician with over 200 volunteer hours *(2015-2019)*
- Villanova men's rowing team member *(2015-2016)*
- Maine Medical Center summer research intern *(2015)*

## Priyanka Nain, Ph.D.

257 Colburn lab, 150 Academy Street, Newark, DE 19716 | [prinain@udel.edu](mailto:prinain@udel.edu)

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I am passionate about applying synthetic biology to address global challenges in sustainability and healthcare. I have a PhD in Molecular Biology and Bioprocess, and over 8 years of academic research experience in biotherapeutic design, cell culture, bioprocess, strain engineering, and biocatalysis. I have led and contributed to several dynamic and interdisciplinary research projects, resulting in 12 peer-reviewed publications, a book chapter, and 3 patents. I have also trained and mentored 10+ undergrads, master's, and PhD students, and presented my work at national and international conferences.

### Education

07/21 – present **Post-Doctoral Research Fellow, Chemical and Biochemical Engineering Department, UDEL**

Thesis: Microbial engineering for amine synthesis/Microbial and mammalian coculture

Advisor: Dr. Aditya M. Kunjapur

12/16 – 02/21 **Ph.D., Chemical Engineering, Indian Institute of Technology Delhi, India**

Thesis: Strategies to improve biotherapeutic production in microbial cell factories

Advisor: Prof. Anurag S. Rathore; Co-supervisor: Prof. James Gomes

CGPA: 9.57/10.0

07/12 – 07/14 **M.Tech., Biotechnology, Thapar Institute of Engineering and Technology, Patiala, India**

CGPA: 8.78/10.0

Thesis: Kinetics of CO<sub>2</sub> sequestration by *Chlorella Vulgaris* in a photobioreactor

Advisor: Prof. Pramod Bajpai; Co-supervisor: Prof. Haripada Bhunia

06/08 – 06/12 **B.Tech., Biotechnology, University Institute of Engineering and Technology KUK, India**

Percentage: 72.6%

Plant tissue culture techniques, HAU Hisar (Summer Internship)

### Teaching Experience

02/18 – 05/18 **Teaching Assistant, IITD Chemical Engineering Department, India (5 hrs/wk)**

Appointed as grader and tutor for the graduate “Bioprocess and Bioseparation” CLL 780 course.

08/17 – 12/17, **Teaching Assistant, IITD Chemical Engineering Department, India (5 hrs/wk)**

Served as a teaching assistant for the undergraduate “Bioprocess and Bioseparation” CLL 777 course.

Planned and led weekly recitations/office hours.

02/15, 05/15 **Teaching Assistant, IITB Chemical Engineering Department, India (5 hrs/wk)**

Served as a teaching assistant for the “Chemical Reaction Engineering” CL324 course.

Planned and led weekly recitations/office hours.

09/15– 12/15 **Teaching Assistant / Research Assistant, Chemical Engineering, IIT Bombay, India (9 hrs/wk)**

Planned and led weekly recitations/office hours for the “Chemical Engineering Lab III CL 335”

Independently planned and performed experiments.

### Awards

WIC Travel Award Nominee for AIChE – 2023

NSF grant to attend the 4<sup>th</sup> International CRISPR Conference – 2021

NSF grant to participate in International Mammalian Synthetic Biology Workshop– 2021

International Travel Award for Poster Presentation in the USA, ACS National Meeting – 2019

BIOPRO World Talent Campus Participant (1 of 18 International Ph.D. Students) –2017

Times of India scholarship from Indian Army, AG's Branch from high school to masters

IIT Bombay -TEQIP Institute fellowship –2014-2015

Qualified Graduate Aptitude Test in Engineering– AIR 352, GATE 2013 and AIR 239, GATE 2014

Best poster award at Bioprocess Engineering Conference India -2018

Education scholarship award from the Indian Army by AWES from 10<sup>th</sup> to B.Tech.

### Peer-Reviewed Publications

ORCID: 0000-0002-1929-1077, Published (12 first/co-first authors)

1. **Nain, P.**; Dickey RM.; Somasundram, V.; Sulzbach, M.; Kunjapur, A. M. Reductive amination cascades in cell-free and resting whole-cell formats for valorization of lignin deconstruction products. **Biotech and Bioeng.** 2023, 1-12.
2. Butler, N. D.; Anderson, S. R.; Dickey, R. M.; **Nain, P.**; Kunjapur, A. M. Combinatorial Gene Inactivation of Aldehyde Dehydrogenases Mitigates Aldehyde Oxidation Catalyzed by E. coli Resting Cells. **Metabolic Engineering** 2023, 77, 294-305.
3. Kachhawaha, K.; Singh, S.; Joshi, K.; **Nain, P.**; Singh, S.K. Bioprocessing of Recombinant Proteins from Escherichia coli Inclusion Bodies: Insights from Structure-Function Relationship for Novel Applications. **Preparative Biochem. Biotechnol.** 2022, 1-25.
4. Gangwar, N.; **Priyanka, P.**; Rathore, A. S. Achieving Charge Variant Profile of Innovator Molecule during the Development of Monoclonal Antibody-Based Biosimilars - Use of Media Components. **Biochem. Eng. J.** 2022, 182, 108438.
5. **Priyanka, P.**; Rathore, A. S. A Novel Strategy for Cloning and Expression of Complex Biotherapeutic in the Microbial System. **J. Chem. Technol. Biotechnol.** 2022, 97, 42-54.
6. **Priyanka, P.**; Patil, R.; Meshram, P. D.; Singh, J.; Rathore, A. S. Ethanol as additive enhances expression of Ranibizumab in Escherichia coli: Impact on cellular physiology and transcriptome. **Process Biochem.** 2022, 112, 167-176.
7. Nivedhitha, S.; **Priyanka, P.**; Rathore, A. S.; Senthil Kumar, S.; Senthilmurugan, S. Cole-Cole Modeling of Real-Time Capacitance Data for Estimation of Cell Physiological Properties in Recombinant Escherichia coli Cultivation. **Biotechnol. Bioeng.** 2022, 119, 2759-2770.
8. Rathore, A. S.; Mishra, S.; Nikita, S.; **Priyanka, P.** Bioprocess Control: **Current Progress and Future Perspectives.** **Life** 2021, 11, 557.
9. Nivedhitha, S.; **Priyanka, P.**; Rathore, A. S.; Senthil Kumar, S.; Senthilmurugan, S. Multi-Objective Optimization for Enhanced Production of Therapeutic Proteins in Escherichia coli: Application of Real-Time Dielectric Spectroscopy. **Ind. Eng. Chem. Res.** 2020, 59, 21841-21853.
10. Bhardwaj, T.; **Priyanka, P.**; Rathore, A. S.; Jha, S. K. An Aptamer Based Microfluidic Chip for Impedimetric Detection of Ranibizumab in a Bioreactor. **Sens. Actuators, B** 2020, 312, 127941.
11. **Priyanka, P.**; Kumar, J.; Gomes, J.; Rathore, A. S. Implementing Process Analytical Technology (PAT) using Advanced Control Schemes for Production of Recombinant Protein from *E. coli*. **Biotechnol. J.** 2019, 14, 1800556. **Media appreciation of the work:** <https://www.thebetterindia.com/158165/iit-delhi-kerala-floods-snakes/>
12. **Priyanka, P.**; Roy, S.; Chopda, V.; Gomes, J.; Rathore, A. S. Comparison and Implementation of Different Control Strategies for Improving the Production of rHSA Using Pichia pastoris. **J. Biotechnol.** 2019, 290, 33-43.
13. **Nain, P.**; Christoff, T.; Sulzbach, M.; Kunjapur, A. M. Epps, TIII. Enabling Polymerization-Ready Biocatalytic Amine Transfer to Functionalized Lignin-Derived Carboxylic Acids and Aldehydes. Manuscript in preparation for ACS sustainable chemistry.

### Book Chapters

1. **Priyanka P.**; Mishra, S.; Rathore A.S. Strategies for improving Biotherapeutic protein production in microbial cell factories. **Spring Nature. Fw: Microbiology Monographs**, Vol. 37, Bernd H.A. Rehm and David Wibowo (Eds): Microbial Production of High-Value Products, 978-3-031-06599-6, 503486\_1\_En, (Chapter 4).

### Patents

1. Kunjapur, A.M, Gopal, M.R., Dickey, R.M., Chen, W., and **Nain P.** "Reductive amination cascades." RP Ref.: **UOD-553WO**; Filing date of the Application- 2nd May 2023.

