



UNIVERSITY OF DELAWARE
ENGINEERING

Department of Chemical & Biomolecular Engineering

DOCTORAL CANDIDATES & POSTDOCTORATES

Resume Booklet
(2021-2022)

University of Delaware

June 2022

Dear Friends and Guests:

On behalf of the faculty of the Department of Chemical & Biomolecular Engineering, I am pleased to introduce to you 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 more than 220 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 strong interdisciplinary programs 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), and now the Center for Hybrid, Active, and Responsive Materials (CHARM) and Center for Plastics Innovation (CPI). 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.

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,



Eric M. Furst
Professor and Department Chair



2021 – 2022 RESUMES

Alphabetical Listing of Resumes

- | | |
|---------------------------|------------------------|
| ➤ Baker-Fales, Montgomery | ➤ Meisenhelter, Joshua |
| ➤ Berger, Jordan | ➤ Oliveira, Nicholas |
| ➤ Cassel, Samantha | ➤ Otten, Jonathan |
| ➤ Chen, Tso-Hsuan | ➤ Shin, Haeun |
| ➤ Chen, Yingjie | ➤ Steinman, Eric |
| ➤ Ding, Haoran | ➤ Surendhran, Roshaan |
| ➤ Forder, James | ➤ Szkodny, Alana |
| ➤ Green, Erica | ➤ Thompson, Will |
| ➤ Heil, Christian | ➤ Woodward, Ian |
| ➤ Herman, Chase | ➤ Ye, Mingchun |
| ➤ Hsiao, Jessie | ➤ Zong, Xue |
| ➤ Jariwala, Soham | |
| ➤ Kim, Doyoung | |
| ➤ Ko, Byung Hee | |
| ➤ Kurdziel, Sophia | |
| ➤ Lee, Jason | |
| ➤ Lee, Lina | |

Montgomery Baker-Fales

PhD Candidate | Chemical & Biomolecular Engineering | University of Delaware

Email: mfales@udel.edu

Phone: 785.409.9297

LinkedIn: in/montefales

EDUCATION

University of Delaware (UD), Newark, DE

2018 - 2023

Ph.D. in Chemical & Biomolecular Engineering | 3.282 GPA

Kansas State University (KSU), Manhattan, KS

2013 - 2017

B.S. in Chemical Engineering | 3.764 GPA (Cum Laude)

RESEARCH EXPERIENCE

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

2018 - Present

- Demonstrated novel thermometric approaches for reliable measurements in microwave-irradiated and chemically harsh environments, leading to direct measurements of never-before observed heating phenomena (see pub. #3, #4)
- Conceptualized a 100-times scaled MW reactor involving principle components from 9 vendors, then implemented for the continuous production of 5-hydroxymethylfurfural at rates of >0.1 kg/hr (see pub. #1)
- Developed 11 electrified reactors for various microwave and plasma applications including for use with high pressures (1000 psi), high temperatures (1000 °C), high throughput (0.5 L/min), flammables, and acidic conditions, all with non-traditional, non-metallic construction
- Research Exchange | **Polytechnic University of Valencia, University of Zaragoza, University of Nottingham**
 - Tested a prototype high-efficiency microwave reactor designed by the ITACA institute at Valencia (which the Vlachos Group ultimately purchased) and trained on the application of microwaves to high-temperature heterogeneous catalytic reactions with the Santamaria Group at Zaragoza
 - Trained on microwave-enabled chemical composition sensing with the Dimitrakakis Group at Nottingham

KSU | Research Assistant | **Dr. Placidus B. Amama**

2017 - 2018

- Researched the interactions of titania and carbon nanotubes for photocatalytic air purification (see pub. #5)

KSU | Undergraduate Research Assistant | **Dr. Placidus B. Amama**

2015 - 2017

- Researched morphological catalyst effects on carbon nanotube growth (pub. #6), electrochemical substrate modification for carbon nanotube growth on metals, and catalyst preparation effects on the Fischer-Tropsch synthesis of hydrocarbons
- Participated in “Earth, Wind, and Fire” REU at KSU in Summer 2016 (NSF Grant #1460776) from which my work, “Catalytic CVD Growth of Carbon Nanotube Carpets on Metallic Substrates”, was presented via poster at the 2016 AIChE meeting
- Research Exchange | **University of Hokkaido**
 - Exchanged research approaches for the synthesis of photocatalytic materials and reactors with the Dr. Shin Mukai Group via 2-week collaboration at the University of Hokkaido (NSF Grant; see pba-research.com/international)

TECHNICAL SKILLS

- Microwave Chemistry & Instrumentation
- Thermometry & Sensing in EMF Environments
- Liquid & Gas Chromatography
- Scanning Electron Microscopy
- X-Ray Diffraction
- Raman Spectroscopy
- Chemical Vapor Deposition
- Ion Beam Sputtering & Etching
- CAD / Solidworks
- LabVIEW