- Rathore, A.S., **Priyanka, P.**, & Meshram, P.D. "A Recombinant Construct, And Implementations Thereof." Reference no.- **WO201911045373**; Filing date of the Application- 18th Feb 2019.
- Subbiah, S., Sivaprakasam, S., Rathore, A.S., Swaminathan, N., & **Priyanka, P.** "A robust system for the real-time estimation of physiological properties of biomass using dielectric spectroscopy." Reference no.- **202131018107**; Filing date of the Application- 19th April 2021

### **Conference Presentations**

<b>Date</b>	<b>Authors</b>	<b>Short Title</b>	<b>Type</b>	<b>Conference</b>	<b>Travel Award</b>
11/09/2023	Priyanka et al	Reductive amination	Oral	AIChE, USA	NSF
01/04/2019	Priyanka et al	Process controller	Poster	ACS, USA	Institutional travel award
02/04/2019	Priyanka et al	PAT implementation	Poster	ACS, USA	Institutional travel award
12/14/2019	P. D. Meshram, Priyanka P.,	HSA Fermentation	Poster	Bioprocessing India (BPI)	DBT
12/14/2018	Priyanka et al	Biomanufacturing	Poster	COE-CBT, India	N/A (local)
12/14/2017	S. Roy, Priyanka P.,	AI/ML-driven Process controller	Poster	BPI	DBT
02/06/2017	Priyanka et al	Biomanufacturing	Oral	Biopro Net Meeting, Virtual	-
08/24/2017	Priyanka et al	Project team assignment	Oral	Biopro WTC, Denmark	Novo Nordisk sponsored
08/23/2017	Priyanka et al	PAT implementation	Poster	Biopro WTC, Denmark	Novo Nordisk sponsored
12/15/2016	Priyanka et al	PAT implementation	Poster	BPI	Institutional travel award
07/08/2015	Priyanka et al	Directed evolution	Poster	Enzyme Engineering XXIII, USA	TEQIP
02/24/2014	Priyanka et al	CO <sub>2</sub> mitigation	Oral	IDCT, India	-

### **Professional Service**

**Manuscript reviewer:** *Journal of Chemical Technology & Biotechnology, MDPI Journals: Biologics, Life, and SynBio, and Biotechnology and Genetic Engineering Reviews*

**Conference abstract reviewer:** *Renewable Energy 2023*

**Membership:** *AIChE, BPI, ACS, and Enzyme Engineering*

### **Mentoring**

10+ undergrads, masters, and Ph.D. students

# Darien K. Nguyen

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## Education

**University of Delaware**, Newark, DE

**August 2020 - Present**

*Ph.D. Candidate in Chemical and Biomolecular Engineering (CBE)*

**Cumulative GPA: 3.797**

- **Research Topic:** Non-thermal, Atmospheric Plasma (NTAP) Processes for Plastic Upcycling and Enhanced Catalysis
- **Advisor:** Professor Dionisios G. Vlachos, Ph.D.

**Winthrop University**, Rock Hill, SC

**Graduation Date: May 2020**

*B.S. Chemistry (ACS Engineering-Physics Concentration), Minors: Math and Physics*

**Cumulative GPA: 3.950**

- **Undergraduate Research:** Fabrication of Supercapacitor Electrodes utilizing Electrophoretic Deposition (EPD) of Metal-Organic Frameworks (MOFs)

## Industrial and Research Experience

**University of Delaware**, Newark, DE

**August 2020 – Present**

*Graduate Research Assistant*

- Explored the utilization of NTAPs as an electrified approach to valorize plastic waste derivatives, specifically liquid linear alkanes.
- Designed and optimized a pin-to-plate, dielectric barrier discharge (DBD) plasma reactor to allow oxidative functionalization of long-chain liquid alkanes at competitive energy yields.
- Successfully enhanced the plasma-liquid interface utilizing a modular biphasic microreactor, achieving the highest energy yield compared to previous plasma processes in the oxidation of n-alkanes.
- Introduced NTAP as a greener, more efficient approach to oxidize activated carbons than traditional nitric acid treatment for enhanced catalytic performance of activated carbon-supported metal catalysts by increasing metal dispersion.
- Established a novel method to utilize NTAP to controllably remove organic ligands in nanoparticle synthesis, namely Pd nanocubes, without altering the morphology. Demonstrated the favorable effects of NTAP over traditional calcination methods in both synthesis and activity testing of nanocatalysts.

**Winthrop University**, Rock Hill, SC

**January 2018 – May 2020**

*Undergraduate Research Assistant*

- Conducted research on the synthesis of MOFs and the fabrication of MOF supercapacitor electors utilizing electrophoretic deposition (EPD).
- Investigated and optimized the electrochemical performance of the supercapacitors through parametric testing of the EPD process and different electrolytes.

**ShayonNano USA Inc.**, Chester, SC

**January 2020 – May 2020**

*Research Intern in the Quality Control Sector*

- Assisted in the manufacturing and synthesis of customized, sustainable materials for paint and coating products.
- Assessed the performance of customized paints and coatings against commercial brands using standards such as opacity, color matching, and physical deterioration.

**Cornell University REU**, Ithaca, NY

**May 2019 – August 2019**

*Researcher in the Nanoscale Science and Technology Facility (CNF)*

- Conducted research exploring the development of microfluidic devices for processing cumulus-oocyte complexes (COCs) for intracytoplasmic sperm injection (ICSI).
- Designed and fabricated microfluidic devices using AutoCAD and photolithography spin-coating techniques. Tested and optimized the devices using crosslinked polymeric beads to simulate COCs.

## Teaching and Mentoring Experience

**University of Delaware**, Newark, DE

**May 2023 – August 2023**

*Graduate Research Mentor*

- Mentored a summer undergraduate as they explored research on the plasma pretreatment of plastics for biodegradation processes.

*Graduate Teaching Assistant*

**February 2022 – December 2022**

- Aided in the teaching of the undergraduate courses, Chemical Engineering Laboratory I (Kinetics) and Chemical Engineering Laboratory II (Distillation Lab)
- Responsibilities included organizing syllabi and schedules, supervising and assisting lab experiments, grading assignments, and responding to course material questions.

**Winthrop University**, Rock Hill, SC

**August 2019 – May 2020**

*Chemistry Department Tutor*

- Tutored fellow undergraduates in all Chemistry courses.
- Responsibilities included hosting weekly office hours and responding to material questions.

*Peer Tutor for the Academic Success Center (ASC)*

**January 2017 – May 2020**

- Tutored fellow undergraduates in various courses: Chemistry I, Chemistry II, Linear Algebra, Differential Equations
- Responsibilities included hosting weekly 1 on 1 sessions and preparing lesson plans.

## Leadership and University Service

**Colburn Club Graduate Student Government (GSG) Representative**, Newark, DE

**August 2023 – Present**

- Responsible for serving as a voice for the CBE graduate student population at GSG meetings, drafting legislation, attending Graduate College town halls, and informing CBE graduates about relevant updates.

**CBE EmPOWER Lead Mentor**, Newark, DE

August 2023 – Present

- Responsible for planning professional development and social events for students in the graduate program to enhance graduate student well-being and assignment/facilitation of mentor-mentee pairs for new CBE graduate students.

**Center of Plastic Innovation (CPI) Professional and Outreach Coordinator**, Newark, DE

August 2022 – Present

- Responsible for organizing professional development events and outreach opportunities for 40+ graduates students and postdocs in CPI.

**Resident Assistant at Winthrop University**, Rock Hill, SC

August 2017 – May 2019

- Responsible for fostering community, providing academic support, and being attentive to the safety and security of residents.

**Orientation Leader at Winthrop University**, Rock Hill, SC

January 2018 – October 2018

- Responsible for providing a welcoming onboarding and transition experience for new students who come from diverse backgrounds.

**Ambassador at Winthrop University**, Rock Hill, SC

January 2019 – May 2020

- Served as tour guides for prospective students and their families on campus visits.

**President of Pi Kappa Phi Fraternity**, Rock Hill, SC

January 2018 – January 2019

- Responsible for acting as chief executive, managing chapter meetings and expenses, overseeing officers and committees, enforcing chapter bylaws, and serving as a chapter representative.

**Honors, Awards, and Fellowships****Fellowships**

- Robert L. Pigford Fellowship September 2020 – September 2021
- Kate Wofford Scholarship Recipient January 2018

**Awards/Honors**

- Exceptional Pass for Chemical Engineering Ph.D. Qualifying Exam August 2021
- Winthrop University Honors Program August 2016-May 2020
- Winthrop University Student Marshall August 2017-May 2018

**Publications**

- Nguyen, D. K.**; Cameli, F.; Dimitrakellis, P.; Vlachos, D. G. "Biphasic Plasma Microreactor for Oxyfunctionalization of Liquid Hydrocarbons." *In Preparation*. **2023**.
- Nguyen, D. K.**; Vargheese, V.; Liao, V.; Dimitrakellis, P.; Sourav, S.; Zheng, W.; Vlachos, D. G. Plasma-Enabled Ligand Removal for Improved Catalysis: Furfural Conversion on Pd/SiO<sub>2</sub>. *ACS Nano*. **2023**.
- Hsiao, Y. W.; **Nguyen, D. K.**; Yu, K.; Zheng, W.; Dimitrakellis, P.; Vlachos, D. G. Enhanced Catalytic Hydrodeoxygenation of Activated Carbon-Supported Metal Catalysts via Rapid Plasma Surface Functionalization. *ACS Applied Materials and Interfaces*. **2023**.
- Nguyen, D. K.**; Dimitrakellis, P.; Talley, M. R.; O'Dea, R. M.; Epps, T. H.; Watson, M. P.; Vlachos, D. G. Oxidative Functionalization of Long-Chain Liquid Alkanes by Pulsed Plasma Discharges at Atmospheric Pressure. *ACS Sustainable Chemistry & Engineering*. **2022**.
- Nguyen, D. K.**; Schepisi, I.; Amir, F. Extraordinary cycling stability of Ni<sub>3</sub>(HITP)<sub>2</sub> supercapacitors fabricated by electrophoretic deposition: Cycling at 100,000 cycles. *Chem. Eng. J.*, **2019**.