LEADERSHIP EXPERIENCE

Reporting and Organization Leadership | **RAPID Manufacturing Institute**

2019 – June 2022

- Coordinated with a small team of scientists to intensify biomass upgrading processes under the RAPID Manufacturing Institute

- Organized to continuously meet milestones, prepared written documents, and presented updates directly to the U.S. Department of Energy, summarizing all quarterly Vlachos Group progress

Vice President | Society of Petroleum Engineers (KSU Chapter)

2014 – 2016

- Co-founded chapter and worked to grow organization to approximately 35 regular attendees
- Secured more than \$3000 in funding from the College of Engineering and the Student Governing Association for multiple educational trips including to the Permian Basin Oil Show in Odessa, TX and the SPE Student Summit in Oklahoma City, OK

Development Lead | KSU Biodiesel Initiative

2013 – 2015

- Worked with student organization in all process roles to produce more than 1500 gallons of biodiesel for use with University maintenance vehicles
- Identified and implemented opportunity for methanol waste recovery (distillation), resulting in savings of \$10.84 per batch

TEACHING EXPERIENCE

UD | Graduate Teaching Assistant

- CHEG 341 – Fluid Mechanics
- CHEG 112 – Introduction to Chemical Engineering

Fall 2020

Spring 2020

KSU | Undergraduate Teaching Assistant

- CHE 416 – Computational Techniques for Chemical Engineers

Fall 2017

SELECTED PRESENTATIONS

NAM 2022 | Manhattan, NY | Oral Presentation

- “Microwave-Heating Induced Temperature Gradients in Liquid-Liquid Biphasic Systems”

AIChE 2021 | Boston, MA | Oral Presentation

- “Microwave Heating of Liquid-Liquid Biphasic Systems”

AIChE 2020 (Spring) | Virtual | Oral Presentation

- “Electrification, Process Intensification, and Artificial Intelligence for Modular and Improved Chemical Manufacturing”

AIChE 2017 | Minneapolis, MN | Oral Presentation

- “Nanocarbon-TiO₂ Composites for Photocatalytic Oxidation of Volatile Organic Compounds”

PEER-REVIEWED PUBLICATIONS

Total Citations: 41 | H-Index: 4 | i10-Index: 2 (as of May 14, 2022)

(# indicates equal contribution)

- M. Baker-Fales**,[#] T.Y. Chen,[#] D.G. Vlachos, “Microwave-Enabled High Throughput Production of 5-Hydroxymethylfurfural”, (*in preparation*)
- T.Y. Chen,[#] Y.W. Hsiao,[#] **M. Baker-Fales**,[#] F. Cameli, P. Dimitrakellis, D.G. Vlachos, “Microflow Chemistry and its Electrification for Sustainable Chemical Manufacturing” *Chem. Sci.* (*submitted*: SC-REV-03-2022-001684)
- T.Y. Chen,[#] **M. Baker-Fales**,[#] H. Goyal, D.G. Vlachos, “Microwave Heating-Induced Temperature Gradients in Liquid–Liquid Biphasic Systems” *Ind. Eng. Chem. Res.*, 2022, 61 (8), 3011–3022.
- T.Y. Chen, **M. Baker-Fales**, D.G. Vlachos, “Operation and Optimization of Microwave-Heated Continuous-Flow Microfluidics,” *Ind. Eng. Chem. Res.*, 2020, 59 (22), 10418-10427. (*Featured on the June 10, 2020 cover of I&EC Research*)
- B. Everhart, **M. Baker-Fales**, B. McAuley, E. Banning, H. Almkhelfe, T. Back, P.B. Amama, “Hydrothermal synthesis of carbon nanotube–titania composites for enhanced photocatalytic performance,” *J. Mater. Res.*, 2020, 35 (11), 1451-1460
- X. Li, **M. Baker-Fales**, H. Almkhelfe, N. Gaede, T. Harris, P.B. Amama, “Rational Modification of a Metallic Substrate for CVD Growth of Carbon Nanotubes,” *Sci. Rep.*, 2018, 8 (1), 1-10
- H. Wang, X. Li, **M. Baker-Fales**, P.B. Amama, “3D Graphene-Based Anode Materials for Li-Ion Batteries,” *Curr. Opin. Chem. Eng.*, 2016, 13, 124-132

Jordan E. Berger

jeberger@udel.edu

112 Chinaberry Dr. Lafayette Hill, PA 19444 | (215) 435-1209

Education

University of Delaware, Newark, DE

2017 - Present

- Ph.D. Candidate in Chemical & Biomolecular Engineering (expected 2022)

GPA: 3.74

Bucknell University, Lewisburg, PA

2017

- B.S. in Chemical Engineering
- Minor: Mathematics and Biology

GPA: 3.81

Research and Work Experience

Graduate Research Assistant

2017 - Present

University of Delaware, Newark, DE

Advisors: Professor Christopher J. Roberts

Doctoral thesis focused on protein chemical and physical stability, (mis)folding, and aggregation, to improve and develop protein characterization, design, and stability