**Conference Presentations****Oral Presentations**

- Nguyen, D. K. et. al. (2023, November) Efficient Modular Plasma Microreactor for Upcycling of Plastic Waste Derivatives. 2023 AIChE Annual Meeting, Orlando, Florida
- Nguyen, D. K. et. al. (2022, November) Oxidative Functionalization of Long-Chain Liquid Alkanes by Pulsed Plasma Discharges at Atmospheric Pressure. 2022 AIChE Annual Meeting, Phoenix, Arizona
- Nguyen, D. K. et. al. (2019, August) Developing Microfluidic Devices for Assisted Reproductive Technologies. National Nanotechnology Coordinated Infrastructure (NNCI) REU Convocation Oral Presentation, Cornell University

**Poster Presentations**

- Nguyen, D. K. et. al. (2023, November) Plasma-Enabled Ligand Removal for Improved Catalysis: Furfural Conversion on Pd/SiO<sub>2</sub>. 2023 AIChE Annual Meeting, Orlando, Florida
- Nguyen, D. K. et. al. (2023, May) Plasma-Enabled Ligand Removal for Improved Catalysis: Furfural Conversion on Pd/SiO<sub>2</sub>. 2023 CCP Spring Symposium and Poster Session, Philadelphia, Pennsylvania
- Nguyen, D. K. et. al. (2018, May) Electrophoretic Deposition of Ni<sub>3</sub>(HITP)<sub>2</sub> for supercapacitor electrodes. 70th Southeastern Regional Meeting of American Chemical Society (SERMACS), Augusta, Georgia

**Relevant Skills**

Reaction and Sustainable Engineering  
Plasma Reactor Design and Processing  
Catalyst Packed-Bed Flow Reactors  
Gas Chromatography/Mass Spectrometry

Gel Permeation Chromatography  
Nuclear Magnetic Resonance  
Fourier Transform Infrared Spectroscopy  
X-ray Photoelectron Spectroscopy

# Alexandra Oliveira

Elkton, MD 21921

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LinkedIn: [www.linkedin.com/in/alexmoliveira](http://www.linkedin.com/in/alexmoliveira)

Google Scholar: <https://scholar.google.com/citations?user=3mPd1B0AAAAJ&hl=en&oi=ao>

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## Research Statement

PhD candidate in Chemical & Biomolecular Engineering with a focus in electrochemical engineering and electrochemistry. My work is to improve the performance and durability of electrochemical devices through the construction of novel membrane-electrode assemblies, catalyst development, and diagnostic testing & characterization to understand the operational mechanisms of anion exchange membrane electrolyzers for green hydrogen generation.

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## Education

**University of Delaware**, Newark, DE

*Expected: May 2024*

- Ph.D. Candidate in Chemical Engineering
- NSF Graduate Research Fellowship

**University of Connecticut**, Storrs, CT

*May 2019*

- B.S.E. in Chemical Engineering, Summa Cum Laude, Minor: English
- Cumulative GPA: 3.97/4.00
- Honors Program, Nutmeg Scholar, Dean's List

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## Research Experience

**Yushan Yan's Lab at University of Delaware**, Newark, DE

*January 2020-Present*

*Graduate Research Assistant*

- Designed and constructed membrane-electrode assemblies with new polymer electrolytes and catalyst layer compositions to improve anion-exchange membrane (AEM) electrolyzer performance and durability
- Synthesized electrocatalysts through corrosion and electrodeposition mechanisms; tested catalyst activity through *ex-situ* and *in-situ* experiments to enhance AEM electrolyzer performance
- Developed two- and three-electrode electrolyzer *in-situ* test procedures to isolate the influence of cell design and operating conditions on water transport in AEM electrolyzers
- Investigated the impact of CO<sub>2</sub> and ion contamination mechanisms on AEM and proton-exchange membrane electrolyzers; conducted and verified experimental results using transport models in Python
- Mentored two undergraduate students in green hydrogen technologies and fundamental electrochemistry, leading to the publication of three co-authored perspective papers
- Designed research projects for undergraduate mentees to study the role of porous transport layers and homemade electrocatalysts in AEM electrolyzers
- Consulted for the design and assembly of 16 integrated electrolyzer test stations for high-throughput research

**Yushan Yan's Lab at University of Delaware**, Newark, DE

*June 2021-February 2023*

*Lab Manager*

- Implemented new SOPs for safe laboratory practices; inspected and coordinated safety routines and lab cleanings in a wet chemical laboratory; acted as primary contact in the case of emergencies
- Managed day-to-day inventory, supplies and material orders, and administrative responsibilities for 20+ staff scientists, postdoctoral researchers, graduate students, and undergraduates; repaired lab equipment
- Trained undergraduate and graduate student researchers; developed and taught electrochemistry lectures
- Organized group meetings and events; onboarded 10 new group members

**Argonne National Laboratory**, Lemont, IL

*May 2018-August 2018*

*Science Undergraduate Laboratory Internship (SULI) Summer Researcher*

- Integrated original Python code with existing programs to model vibrational energies for 60 combustion-related molecules using vibrational perturbation theory
- Generated predictive values for thermodynamic properties for Argonne's open-source Active Thermochemical Tables (ATcT) database

**Fikile Brushett's Lab at Massachusetts Institute of Technology**, Cambridge, MA

*June 2017-August 2017*

*Summer Research Affiliate*

- Improved the performance of aqueous and nonaqueous redox flow batteries by increasing electrode surface area by 30x through the modification of electrode microstructures
- Characterized vanadium flow battery electrodes through performance and impedance experiments

**Brian Willis's Laboratory at University of Connecticut**, Storrs, CT

*August 2017-August 2019*

*Undergraduate Researcher*

- Developed an original MATLAB model to predict the signal output of an array of vapor sensors for applications in explosives detection and medicine
- Fabricated semiconductor electrodes with gold nanoparticles to study sensitivity and selectivity for use as chemical vapor sensors



# Alexandra Oliveira

**William Mustain's Laboratory at University of Connecticut**, Storrs, CT  
Undergraduate Researcher

January 2017-May 2017

- Synthesized metal oxide anodes and assembled Li-ion batteries to improve energy density, cycle life, capacity retention, and cell impedance

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## Skills and Certifications

**Computational Programs:** MATLAB, Python, Linux, Fusion360, ASPEN, Minitab, OriginLab

**Laboratory Techniques:** Electrochemical device testing & characterization, membrane electrode assembly preparation, electrodeposition, chemical vapor deposition, catalyst testing, electrochemical device maintenance, 3D printing

**Analytical Techniques:** SEM, SEM EDX, ICP-MS, Ion Chromatography, Rotating Disk Electrode, EIS

**Certifications:** NCEES Engineer-In-Training

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## Selected Publications

- (1) **Oliveira, A.M.;** Setzler, B.P.; Yan, Y. CO<sub>2</sub>-Tolerant Hydroxide Exchange Membrane Electrolyzers for Green Hydrogen Generation. *Submitted*.
- (2) **Oliveira, A.M.;** Beswick, R.R.; Yan, Y. A Green Hydrogen Economy for a Renewable Energy Society. *Current Opinions in Chemical Engineering*. **2021**, 33, 100701.
- (3) Beswick, R.R.\*; **Oliveira, A.M.\*;** Yan, Y. Does the Green Hydrogen Economy Have a Water Problem? *ACS Energy Lett.* **2021**, 6(9), 3167-3169.
- (4) **Oliveira, A.M.;** Beswick, R.R.; Yan, Y. Trends in the Recognition of Women in Electrochemistry. *J. Electrochem. Soc.* **2022**, 169(2) 023508.
- (5) Xiao, J.; **Oliveira, A.M.;** Wang, L.; Zhao, Y.; Wang, T.; Wang, J.; Setzler, B.P.; Yan, Y. Water-Fed Hydroxide Exchange Membrane Electrolyzer Enabled by a Fluoride-Incorporated Nickel-Iron Oxyhydroxide Oxygen Evolution Electrode. *ACS Catal.* **2021**, 11, 264-270.
- (6) Forner-Cuenca, A.; Penn, E.E.; **Oliveira, A.M.;** Brushett, F.R. Exploring the Role of Electrode Microstructure on the Performance of Non-Aqueous Redox Flow Batteries. *J. Electrochem. Soc.* **2019**, 166, A2230-A2241.
- (7) Palmieri, A.; Yazdani, S.; Kashfi-Sadabad, R.; Karakalos, S.G.; Ng, B.; **Oliveira, A.;** Peng, X.; Pettes, M.T.; Mustain, W.E. "Improved Capacity Retention of Metal Oxide Anodes in Li-Ion Batteries: Increasing Intraparticle Electronic Conductivity through Na Inclusion in Mn<sub>3</sub>O<sub>4</sub>", *ChemElectroChem*. **2018**, 5(15), 2059-2063.
- (8) Gao, T.; Wang, Y.; Luo, Y.; Zhang, C.; Pittman, Z.; **Oliveira, A.M.;** Craig, H.; Zhao, J.; Willis, B.G. Fast and Reversible Chemiresistive Sensors for Robust Detection of Organic Vapors Using Oleylamine-Functionalized Palladium Nanoparticles. *International Journal of High Speed Electronics and Systems*, 2018, 27, 1840027.
- (9) Gao, T.; Wang, Y.; Zhang, C.; Pittman, Z.A.; **Oliveira, A.M.;** Fu, K.; Zhao, J.; Srivastava, R.; Willis, B.G. Classification of Tea Aromas Using Multi-Nanoparticle Based Chemiresistor Arrays. *Sensors*, 2019, 19(11), 2547.