Guest Researcher

Aug. 2020 - Aug 2021

NIST Center for Neutron Research, Gaithersburg, MD

- Investigated the role of pressure and sub-zero temperatures in monoclonal antibody (MAb) unfolding thermodynamics, protein-protein interactions, and aggregation
- Achieved novel mechanistic insight into MAb conformational stability and aggregation by examining *in situ* pressure/temperature effects
- Developed and validated an alternate accelerated stability test for monoclonal antibodies using a combination of extreme pressure and temperature

Presidential Research Fellow

2014 - 2017

Bucknell University, Lewisburg, PA

Advisors: Tim Raymond, Ph.D. and Dabrina Dutcher, Ph.D.

Honors Thesis: Factors That Affect Particle Size Distributions in Electronic Cigarette Effluent

- Studied behavior and health effects of particles and vapors produced by electronic cigarettes
- Designed an Arduino controlled device mimicking a human lung taking a puff
- Conducted a Principal Component Analysis to isolate variables that affected effluent

Analytical Research & Development Intern

Summer 2017

- Lannett Company, Philadelphia, PA

- Performed dissolution assays compliant with USP to evaluate impurity and dissolution profiles of drug products

Process Improvement Intern

Summer 2016

- Arkema, Altuglas International, Bristol, PA

- Developed technique for measuring opalescence of Plexiglas (PMMA)
- Worked with operators to implement new quality control method

Publications

- **Berger, J.E.**, Teixeira, S.C.M., Reed K., Razinkov, V.I., Sloey C.J., Qi W., Roberts, C.J. High-Pressure Low-Temperature Induced Unfolding and Aggregation of MAbs: Role of the Fab and Fc Fragments. 2022. (Submission to J Phys Chem B Dec 2021, anticipated Apr 2022)

- **Berger, J.E.**, Teixeira, S.C.M., Roberts, C.J. High Pressure Stability of NIST MAb with Modulated Buffer Conditions. 2022. (In preparation)
- **Berger, J.E.**, Teixeira, S.C.M., Sloey C.J., Qi W., Roberts, C.J. *In situ* Measurement of Protein Interactions at High Pressure. 2022. (In preparation)

Selected Presentations

- **Berger, J.E.**, Teixeira, S.C.M., Reed K., Razinkov, V.I., Sloey C.J., Qi W., Roberts, C.J. High-Pressure Low-Temperature Induced Unfolding and Aggregation of a Monoclonal Antibody. *Gordon Research Conference on Biotherapeutics and Vaccine Development*. Invited Talk. March 2022.
- **Berger, J.E.**, Teixeira, S.C.M., Reed K., Razinkov, V.I., Sloey C.J., Qi W., Roberts, C.J. High-Pressure Low-Temperature Induced Unfolding and Aggregation of a Monoclonal Antibody: Role of the Fab and Fc Fragments. *ACS: Division of Biochemical Technology*. Oral-Virtual. August 2021.
- **Berger, J.E.**, Teixeira, S., Roberts, C.J. Protein Interactions, Unfolding, and Aggregation at Low Temperatures and High Pressures. *American Conference on Neutron Scattering, Biotech*. July 2020.
- **Berger, J.E.**, Ivancic, V.A., Zonderman, J., Roberts, C.J. Impact of Low Temperatures and High Pressures on Antibody Higher Order Structure. *Cambridge Healthtech Institute*. June 2020. Webinar.
- **Berger, J.E.**, Daley, M., Baish, J., Raymond, T., Dutcher, D. Factors that affect Particle Distribution of Electronic Cigarette Effluent. *Pennsylvania State Legislature*. April 2016

Skills

- Liquid state characterization: LC/MS, Static and Dynamic LS, Small Angle Neutron Scattering, UV-Vis Spectroscopy, Fluorescence Spectroscopy, FT-IR, Circular Dichroism
- Solid state characterization: XRD, TGA, DVS
- Software: SuperPro Designer, Python, LabVIEW, Matlab, PyMOL, Microsoft Office (Excel, Word, Powerpoint)

Awards and Other Achievements

- ACS BIOT Design Challenge, First Place (2022)
- ACS BIOT Service Award (2021)
- Selected as graduate student representative to the Faculty Senate Academic Appeals Committee (2019)
- Presidential Fellowship, Bucknell University (2017)
- Baccalaureate service speaker at Bucknell University (2017)
- Residential Advisor of the Year Award (2017)
- Valedictorian speaker of Plymouth Whitmarsh High School, Colonial School District, PA (2013)
- Dr. Kenneth Wilkinson Award for Leadership, Service, and Character (2013)

Leadership and Mentorship

- | | |
|--|----------------|
| Treasurer , American Chemical Society, Mid-Atlantic BIOT Student Chapter | 2019 - 2022 |
| - Provide a forum for collaboration and connect graduate students, faculty, and industry representatives in the mid-Atlantic region | |
| - Organized several events (in person and virtual) that engaged students and industry | |
| Herb Cohen Memorial Fund Board Member | 2017 - Present |
| - This charity provides financial aid for campers to attend a variety of camps | |
| Radio Show Host, Rise and Science , University of Delaware, 91.3 WVUD | 2017 - 2019 |
| - Community radio program for accessible and fun science communication | |
| Sanctioning and Appellate Board Member for Discrimination and Sexual Misconduct Student Cases , University of Delaware, Office of Student Conduct | 2017 - 2022 |


Samantha E. Cassel

PhD Candidate

Chemical and Biomolecular Engineering

University of Delaware, 590 Avenue 1743, Newark DE 19713

secassel@udel.edu 

215.285.5688 

linkedin.com/in/samantha-cassel 

EDUCATION

Ph.D. Candidate in Chemical Engineering

University of Delaware, Newark DE

Fall 2017 – present

M.S. in Biomedical Engineering *Accelerated Dual Degree Program*

Drexel University, Philadelphia PA

2017

B.S. in Biomedical Engineering *Biomaterials and Tissue Engineering, Summa Cum Laude*

Drexel University, Philadelphia PA

2017

RESEARCH EXPERIENCE

Graduate Research Assistant *Advisor: Prof. April Kloxin*

University of Delaware, Department of Chemical and Biomolecular Engineering

Fall 2017 – present

Development of a dynamic, *in vitro* disease model of pulmonary fibrosis using a synthetic hydrogel platform with multiscale, self-assembling fibrillar structure and dynamic reporters of cell response

- Synthesize, purify, and characterize self-assembling, fibrillar peptides and functionalized polymer macromers for covalent incorporation (thiol-ene click chemistry) into 3D hydrogel cell culture platforms
- Characterize mechanical properties of hydrogel platforms using shear rheometry methods
- Established 15+ stable cell lines for reporting temporal dynamics of alpha smooth muscle actin expression
- Developed confocal live-imaging methods and data-analysis protocols to track and quantify reporter cell dynamics
- Encapsulate reporter cell lines and primary cells in hydrogel systems and assessed response (viability, migration, protein expression) to multiple stimuli (fibrillar structure, biochemical cues, co-culture interactions)

Research Assistant *Advisors: Prof. Kara Spiller & Prof. Amy Throckmorton*

Drexel University, School of Biomedical Engineering, Science, and Health Systems

Summer 2017

Design of a dynamic cardiovascular shunt with increasing lumen diameter to improve outcomes of Norwood procedure in patients with single ventricle physiology

Research Assistant *Advisor: Prof. Amy Throckmorton*

Drexel University, School of Biomedical Engineering, Science, and Health Systems

Fall 2016 – Spring 2017

Development of a novel fluid off-loading rotary pump designed to drive lymph fluid from the thoracic duct into the subclavian vein, unloading fluid congestion and reintroducing it into the cardiovascular system

PROFESSIONAL EXPERIENCE

Biomaterials R&D Engineering Co-op

DePuy Synthes, Bone Graft Substitutes, West Chester PA

Fall 2015 – Spring 2016

- Conducted cross-linking, degradation, and mechanical testing on polymers and composites
- Developed rheological methods for characterizing stability of polymers to optimize storage conditions

Quality Engineering Co-op

Secant Medical, LLC, Quality Engineering, Perkasie PA

Fall 2014 – Spring 2015

- Developed Failure Modes and Effects Analysis (FMEA) reports for textile production processes and presented results
- Designed and implemented Test Method Validation (TMV) protocols
- Analyzed datasets for Process & Operational Qualifications (PQ/POQ) of development products

Clinical Research Assistant

Thomas Jefferson University, Department of Emergency Medicine, Philadelphia PA

Fall 2013 – Spring 2014

- Revised protocols and regulatory documents for submission to Institutional Review Board
- Collaborated with research coordinators to troubleshoot and revise recruitment methods

RESEARCH SKILLS

Mammalian Culture/Assessment

Confocal microscopy
Lentivirus production
Stable cell line production
3D hydrogel encapsulation
Flow cytometry/FACS
Viability/metabolic assays
Immunostaining
DNA/RNA isolation
RT-qPCR

Materials Synthesis/Characterization

Solid phase peptide synthesis
Click chemistry
Shear rheometry
Reverse-phase HPLC
Mass spectroscopy (ESI, LC-MS)
Circular dichroism
UV-Vis spectroscopy
Polymer end-group modification
¹H NMR

Bacterial Culture

Plasmid purification
Gel electrophoresis
Transformation
Ligation
Site-directed mutagenesis

Computer

MS Office
MATLAB
Minitab
ImageJ
Volocity
BioRender
Python
Origin Labs

LEADERSHIP EXPERIENCE

Chemical and Biomolecular Engineering Representative, Women in Engineering Steering Committee 2020 – 2022