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## Selected Presentations

**Meeting of the American Institute of Chemical Engineers** November 2023  
Engineering the Water Balance in Hydroxide Exchange Membrane Electrolyzers Under Cathode Dry Conditions

**Meeting of the Electrochemical Society** October 2022  
Anode-Fed Anion Exchange Membrane Electrolyzers for Hydrogen Generation Tolerant to Anion Contaminants

**Gordon Research Conference (Fuel Cells)** July 2022  
Towards Contaminant-Tolerant Anion Exchange Membrane Water Electrolyzers

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## Selected Awards and Fellowships

NSF Graduate Research Fellow April 2020-Present  
University of Delaware Collins Fellow January 2020-August 2020  
University of Delaware Saurabh A. Palkar Graduate Award for Mentoring Fellowship May 2022

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## Teaching, Volunteer, and Leadership

**Colburn Club, University of Delaware**, Newark, DE September 2021-Present  
Outreach Committee Officer

- Tutored sixth grade students in algebra at Shue-Medill Middle School
- Designed and organized science demos to teach interactive lessons for underprivileged students

**University of Connecticut Chem-E-Car Team**, Storrs, CT January 2016-May 2019  
President, Member

- Designed a car powered by a fuel cell and electrolytic hydrogen to compete nationally at AIChE
- Led a six-member team to construct a homemade aluminum air battery to teach electrochemistry to undergraduates



# BRIAN PAUL

## Education

<b>University of Delaware</b> , Newark DE	Expected Summer 2024
PhD Candidate, Chemical & Biomolecular Engineering	
<b>University of California, Irvine</b>	June 2019
B.S., Chemical Engineering ; B.S., Materials Science & Engineering	GPA: 3.75/4.0
Graduated <i>Cum Laude</i> · Tau Beta Pi & Omega Chi Epsilon Engineering Honor Societies	
<b>Irvine Valley College</b>	May 2015
A.A., Social & Behavioral Science	GPA: 3.95/4.0
Graduated <i>Magna Cum Laude</i> · Earned Associate Degree during high school	

## Technical Skills

**Characterization:** Circular dichroism (CD), small-angle neutron scattering (SANS), small-angle x-ray scattering (SAXS), static/dynamic light scattering (SLS/DLS), bulk rheology, diffusing wave spectroscopy (DWS) microrheology, optical microscopy, size exclusion chromatography (SEC)

**Computational:** Aspen, AutoCAD, BioXTAS RAW, Cura (3D printing), IGOR, ImageJ, LaTeX, MATLAB, Minitab, Origin, Pro/II, PyMOL, RheoCompass, SasView, SimCentral, Simulink, SolidWorks, TRIOS

## Research Experience

**Graduate Researcher**, University of Delaware Sept 2019 – Present  
Advisors: Dr. Norman Wagner, Dr. Abraham Lenhoff, Dr. Eric Furst, and Dr. Susana Teixeira

**Guest Researcher**, NIST Center for Neutron Research, Gaithersburg, MD Jan 2022 – Present

- Investigated effects of high hydrostatic pressure on protein formulation behavior with bulk rheology and microrheology, dynamic and static light scattering, and small-angle neutron/x-ray scattering (SANS/SAXS)
- Developed empirical methodology to capture combined effects of high hydrostatic pressure and high ionic strength on protein-protein interactions
- Mapped local crystalline ordering within salted-out protein dense phases via small-angle scattering
- Characterized pressure-driven rheological properties of protein gels using diffusing wave spectroscopy (DWS)
- Constructing structure-property relationships in salted-out protein dense phases under high hydrostatic pressure as a route for predicting structural and mechanical behavior across formulation conditions
- Collaborating with NIST Center for Neutron Research to design and build novel sample environment for simultaneous *in-situ* SANS and DWS under high hydrostatic pressure

**Undergraduate Researcher**, UC Irvine, Colloid Science Laboratory (Mohraz Group) Sept 2017 – June 2019  
Advisor: Dr. Ali Mohraz

- Demonstrated potential for bijel production from novel polymeric fluid system to simplify scaffold production
- Designed Stober process to synthesize silica particles with tunable diameter from 80-500 nanometers

**Undergraduate Research Assistant**, UC Irvine, Ceramics Laboratory (Mecartney Group) Sept 2016 – Mar 2017  
Advisor: Dr. Martha Mecartney

- Produced ceramic samples for analysis via scanning electron microscopy and X-ray diffraction analysis
- Analyzed > 50 micrographs of flash-sintered ceramic composites for grain size effects via ImageJ

## Publications

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- **Paul, B.;** Lenhoff, A.M.; Teixeira, S.C.M.; Wagner, N.J.; Furst, E.M. High-pressure microrheological investigation of a food-grade gelatin gel. *In preparation*.
- **Paul, B.;** Furst, E.M.; Lenhoff, A.M.; Wagner, N.J.; Teixeira, S.C.M. Combined effects of pressure and ionic strength on protein-protein interactions: an empirical approach. *Biomacromolecules* 2023. *Accepted*.
- Ching, H.; Thorson, T.J.; **Paul, B.;** Mohraz, A. Rapid production of bicontinuous microporous materials using intrinsically polymerizable bijels. *Materials Advances* 2021, 2, 5067-5075.

## Selected Presentations

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- **B. Paul,** S.C.M Teixeira, E.M. Furst, A.M. Lenhoff, N.J. Wagner. "Interplay Between Pressure and Salt Effect on Protein-Protein Interactions." American Chemical Society Biochemical Technology Division, August 13 – 17, 2023, San Francisco CA (oral presentation.)
- **B. Paul,** S.C.M Teixeira, E.M. Furst, A.M. Lenhoff, N.J. Wagner. "In-Situ High Pressure Scattering for Studying Protein Behavior." American Crystallographic Association, June 7 – 11, 2023, Baltimore MD (oral presentation.)
- **B. Paul,** S.C.M Teixeira, E.M. Furst, A.M. Lenhoff, N.J. Wagner. "Ovalbumin Dense Phase Formation in Concentrated Electrolyte Solutions." Neutrons and Food 6, May 16 – 18, 2022, virtual (oral presentation.)
- **B. Paul,** N.J. Wagner, E.M. Furst, A.M. Lenhoff, S.C.M. Teixeira. "Structural Investigation of Salt-Induced Local Ordering in Protein Dense Phases." 95<sup>th</sup> ACS Colloid and Surface Science Symposium, June 14 – 16, 2021, virtual (oral presentation.)

## Selected Teaching & Mentorship Experience

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<b>Peer Mentor,</b> UD CBE EmPOWER, Newark, DE	Aug 2021 – Present
<b>Guest Instructor,</b> Center for High Resolution Neutron Scattering, Gaithersburg, MD	Feb 2021, Oct 2022
<b>Graduate Teaching Assistant (double assignment),</b> University of Delaware	Feb 2021 – June 2021

## Selected Industry Experience

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<b>Engineering Prototyping Lab Intern,</b> UCI Applied Innovation, Irvine, CA	June 2018 – June 2019
▪ Trained engineers on prototyping equipment and assisted lab users; wrote optical microscope SOP	
<b>Chemical Process R&amp;D Intern,</b> Schneider-Electric, Lake Forest, CA	June 2017 – Sept 2016, 2017
▪ Beta tested SimCentral 1.8; logged defects and developed an 8-step checklist to improve existing test cases	
▪ Developed thermodynamic model for asphaltene deposition in deep sea oil pipes	

## Selected Awards & Grants

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**Three Minute Thesis 2<sup>nd</sup> Place Award** (2023). This award was given for placing 2<sup>nd</sup> of 30+ competitors for summarizing thesis work in a single slide at the American Crystallographic Association meeting; **ACA Student Travel Award** (2023). Awarded to 1 student in each technical track; **Chancellor's Award of Distinction** (2019). Awarded to 52 graduating students across all majors at UC Irvine (top 0.5% of ~10,000 graduates for academics, university involvement, and community service.) **Summer Undergraduate Research Fellowship** (2018). Grant of \$1500 from Undergraduate Research Opportunity Program to perform academic on-campus research during the summer term.