- Led the organization and execution of two college-wide events per semester
- Developed new programming to further the goal of advocacy and representation of women in engineering

Committee Lead & Peer Mentor, Empathetic Peers Offering Wisdom Encouragement, & Resources 2019 – 2022

- Mentored 2-3 incoming first year students each year to aid in their transition to graduate school
- Collaborated to develop and organize professional development events to assist students in all program years

President, Colburn Club (Chemical and Biomolecular Engineering graduate student organization) 2019 – 2020

- Collaborated with staff & faculty to organize two recruitment weekends for up to 40 visiting students, including one rapid pivot to a virtual recruitment experience in March 2020
- Managed team of 50-60 graduate student volunteers for successful execution of recruitment events
- Lead team of 10-12 graduate student leaders in planning professional development and social events for all department graduate students

TEACHING EXPERIENCE [number of students enrolled]

CHEG112: Intro to Chemical Engineering [125], *University of Delaware* Spring 2019

CHEG332: Chemical Engineering Kinetics [74], *University of Delaware* Fall 2018

BMES505/506/507: Mathematics for the Biomedical Sciences I/II/III [31/28/22], *Drexel University* 2016 – 2017

Math Tutor, Serviam Girls Academy (grades 5-8), New Castle DE 2017 – 2021

HONORS & AWARDS

Saurabh A. Palkar Graduate Award for Mentoring Fellowship 2022

Robert L. Pigford Teaching Assistant Award 2020

UD Graduate Student Conference Travel Award 2019

SELECTED PEER-REVIEWED PUBLICATIONS

tinyurl.com/gscholar-secassel

1. ME Smithmyer, **SE Cassel**, and AM Kloxin. "Bridging 2D and 3D culture: probing impact of extracellular environment on fibroblast activation in layered hydrogels" *AIChE J*, Futures Issue, 2019.
2. ME Smithmyer, CC Deng, **SE Cassel**, PJ LeValley, BS Sumerlin, and AM Kloxin. "Self healing boronic acid-based hydrogels for 3D co-cultures" *ACS Macro Letters*, **7**, 1105-1110, 2018.

In preparation: [*equal contribution]

1. **SE Cassel** and AM Kloxin. "Establishment of a dynamic reporter for assessing real-time activation of wound healing cells" for submission in 2022
2. K Bomb*, **SE Cassel***, L Pradhan, CA Fromen, and AM Kloxin. "Design and application of model systems for understanding lung fibrosis to identify therapeutic targets and predict clinical success" for submission in 2022

SELECTED CONFERENCE PRESENTATIONS

1. **SE Cassel** and AM Kloxin. "Lentiviral reporters for temporal characterization of cell activation in response to dynamic stimuli." Oral Presentation at 2022 Annual Society for Biomaterials Meeting; April 27-30; Baltimore, MD
2. **SE Cassel** and AM Kloxin. "Lentiviral-based reporters for temporal characterization of fibroblast activation in response to dynamic stimuli" Poster (virtual) at 2020 World Biomaterials Congress

Tso-Hsuan Chen

TEL: (+1)302-480-4581 Email: eddyeddy@udel.edu
www.linkedin.com/in/tso-hsuan-chen

EDUCATION

University of Delaware
Ph.D. Chemical Engineering

September 2018-Present

National Taiwan University
B.S. Chemical Engineering

September 2013-June 2017

ACADEMIC EXPERIENCES

Vlachos Lab, Ph.D. Student
Dr. Dionisios G. Vlachos

September 2018-Present

- Investigating the mechanism and kinetics of the direct acylation reaction of furan over various catalysts using density functional theory (DFT) calculations and microkinetic modeling (MKM).
- Understanding the solvent effect for fructose dehydration in biphasic systems using classical molecular dynamics (MD) and quantum mechanics/molecular mechanics (QM/MM) MD simulations.
- Investigating the effect of entropy and metal/support dynamics on the kinetics and thermodynamics for the nucleation of Pt₂, Pd₂ and Pt-Sn on the alumina support using ab initio MD (AIMD) in conjunction with thermodynamic integration (TI) and metadynamics (MTD) methods.
- Developing neural network potentials (NNPs) for zeolite system to study the changes of translational and rotational entropies for substrates during the reactions in confined environments.

Precise Printing Technology Lab, Research Assistant

July 2017-April 2018

Dr. Ying-Chih Liao

- Developing novel aerial filtration models with COMSOL simulations.
- Fabricating a hydrophobic but oleophilic foam that could be used for the oil-mist removal.

Precise Printing Technology Lab, Research Undergraduate

February 2016 – June 2017

Dr. Ying-Chih Liao

- Fabricating stretchable 3D conductive patterns using inkjet printing technique.
- Developing healable and conductive patterns on foldable and extremely rough substrates.
- Designing an integrated sensor for temperature and humidity tracking by inkjet printing technique.

Asmedia Technology Inc., Internship

June 2015 – September 2015

- Designing and improving the integrated circuits (IC).
- Tracking the quality of chip manufacture.

PEER-REVIEWED PUBLICATIONS

- Quiroz, N. R., **Chen, T. H.**, Chen, T. Y., Caratzoulas, S., & Vlachos, D. G. (2022) Unexpected Kinetic Solvent Effects Enhance Activity and Selectivity in Biphasic Systems. (Submitted)
- Luo, T. Y., Park, S., **Chen, T. H.**, Perna, P., Patel, R., Siepmann, J. I., Caratzoulas, S., Xia, Z., & Tsapatsis, M. (2022). Simultaneously Enhanced Hydrophilicity and Stability of a Metal-Organic Framework via Post-Synthetic Modification for Water Vapor Sorption/Desorption. (Submitted)
- **Chen, T. H.**, Vlachos, D. G., & Caratzoulas, S. (2021). Brønsted Acid Catalysis of the Direct Acylation of 2-Methylfuran by Acetic Acid. Theoretical Insights into the Role of Brønsted Acidity and Confinement. *ACS Catalysis*, 11(15), 9916-9925.
- Dorneles de Mello, M., Kumar, G., Tabassum, T., Jain, S. K., **Chen, T. H.**, Caratzoulas, S., ... & Tsapatsis, M. (2020). Phosphonate-Modified UiO-66 Brønsted Acid Catalyst and Its Use in Dehydra-Decyclization

of 2-Methyltetrahydrofuran to Pentadienes. *Angewandte Chemie*, 132(32), 13362-13368.

- **Chen, T. H.**, Yeh, Y. C., & Liao, Y. C. (2018). Healable and foldable carbon nanotube/wax conductive composite. *ACS applied materials & interfaces*, 10(28), 24217-24223.

SELECTED CONFERENCE PRESENTATIONS

- **Chen, T. H.**, Vlachos, D. G., & Caratzoulas, S. (2020). Computational Insights into the Direct Acylation of 2-Methylfuran with Acetic Acid over Phosphotungstic Acid and H-BEA Zeolite. *AICHE Annual Meeting*. Presentation
- **Chen, T. H.**, Vlachos, D. G., & Caratzoulas, S. (2020). Acylation of 2-Methylfuran with Acetic Acid over HPW and H-BEA Catalyst. *CCEI Spring Symposium*. Presentation
- **Chen, T. H.**, & Liao, Y. C. (2017). Graphene-modified Sponges for The Oil Mist Removal. *Korea / Japan / Taiwan Chemical Engineering Conference*. Poster, First-Place Award
- **Chen, T. H.**, & Liao, Y. C. (2017). Fabrication of Healable Conductive Tracks on Foldable Substrates and Extremely Rough Surface with MWCNT-Based Composite. *Annual Meeting of Taiwanese Interface Society*. Poster, Third-Place Award
- **Chen, T. H.**, & Liao, Y. C. (2016). Fabrication of 3D Stretchable Conductive Pattern by Printing with Dispenser. *63rd TwiCHE Annual Conference*. Poster

AWARDS AND HONORS

Presidential Award – NTU, Department of Chemical Engineering	2017
• An award bestowed to the top 5% students in academic records.	
Cathay Life Insurance Fellowship –	2016
• Offered for students that has an average score of A in academic record.	
Taiwan Business Bank Fellowship –	2014
• Offered for students that has an average score of A in academic record.	

ACTIVITIES

Graduate Applied Chemical Kinetics , Teaching Assistant	September 2020-December 2020
• Giving office hours, providing homework solutions and grading assignments.	
Undergraduate Introduction to Chemical Engineering , Teaching Assistant	February 2021-May 2021
• Giving office hours and providing homework solutions.	
AICHE in National Taiwan University Student Chapter , Co-Founder	May 2017-May 2018
• Setting up regulations for the organization.	
• Building up connections with chemical engineers worldwide by inviting speakers from the field to present in the chemical engineering department and seeking for industry-academic cooperation.	
World Vision International , Translate Volunteer	January 2016-December 2017
• Translating letters of funding for sponsors and the funded people.	

SKILLS

Language: Mandarin Chinese, English.

Software: Gaussian, CP2K, Quantum Espresso, VASP, LAMMPS, Amber, Comsol Simulation, Solidwork, Packmol, VMD, Python, Matlab, Fortran, MS Excel, MS Power Point, MS Word.

Experimental Technique: Scanning Electron Microscopy, Zeta Sizer, Four-point Probe, Optical Microscopy, Lumisizer, FTIR Analysis, X-ray Photoelectron Spectroscopy.