## Selected Leadership & Volunteer Experience

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<b>Co-Chair,</b> 2024 Gordon Research Seminar on Colloids, Macromolecules, and Polyelectrolyte Solutions	Feb 2024
<b>President,</b> American Chemical Society Biotechnology Mid-Atlantic Student Chapter	Sept 2021 – Sept 2023
<b>Recruiting/Communications Lead,</b> ACS BIOT Mid-Atlantic Student Chapter	Sept 2019 – Sept 2021
<b>Outreach Coordinator,</b> Colburn Club, Newark, DE	Sept 2019 – Aug 2021
<b>Vice President of External Affairs,</b> American Institute of Chemical Engineers at UCI	Apr 2018 – June 2019
<b>Regional Conference Sponsorship Chair,</b> American Institute of Chemical Engineers at UCI	Oct 2017 – Apr 2018

# Tessa Posey, Chemical Engineering Doctoral Candidate

Address: 354 Beechwood Road, Berwyn, PA, 19312 Cell: 610-420-5459 Email: [tessa.posey@gmail.com](mailto:tessa.posey@gmail.com)

## EDUCATION

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**Doctoral Candidate, Chemical Engineering**, University of Delaware, Newark DE August 2020-Current, GPA: 3.67

**B.S., Biomedical Engineering**, University of South Carolina, Honor's College, Columbia SC August 2016-2020, GPA: 3.85, *Leadership Distinction in Research*

## RESEARCH EXPERIENCE

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### Graduate Research Experience

**Advisor: Dr. Christopher Kloxin**, August 2020-Current

- Current project focused on synthesizing coiled-coil peptide bundles through solid phase peptide synthesis, modifying them with click chemistry reactive handles, and performing atom transfer radical polymerization off the peptide bundles.
- Manages and trains users for the Liberty Blue peptide synthesizer across multiple lab groups; previous manager of Chorus peptide synthesizer across the Peptide-Protein Materials Center.

### Undergraduate Research Experience

**Advisor: Dr. Flavia Vitale, University of Pennsylvania NSF REU** 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.

**Advisor: Dr. Christopher Kloxin, University of Delaware NSF REU** 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.

**Advisor: Dr. Hans-Conrad Zur Loye, University of South Carolina** 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 quaternary nanoparticles for optogenetic applications.

## PUBLICATIONS

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Halaszynski, Nicole; **Posey, Tessa**; Weiran, Xie; Sutherland, Bryan; Pochan, Darrin; Kloxin, Chris. Peptide-based bottlebrush nanorods synthesized via click chemistry and ATRP. **In Preparation.**

Murphy, Brendan; Apollo, Nicholas; Unegbu, Placid; **Posey, Tessa**; Rodriguez-Perez, Nancy; Hendricks, Quincy; Cimino, Francesca; Richardson, Andrew; Vitale, Flavia. Vitamin C-Reduced Graphene Oxide Coatings Improve the Performance and Stability of Multimodal Microelectrodes for Neural Recording, Stimulation, and Dopamine Sensing. *iScience*, **July 15, 2022.**

Egodawatte, Shani; Zhang, Eric; **Posey, Tessa**; Gimblet, Grayson; Foulger, Stephen; zur Loye, Hans-Conrad. Synthesis of Scintillating Ce<sup>3+</sup> doped Lu<sub>2</sub>Si<sub>2</sub>O<sub>7</sub> Nanoparticles Using the Salt-Supported High Temperature (SSHT) Method: Solid State Chemistry at the Nanoscale. *ACS App. Nano Mat.*, 2, 4, 1857-1865. **March 20, 2019**

## PRESENTATIONS

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Coiled-Coil Peptides as Molecular Building Blocks **Poster Presentation**. Winter Research Review, University of Delaware **01/2023**

Coiled-Coil Peptides as Molecular Building Blocks **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**

Fabrication and Characterization of Vitamin-C Reduced Graphene Oxide Neural Microelectrodes **Poster Presentation**. Sunfest Summer Symposium, University of Pennsylvania **07/2019** *Awarded First Place in Poster Competition*

The Synthesis of Scintillating Ce<sup>3+</sup> doped Lu<sub>2</sub>Si<sub>2</sub>O<sub>7</sub> Nanoparticles **Poster Presentation**. Discover USC, University of South Carolina **04/2019**

Material Discovery and Characterization of Luminescent and Scintillating Crystals by Flux Crystal Growth **Poster Presentation**. Discover USC, University of South Carolina **04/2019**

The Synthesis of Scintillating Nanoparticles for Optogenetics **Poster Presentation**. Mid-Atlantic Undergraduate Research Conference, Virginia Polytechnic Institute **03/2019**

Peptide Synthesis and Assembly **Poster Presentation**. Summer Symposium, University of Delaware **08/2018**

## HONORS AND AWARDS

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- **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

## STUDENT ORGANIZATIONS

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University of Delaware

- **Peer Mentor** *Empower*

University of South Carolina

- **President** *Alpha Eta Mu Beta Biomedical Engineering Honor Society*
- **Vice President** *Biomedical Engineering Society* (Previous **Community Chair**).
- **Recruitment Chair** *Tau Beta Pi Engineering Honor Society*
- **Site Leader** *Service Saturday*
- **Peer Mentor** *College of Engineering and Computing*

## TEACHING EXPERIENCE

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**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)

# James D. Tang, Ph.D.

1424 Wharton Drive, Newark DE 19711 | [jdt@udel.edu](mailto:jdt@udel.edu) | (919) 602-0856

## PROTEIN AND CELLULAR ENGINEER

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- Postdoctoral research (U. Delaware) utilizing molecular biology, biochemistry, protein, and cellular engineering to develop tunable, heterobifunctional biopolymers, light-sensitive antibodies, light-switchable bioconjugate platforms, and conditional targeted protein degradation systems
- Postdoctoral research (U. Virginia) leading a team of 3 graduate students in creating and implementing a high-throughput mammalian cell-based assay for elucidating transmembrane protein-protein interactions in SARS-CoV-2 structural genes. Publications in *Biotechnol. Bioeng*, 2021 and *Biochimica et Biophysica Acta* 2023
- Ph.D., U. Virginia. Chemical Engineering. Lampe Lab 2019. Led successful drug delivery and discovery efforts of a novel self-assembling pentapeptide in under 6 months, resulting in 2 fellowships and 3 first-author papers
- 8 peer-reviewed publications, 6 first author. *Biomacromolecules* 2016 and 2018, *JACS* 2019, and *ACS Biomater. Sci. Eng.*, 2019. Two Patents, 2018, 2022

## RESEARCH EXPERIENCE

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**University of Delaware**, Postdoctoral Research – Prof. Wilfred Chen & Prof. Abraham Lenhoff      Apr. 2022 – Present

- Developed heterobifunctional biopolymers for tunable binding and affinity precipitation of Strep-tag II fusion proteins such as adeno-associated viruses (AAVs) and other virus-like particles with up to 98% recovery and purity
- Engineered a novel Sortase-based, light-switchable bioconjugation platform for programmable tethering and release of protein and small molecule cargoes with approximately 5-fold difference in ligation efficiency between light and dark states for both *in vitro* and *in vivo* applications
- Employed protein-based ‘click-chemistry’ technology to produce modular protein nanocages using light-responsive nano- and monobodies for targeted protein binding and purification
- Designed a high-throughput, small molecule-driven, cell-based biosensor for studying protein-protein interactions, bioconjugations, and targeted protein degradation (bio-PROTAC)

**University of Virginia**, Postdoctoral Research – Prof. Bryan Berger      Oct. 2019 – Feb. 2022

- Elucidated the mechanisms behind homo- and heterodimer interactions between transmembrane domains of single nucleotide polymorphisms of hBST-2/Tetherin and SARS-Cov-19 ORF7a using a bacterial cell-based AraC-driven transcriptional reporter, leading to the discovery of novel oligomerization interactions
- Created a directed evolution platform to engineer recombinant glassin for enzymatic polycondensation of metal sulfides, selenides, and oxide bionanoparticles
- Characterized and recombinantly expressed a cold-adapted novel recombinant chitinase from *Glaciozyma antarctica* PI12 in *Pichia pastoris* as a ‘green’ antifungal biocontrol agent

**University of Virginia**, Graduate Research – Prof. Kyle Lampe      Aug. 2014 – Jul. 2019  
*Experimental Work:*

- Developed a novel stimuli-responsive self-assembling pentapeptide hydrogel for injectable cell delivery applications
- Led a team of 10 undergraduate researchers in the optimization and characterization of self-healing, injectable peptide hydrogels for the protection of neural stem cells against syringe-induced shear forces, resulting in multiple publications and undergraduate student awards and fellowships
- Engineered temperature-responsive coacervates from self-assembly of polysaccharides and elastin-like polypeptide mixtures

### Computational Studies:

- Uncovered the molecular level mechanisms responsible for the self-assembly behavior of a laminin-mimetic, elastin-like protein using molecular dynamic simulations
- Revealed the interplay between solvent accessible surface area and self-assembling propensities of pentapeptide hydrogels

## ADDITIONAL RELEVANT EXPERIENCE

**Burt's Bees**, Product Supply Chain Analyst May 2013 – Jul. 2013

- Led a team of 5 chemical and mechanical engineers to provide technical performance analysis and assessment of product manufacturing, resulting in a 20% decrease in equipment downtime

**DuPont**, R&D Co-Op Jun. 2011 – Dec. 2011, May 2012 – Aug. 2012, Jan. 2013 – May 2013

- Contributed to the development of Tyvek® ThermoWrap® with a 100% improvement in effective R-value

## EDUCATION

Ph.D. Chemical Engineering, University of Virginia | Charlottesville, VA. Advisor: Prof. Kyle Lampe 2019