Yingjie Chen

cyl@udel.edu <https://www.linkedin.com/in/yingjie-chen>
+1 812-241-0212

150 Academy St
Newark, DE 19716

EDUCATION

University of Delaware	Newark, DE
Ph.D. Candidate in Chemical and Biomolecular Engineering, GPA 3.66/4.00	08/2019 — 05/2023
Advisor: Prof. Marianthi Ierapetritou	
Rutgers, The State University of New Jersey	Piscataway, NJ
Ph.D. Student in Chemical and Biochemical Engineering, GPA 4.00/4.00	08/2018 — 08/2019
Rose-Hulman Institute of Technology	Terre Haute, IN
B.S. in Chemical Engineering, magna cum laude, GPA 3.89/4.00	09/2014 — 05/2017
Nanyang Technological University	Singapore
Chemical and Biomolecular Engineering, Global Exchange Program	01/2016 — 05/2016

RESEARCH AND WORK EXPERIENCE

Graduate Research Assistant	08/2018 — Present
Thesis Project: Hybrid Approaches for Modeling and Optimization of Continuous Solid-Based Pharmaceutical Manufacturing (CPM) Process under an Industry 4.0 Framework	

Advisor: Prof. Marianthi Ierapetritou

- Participate in FDA-funded projects to realize Industry 4.0 framework for CPM processes under QbD initiative
- Utilize process data to develop hybrid and machine learning (ML) models to improve process predictability
- Conduct analyses with flowsheets in MATLAB/gPROMS to identify critical parameters and design space
- Familiarize with powder/blend material characterization and incorporate property databases into modeling
- Implement adaptive algorithms in Python to address model update issues for PAT and unit operation models
- Perform economic analysis and optimization of CPM to reduce energy consumption by 20%
- Assess process environmental impacts with life cycle analysis (LCA) to strive for process sustainability
- Extend surrogate-based, feasibility-driven optimization to multi-objective space to support decision-making

Process Team Core Member / Operations Intern	07/2017 — 08/2018
---	-------------------

Eli Lilly and Company

- Coordinated cGMP process operations and cooperated with international sites to benchmark operation designs
- Integrated a data analysis platform with TrakSys using Python and VB to visualize process operations
- Acted as a process subject matter expert in Six Sigma project to reduce batch changeover time from 4 to 2 hrs
- Implemented optimization measures (SOP, process, RCA, and HR) to improve shift effectiveness by 25%
- Contributed in change (MOC) and qualification (PQ) of speed-up projects to increase line capability by 50%
- Assisted with updating over 20 departmental work instructions to align with current operational practices
- Responsible for departmental procurement and resource planning to support business operations
- Applied MES data to visually manage the shop floor, ensuring 100% on-time completion of plans

SKILLS

Software/Programming	Python, gPROMS, MATLAB, Minitab, DeltaV, OSI PI, SAP, Rockwell PMX, TIBCO
Laboratory/Plant	Direct compaction, Wet granulation, Sterile product filling and packaging, Ultrafiltration, Fluidized bed
Language	English, Cantonese, Mandarin, German (Elementary)

PUBLICATIONS

1. **Chen, Y.**, Ierapetritou, M. (2022). "Surrogate-based multi-objective optimization with feasibility driven constraints for continuous pharmaceutical manufacturing." [In Preparation].
2. **Chen, Y.**, Gupta, S., Sampat, C., Ramachandran, R., Muzzio, F., Ierapetritou, M. (2022). "Adaptive NIRS model on an analytics platform for monitoring low dose blend uniformity in a feed frame." [In Preparation].
3. **Chen, Y.**, Bhalode, P., Ierapetritou, M. (2022). "Review of Recent Advancements Towards the Development of Digital Twin of Continuous Pharmaceutical Manufacturing." Book Chapter. [Submitted].
4. Sampat, C., Kotamarthy, L., Bhalode, P., **Chen, Y.**, Dan, A., Parvani, S., Dholakia, Z., Singh, R., Glasser, B., Ierapetritou, M., Ramachandran, R. (2022). "Enabling Energy-Efficient Manufacturing of Pharmaceutical Solid Oral Dosages via TEA and Process Modeling." *J of Adv Manufacturing and Processing*. [Under Review].
5. **Chen, Y.**, Yang, O., Sampat, C., Bhalode, P., Ramachandran, R., Ierapetritou, M. (2020). "Digital Twins in Pharmaceutical and Biopharmaceutical Manufacturing: A Literature Review." *Processes* 8(9).
6. **Chen, Y.**, Ierapetritou, M. (2020). "A framework of hybrid model development with identification of plant-model mismatch." *AIChE Journal* 66(10): e16996.
7. Bhalode, P., **Chen, Y.**, Ierapetritou, M. (2021). "Hybrid Modelling Strategies for Continuous Pharmaceutical Manufacturing within Digital Twin Framework." *Proceedings of the 14th International Symposium on PSE*.
8. Bhalode, P., Metta, N., **Chen, Y.**, Ierapetritou, M. (2020). "Efficient Data-based Methodology for Model enhancement and Flowsheet analyses for Continuous Pharmaceutical Manufacturing." *Computer Aided Chemical Engineering* 48.