B.S. Chemical Engineering, North Carolina State University | Raleigh, NC 2014

Concentration in Nanoscience (Magna Cum Laude), Minor in Japanese

International Studies Program, Nagoya University | Nagoya, Japan 2009 – 2010

Honors: Japan Student Services Organization Scholarship

## PATENTS

- Lampe K.J., **Tang J.D.**, (2022) "Self-assembling peptides and hydrogels," U.S. Patent Application No. 17/290,050
- Lampe K.J., **Tang J.D.**, (2018) "Compositions and Methods for Preparing and Using Hydrogels," U.S. Provisional Patent Application No. 62/753,436

## HONORS, AWARDS, and FELLOWSHIPS

Phil Parrish Postdoctoral Fellowship in Engineering 2021 – 2022

UVa Chemical Engineering Special Recognition Award for Outstanding Dissertation 2020

Sture G. Olsson Endowed Graduate Fellowship in Engineering 2018 – 2019

Society for Biomaterials Student Travel Achievement Recognition Award 2018

National Science Foundation Graduate Research Fellowship Program – Honorable Mention 2016

NCSU University Honors Program 2007 – 2014

NCSU Pulp and Paper Foundation Merit Scholarship 2007

## TECHNICAL SKILLS

**Molecular Biology:** PCR, high-throughput cloning (Gibson and Golden Gate Assembly) and expression, sequencing, DNA/RNA extraction, directed evolution, gene design, adenovirus and adeno-associated virus vector design, recombinant protein production (bacterial, yeast, mammalian), protein purification, single/multi-site directed mutagenesis, CRISPR/Cas genome editing, lambda Red recombination

**Protein Biochemistry Techniques:** SDS-PAGE, chromatography, ITC, western and dot blotting, circular dichroism spectroscopy, DLS, spectroscopy (UV/Vis, fluorescence), immunohistochemistry, immunofluorescence

**Software:** Python, SnapGene, Benchling, ImageJ, Nanoscale Molecular Dynamics (NAMD), Visual Molecular Dynamics (VMD), Unicorn (ÄKTA), MatLab, GraphPad Prism

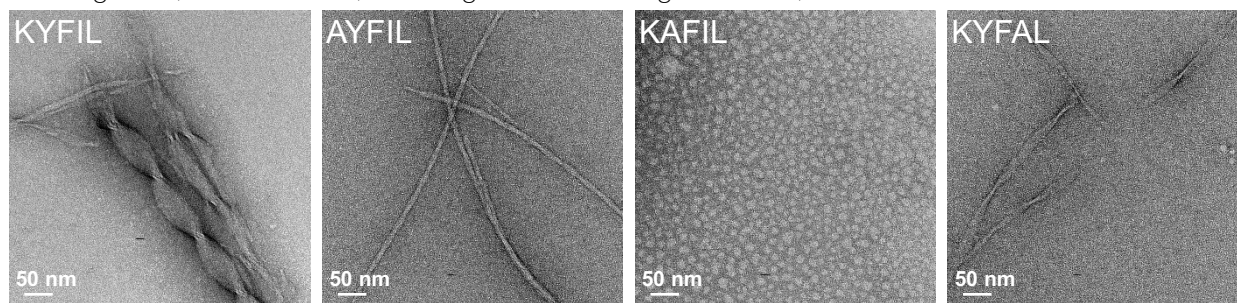
**Cell Culture:** Oligodendrocyte precursor cells, PC12 cells, neural stem cells, HEK293T cells, proficient in transfection using Lipofectamine® treatment, flow cytometry

**Additional Skills and Equipment:** Solid-phase peptide synthesis (CEM Liberty Blue), design of experiments, cell-based assay development, microplate assays, high throughput functional screening in vitro assays, confocal microscopy (Zeiss LSM510-META, Zeiss LSM800), presentations, mentorship, written communication (SOPs, publications), troubleshooting, standard bioinformatics toolset including BLAST, GenBank, and MSA



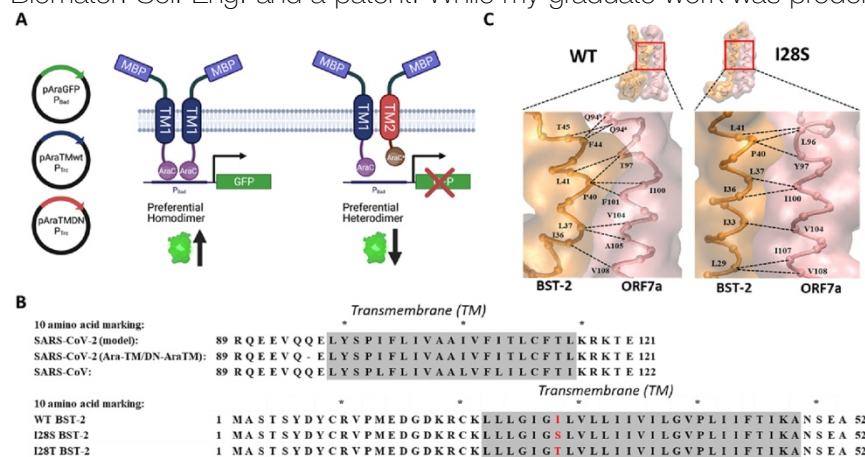
# James D. Tang, Ph.D. Research Summary

My work as a graduate student with Dr. Kyle Lampe at the University of Virginia focused on developing a novel stimuli-responsive, self-assembling hydrogel for use as a neural tissue regeneration platform (Figure 1). The project's primary goal is to create a tunable, injectable 3D hydrogel environment that promotes encapsulated neural cell growth, differentiation, and migration. In the figure below, we discovered that the self-assembly of



**Figure 1.** Representative TEM images of 1.5 wt. % pentapeptides in PBS at pH 7.4. KYFIL hydrogels exhibit twisted ribbon morphologies, while AYFIL hydrogels are comprised of twisted fibrils. KAFIL peptide solutions at pH 7.4 form spherical aggregates (non-gelling conditions), while KYFAL hydrogels also form twisted ribbon morphologies, with longer and more infrequent pitch than KYFIL peptides.

hierarchical twisted 'macromolecular' structures can be altered by substituting any residue within the ...Phe-Ile-Leu... moiety that detracts from the amphiphilicity of the sequence and  $\pi$ -system interactions. This project was funded by the Jeffress Trust Awards Program in Interdisciplinary Research (\$100,000) which I co-wrote with Dr. Kyle Lampe. During this time in my graduate career, I was also awarded with a Sture G. Olsson Endowed graduate fellowship for my work, and which also resulted in 5 first-author papers in JACS, Biomacromolecules, and ACS Biomater. Sci. Eng. and a patent. While my graduate work was predominantly focused on hydrogel biomaterials



**Figure 2. (A)** AraTM and DN-AraTM assay. In the AraTM assay, pAraTMwt expresses the full-length AraC fused to a target sequence under control of the PTc promoter. This plasmid is co-expressed with the pAraGFP plasmid that contains an eGFP reporter gene under control of the PBAD promoter. In the DN-AraTM assay, addition of the pAraTMDN plasmid expresses the truncated AraC (AraC\*) fused to a competitor sequence under control of the PTc promoter. Co-expression of both constructs with pAraGFP in *E. coli* leads to a distribution of interactions between AraC and AraC\* fusions, and the relative affinity for homo- versus heterooligomerization can be independently quantified in terms of eGFP expression; reduced GFP expression is indicative of preferential heterooligomerization, whereas increased GFP expression is indicative of preferential homooligomerization. **(B)** Truncated amino acid sequences of SARS-Cov-2 ORF7a and BST-2 domains used for the current work. **(C)** Key residue contacting pairs of both WT and I28S heterodimerization revealed from MD simulations.

development and neuroscience, I also received extensive training in cell culturing, peptide synthesis, immunostaining, immunohistochemistry, and small molecule (peptide-based) drug discovery efforts. After my graduation in 2019, I decided to completely pivot to the synthetic biology and protein engineering field.

As a postdoctoral scholar in the Berger lab at University of Virginia, I helped develop a novel approach to study receptor homo- and heterodimerization in cell membranes. Unfortunately, the pandemic hit right as I started to transition to an entirely new field, and the 6 – 8-month closure of the University, as well as supply chain issues resulted in an unexpected extended time at the University of Virginia as a postdoctoral scholar, as seen above in my resume. However, during this challenging time, I was still able to pivot and acquire the necessary

skills to succeed in this new field, resulting in 2 peer-reviewed publications within a year once the university opened up again. We identified specific, structural models of these homo- and heterooligomeric interfaces between SARS-CoV-2 structural proteins and certain single nucleotide polymorphisms (SNPs) of bone marrow stromal antigen 2 (BST-2), leading to the discovery that SARS-CoV-2 ORF7a prevents glycosylation of certain BST-2 SNPs, thereby impairing its anti-viral function (Figure 2).

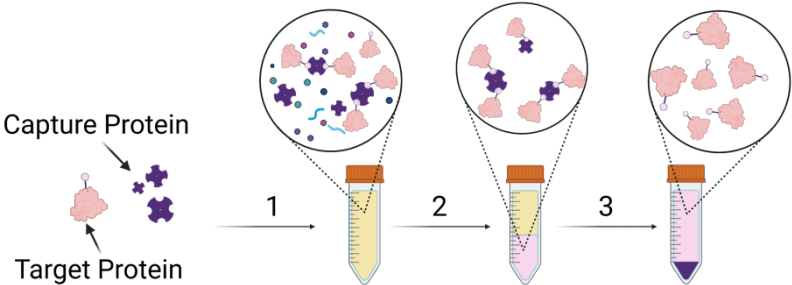


Figure 3. Enhanced affinity precipitation of Strep-tag II fusion proteins using engineered streptavidin constructs through a combination of increased aggregate sizes and cross-linking via multivalent interactions. Step 1: Direct mixing of Strep/StrepXT-ELP fusion proteins into cell lysates containing target protein of interest. Step 2: Multivalent binding between the tetrameric streptavidin constructs and Strep-tag II target proteins result in cross-linking and formation of an insoluble precipitate following an increase in temperature or salt concentration. Step 3: Dissociation and resolubilization of both Strep-tag II target proteins and Strep/StrepXT-ELP in mild buffer conditions containing excess D-Biotin.

binding-induced multivalent crosslinking upon protein capturing. The efficient biotin-mediated dissociation of the bound *Strep*-tag II fusion protein from the streptavidin-ELP capturing scaffold allows for mild elution conditions. This non-chromatographic based affinity method provides an attractive approach for efficient and cost-effective protein purification.

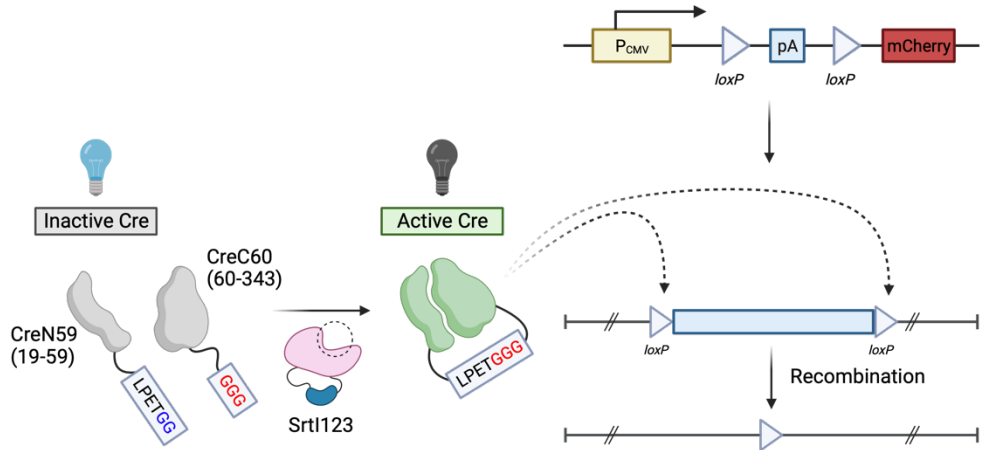


Figure 4. Schematic representation of the reporter system using the engineered Sortase A enzyme (SrtI123, pink). Cre recombinase was split into two fragments: CreN59 (residues 1–59) fused to LPETGG Sortase recognition signal driven by a constitutive promoter ( $P_{CMV}$ ) and CreC60 (residues 60–343) fused to GGG. Upon blue light illumination, the photoreceptor asLOV2 is activated and disrupts the active site of the Sortase A enzyme through allosteric effects. Consequently, the catalytic activities of Cre recombinase can be restored once the two Cre fragments assemble based on the Sortase A-dependent protein-protein ligation of their respective LPETGG and GGG fusion domains, enabling the reconstituted Cre recombinase to excise DNA sequences flanked by loxP sites, and inducing expression of mCherry.

engineering and developing a mammalian cell line to track luminescent and fluorescence outputs based on protein degradation and protein ligation platforms, this assay allows us to take a snapshot of when protein degradation and/or ligation occurs using a novel engineered light-responsive Sortase A enzyme (Figure 4).

At the University of Delaware, I developed an affinity precipitation process for selective, non-chromatographic separations of viruses and virus-like particles using an engineered streptavidin fusion protein (Figure 3). This technique results in up to 98% recovery and purity of our protein of interest, which can be performed in under an hour. we generated an ELP fusion to a *soluble* streptavidin mutant that enables rapid purification of any *Strep*-tag II fusion protein of interest. This heterobifunctional protein takes advantage of the native tetrameric structure of streptavidin, leading to

Additionally, my work also involves the engineering of novel light-responsive proteases and transpeptidases that could potentially be used for cell labeling and tracking, as well as logic-gated control of signaling cascades. Using circular permutation, we engineered a Sortase A enzyme and attached light-responsive LOVtrap domains (LOV2 and ZDK1) to the terminal ends to incorporate light-induced allosteric control to turn off and turn on Sortase A enzyme activity following blue-light illumination. Additionally, I am currently



## PUBLICATIONS

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- Tang J.D., Thede A.T., Kittel A.R., Cocker C.E., Harold L.J., Amelung C.D., Lampe K.J., "The effects of cell-adhesive ligand presentation on supramolecular peptide assembly in silico, RAPID hydrogel formation, and encapsulated oligodendrocyte precursor cell growth and morphology," in print - Cells Tissues Organs, **2023** (<https://doi.org/10.1159/000534280>)
- Mann M.M., Hsieh M.K., Tang J.D., Hart W.S.; Lazzara M.J., Klauda J.B., Berger, B.W., "Understanding how transmembrane domains regulate interactions between human BST-2 and the SARS-CoV-2 accessory protein ORF7a," *Biochimica et Biophysica Acta (BBA) – Biomembranes*, **2023**, 1865, 184174. (<https://doi.org/10.1016/j.bbamem.2023.184174>)
- Mann M.M., Tang J.D., Berger, B.W., "Engineering human liver fatty acid binding protein for detection of poly- and perfluoroalkyl substances," *Biotechnol. Bioeng.*, **2021**, (<https://doi.org/10.1002/bit.27981>)
- Tang J.D., Roloson E.B., Amelung C.D., Lampe K.J., "Rapidly Assembling Pentapeptides for Injectable Delivery (RAPID) Hydrogels as Cytoprotective Cell Carriers," *ACS Biomater. Sci. Eng.*, **2019**, 5, 2117-2121. (<https://doi.org/10.1021/acsbiomaterials.9b00389>)
- Tang J.D., Mura C., Lampe K.J., "Stimuli-Responsive, Pentapeptide, Nanofiber Hydrogel for Tissue Engineering," *J. Am. Chem. Soc.*, **2019**, 141, 4886-4899. (<https://doi.org/10.1021/jacs.8b13363>)
- Tang J.D., Caliri S.R., Lampe K.J., "Temperature-dependent complex coacervation of engineered elastin-like polypeptide and hyaluronic acid polyelectrolytes," *Biomacromolecules*, **2018**, 19 (10), 3925-3935. (<https://doi.org/10.1021/acs.biomac.8b00837>)
- Tang J.D., Lampe K.J., "From *de novo* peptides to native proteins: advancements in biomaterial scaffolds toward acute ischemic stroke repair," *Biomedical Materials*, **2018**, 13 034103. (<https://doi.org/10.1088/1748-605X/aaa4c3>)
- Tang J.D., McAnany C.E, Mura C., Lampe K.J., "Towards a Designable Extracellular Matrix: Molecular Dynamics Simulations of an Engineered Laminin-mimetic, Elastin-like Fusion Protein," *Biomacromolecules*, **2016**, 17 (10), 3222–3233. (<https://doi.org/10.1021/acs.biomac.6b00951>)

## MANUSCRIPTS IN SUBMISSION/REVIEW

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- Tang J.D., Lenhoff A.M, Chen W., "Engineering of heterobifunctional biopolymers for tunable binding and precipitation of Strep-tag fusion proteins," *in review*.
- Tang J.D., Yang H., Chen W., "Optogenetic control of biorthogonal protein-protein ligation using an engineered photoswitchable Sortase," *in submission*.
- Tang J.D., Yang H., Chen W., "Intracellular protein photoactivation of a novel circularly permuted Sortase enzyme," *in submission*.

## PRESENTATIONS

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- Tang J.D., Lenhoff A., Chen W., "Engineering of heterobifunctional biopolymers for tunable binding and precipitation of Strep-tag fusion proteins," *American Chemical Society*, **2023** (podium presentation)
- Tang J.D., Mann M.M., Sallada N.D., Hsieh M.K., Klauda J., Berger B.W., "SARS-CoV-2 ORF7a intracellular targeting and its inhibitory effects on bone marrow stromal antigen 2 dimerization," *Mid-Atlantic Synthetic Biology Symposium*, **2021** (poster)
- Tang J.D., Hsieh M.K., Klauda J., Berger B.W., "EAGER: Collaborative Research: Design of Inhibitors for ORF7a and ORF7b Oligomerization in COVID-19," *ACS BIOT*, **2020** (podium presentation)
- Tang J.D., Lampe K.J., "Rapidly Assembling Pentapeptides for Injectable Delivery (RAPID) Hydrogels as Cytocompatible Cell Carriers," *World Biomaterials Congress*, **2020** (podium presentation)
- Tang J.D., Lampe K.J., "Engineering Rapidly Assembling Pentapeptides for Injectable Delivery (RAPID) Hydrogels for Neural Cell Injection and Differentiation," *Biomedical Engineering Society*, **2019** (podium presentation)
- Flores, A., Tang J.D., Lampe K.J., Harrington, D.A., "Three-Dimensional Salivary Spheroids in Pentapeptide Nanofiber Hydrogels," *Annual Biomedical Research Conference for Minority Students (ABRCMS)*, **2019** (poster).

- Tang J.D., Lampe K.J., "Rapidly Assembling Pentapeptides for Injectable Delivery (RAPID) Hydrogels as Cytocompatible Cell Carriers," *Society for Biomaterials*, 2019 (podium presentation)
- Tang J.D., Lampe K.J., "pH responsive self-assembling pentapeptide hydrogels with tunable properties for neural tissue engineering," *Gordon Research Conference on Signal Transduction by Engineered Extracellular Matrices*, 2018 (poster).
- Tang J.D., Caliri S.R., Lampe K.J., "Temperature-responsive particles from self-assembly of polysaccharides and elastin-like polypeptide mixtures," *Society for Biomaterials*, 2018 (poster)
- \*Tang J.D., Lampe K.J., "pH responsive self-assembling pentapeptide hydrogels with tunable properties for neural tissue engineering," *Society for Biomaterials*, 2018 (podium presentation, \*won the STAR award for outstanding abstract)
- Maryam Ansari, Tang J.D., McAnany C.E, Mura C., Lampe K.J., "Molecular Dynamics Simulations of a Laminin and Elastin-Based Triblock Fusion Polypeptide," *American Institute of Chemical Engineers Annual Meeting*, 2017 (poster)
- Tang J.D., McAnany C.E, Mura C., Lampe K.J., "A conformational analysis of an engineered laminin-mimetic, elastin-like fusion protein using molecular dynamics simulations," *American Institute of Chemical Engineers Annual Meeting*, 2016 (podium presentation).
- Tang J.D., McAnany C.E, Mura C., Lampe K.J., "A conformational analysis of an engineered laminin-mimetic, elastin-like fusion protein using molecular dynamics simulations," *Gordon Research Conference on Signal Transduction by Engineered Extracellular Matrices*, 2016 (poster).
- Tang J.D., McAnany C.E, Mura C., Lampe K.J., "A conformational analysis of an engineered laminin-mimetic, elastin-like fusion protein using molecular dynamics simulations," *7<sup>th</sup> Biennial BTP Symposium*, 2016 (poster).
- Tang J.D., McAnany C.E, Mura C., Lampe K.J., "An engineered laminin-mimetic, elastin-like protein hydrogel for neural regeneration," *Central Virginia Chapter of the Society for Neuroscience, Annual Symposium and Poster Session*, 2016 (poster)

# AKASH WARTY

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I am a graduate student pursuing a Doctor of Philosophy degree in Chemical Engineering at University of Delaware, Newark, DE, USA. I specialize in Catalytic Engineering and separations technology. I have 6 months of internship experience and have worked on multiple research projects over the past 5 years.

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## EDUCATION

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|--|----------------------------|
| <b>University of Delaware, Newark, DE</b><br>Ph.D. Candidate in Chemical Engineering with a GPA of 4.00/4.00.<br>Advisor: Dr. Dongxia Liu        | <b>Jan 2023 – Present</b>  |
| <b>University of Maryland, College Park, MD</b><br>MS/Ph.D. student in Chemical Engineering with a GPA of 3.88/4.00.<br>Advisor: Dr. Dongxia Liu | <b>Aug 2018 – Dec 2022</b> |
| <b>National Institute of Technology, Trichy, India</b><br>Graduated with B.Tech. in Chemical Engineering with a GPA of 8.19/10                   | <b>Aug 2014 – May 2018</b> |
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## RESEARCH PROJECTS

- |   |                            |
|---|----------------------------|
| <b><i>Electrochemical Synthesis Technique for Zeolite Synthesis</i></b><br>○ Developed a novel technique for the synthesis of hydroxy sodalite zeolite by using synthesis solutions in an electrolytic cell.<br>○ Analysed several parameters affecting the synthesis and comparison with conventional hydrothermal synthesis technique was performed.<br>○ The procedure shows promise in zeolite synthesis by reducing synthesis times in comparison to conventional methods.   | <b>Jan 2022 – Present</b>  |
| <b><i>Ceramic Hollow Fibers for Membrane Reactors</i></b><br>○ Hollow fiber supports were produced using the phase-inversion method.<br>○ Zeolite membranes were grown on alumina hollow fibers supports for methanol-water separations for use as a membrane reactor.<br>○ Prepared perovskite type membranes using the dip-coating and sintering technique on perovskite type ceramic hollow fibers for hydrogen permeable membrane reactors for high temperature applications. | <b>Jan 2020 – Jan 2022</b> |
| <b><i>Controlled Growth of Hydroxyapatite Catalyst</i></b><br>○ Catalyst is grown using various seeding processes followed by hydrothermal synthesis and its performance on ethanol coupling reactions are studied.   | <b>Jul 2019 – Dec 2019</b> |
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## DESIGN PROJECTS

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|---|----------------------------|
| <b><i>Solar Module Design Requirements for a Residential Home</i></b><br>○ Photovoltaic cell array was designed with daily energy usage of the home and the solar insolation data over the year under AM1.5 conditions.<br>○ Solar array requirements and design were satisfied by 24 modules and a suitable battery storage as expected.   | <b>Oct 2018 – Dec 2018</b> |
| <b><i>Plant Design for Manufacturing Oxalic Acid from Molasses</i></b><br>○ Heat transfer, mass transfer and energy balance principles were utilized to design equipment necessary to manufacture 1000kgs of Oxalic Acid per batch. Statistical analysis on investment and returns were also performed.<br>○ Successfully analysed production efficiency at 76% with purity of 98%. | <b>Jan 2018 – May 2018</b> |
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## WORK EXPERIENCE

- |  |                           |
|--|---------------------------|
| <b><i>Lab Safety Manager, Catalysis Engineering Laboratory, University of Delaware, Newark, DE, USA</i></b><br>○ Developed safety policies for a new lab setup as per university requirements.<br>○ Oversee working environment in the lab to maintain safe operating standards.<br>○ Lead lab safety meetings and training for new incoming students (post-doc/ graduate/ undergraduate/ high school) on safe practices and important policies to promote safety. | <b>Jan 2023 – Present</b> |
|--|---------------------------|

**Lab Safety Manager, Catalysis Engineering Laboratory, University of Maryland, College Park, MD, USA**

**Oct 2021 – Dec 2022**

- Oversee working environment in the lab to maintain safe operating standards.
- Lead lab safety meetings and training for new incoming students (post-doc/ graduate/ undergraduate/ high school) on safe practices and important policies to promote safety.

**Graduate Teaching Assistant, University of Maryland, College Park, MD, USA**

**Aug 2021 – May 2022**

**CHBE422: Transport Phenomena I – Fluid Dynamics**

- Planned and conducted discussion hours every week for a class of 42 undergraduate students along with assisting students with assignments and coursework.
- Evaluated 21 homework assignments weekly and graded two midterm and one final exam for all students.

**CHBE473/ENCH648K: Electrochemical Energy Engineering**

- Assisted 16 undergraduate and 10 graduate students with assignments and coursework.
- Graded assignments for each student weekly.

**R&D Summer Intern, Jayant Agro – Organics Limited, Mumbai, India**

**May 2017 – July 2017**

**Process Development of Hydrogenated Methyl Ester.**

- Conducted various ester-based reactions, catalytic hydrolysis, and fatty amide synthesis for products with high purities. Designed a distillation column for a multi-component system of methyl esters.
- Achieved processes resulting in products with purities greater than 99%.

**Plant Training, Omkar Specialty Chemicals Limited, Maharashtra, India**

**May 2015 – June 2015**

Studied various equipment including centrifuges, filters, reactors, dryers, and mills. Processes in a chemical plant and lab were also studied.

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**SKILLS**

**Laboratory Equipment:** Autoclave, HPLC System, GC System, Karl Fischer Titrator, Scanning Electron Microscope, X-Ray Diffraction, UV-vis Spectrometer.

**Lab Skills:** Distillation, Process Design, Lab scale reactor design, Lab Safety Management.

**Software:** Aspen Plus, MATLAB, Python, MathCAD, Engineering Equation Solver and AutoCAD.

**Documentation Skills:** Microsoft Office, LaTeX, Technical Writing.

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**EXTRACURRICULAR ACTIVITIES**

**Pragyan, Deputy Manager for Guest Lectures, NIT Trichy, India**

**July 2015 – May 2017**

- Initiated discussions with various eminent personalities inviting them as guest speakers for the main event. Managed and co-ordinated the proceedings during the event.

**Music Troupe, NIT Trichy, Guitarist**

**Jan 2016 – May 2018**

- Performed at various competitions including Saarang (IITM), Unmaad (IIMB) and events held in college as a guitarist. Also organised the music events during Festember, Cultural Festival of NIT Trichy.

# CHEMICAL & BIOMOLECULAR ENGINEERING