SELECTED PRESENTATIONS

1. **Chen, Y.**, Gupta, S., Román-Ospino, A., Muzzio, F., Ierapetritou, M. "Adaptive Strategies for Updating Unit Operation Models and In-Line Monitoring of Blend Uniformity in CPM Process", *AIChE*, November 2021.
2. **Chen, Y.**, Ierapetritou, M. "Implementation of Hybrid Models to Perform System Analyses with Model Maintenance in Continuous Pharmaceutical Manufacturing", *AIChE*, November 2020.
3. **Chen, Y.**, Ierapetritou, M. "Development of Data-Driven and Hybrid Models for Continuous Pharmaceutical Manufacturing Lines Under Industry 4.0 Framework", *AIChE*, November 2019.
4. **Chen, Y.**, Dias, L., Metta, N., Ierapetritou, M. "Data-driven Modeling of Unit Operations in Continuous Pharmaceutical Manufacturing Line under the Industry 4.0 Framework", *ML in Science and Engr.*, June 2019.

TEACHING EXPERIENCE

Teaching Assistant, Dept. of Chemical and Biochemical Engineering, Rutgers 08/2018 — 08/2019

Courses: 155:415/416 Process Engineering Lab I/II (82 enrollment, with Prof. Alex Bertuccio)

- Coordinated the entire senior unit operations lab series and supervised all 13 laboratory experiments
- Responsible for lab management, grading, and providing guidance in written and oral presentations

ACTIVITIES

Vice President, Chemical and Biochemical Graduate Student Organization, Rutgers 09/2018 — 08/2019

Executive Member, Employee Wellbeing Team, Lilly 09/2017 — 07/2018

Student Representative, Institute Committee of Global Studies, Rose-Hulman 09/2016 — 05/2017

Treasurer, AIChE Rose-Hulman Chapter 09/2016 — 05/2017

HONORS AND AWARDS

Travel Grant Award, 2019 Machine Learning in Science and Engineering Conference 2019

Best Operations Team Award; Best Team Award for Employee Wellbeing, Lilly 2018

Dean's List; Heminway Bronze Medal of Academic Superiority, Rose-Hulman 2014 — 2017

Haoran Ding

Graduate Research Assistant

Department of Chemical & Biomolecular Engineering, University of Delaware

Tel: 302-250-0090 | E-mail: hding@udel.edu | Address: 309 Colburn Lab, 150 Academy St. Newark, DE 19711

(Updated at 12/2021)

EDUCATION

Department of Chemical & Biomolecular Engineering, University of Delaware	Newark, DE, US
Ph.D. Student	07/2018-Present
School of Chemical & Biochemical Engineering, Western University	London, ON, Canada
Visiting Student (Graduation Project)	02/2018-05/2018
School of Chemical & Biomolecular Engineering, Georgia Institute of Technology	Atlanta, GA, US
Visiting Research Student	06/2017-08/2017
School of Chemical Engineering and Technology, Tianjin University	Tianjin, China
Bachelor of Engineering in Applied Chemistry	09/2014-07/2018

RESEARCH EXPERIENCES

Ph.D. Project: Electrochemical functionalization of p-xylene

| Graduate Research Assistant 07/2021-present

Advisor: Dr. Marat Orazov, Department of Chemical & Biomolecular Engineering, University of Delaware

- Investigated the electrochemical oxidation of p-xylene in carboxylic acid solvents to synthesize value-added esters and aldehydes.
- Added anhydride as a drying agent and acylal-stabilizing agent to improve the selectivity and Faradaic efficiency of electrolysis.
- Applied periodical negatively pulse to mitigate the surface deactivation during the electrolysis and promote the formation of the desired ester products.
- Tested the electrolysis with different carboxylic acids, electrolytes, electrodes and temperatures.

Ph.D. Project: Expanding on Kolbe Electrolysis for Organic Electrosynthesis

| Graduate Research Assistant 01/2019-present

Advisor: Dr. Marat Orazov, Department of Chemical & Biomolecular Engineering, University of Delaware

- Employed Kolbe electrolysis to generate reactive carbon-centered radicals to do addition reaction toward styrene.
- Investigated the parameters that affect the electrolysis selectivity and Faradaic efficiency and optimized the electrolysis conditions.
- Investigated the reaction mechanism by a TEMPO radical trap.

- Applied periodical negatively pulse to mitigate the surface deactivation during the electrolysis and promote the formation of the desired ether product.

Graduation Project: Improvement of fluidizing ability of Geldart-C particles

| Undergraduate Researcher

02/2018-05/2018

Advisor: Dr. Jesse Zhu, School of Chemical and Biochemical Engineering, Western University

- Applied silica nanoparticles as additives into hard-to-fluidize Geldart-C polyurethane particles to improve their flowing properties and explored the effects under different addition concentrations.
- Explored the effects of four different fluidizing gases (Air, Helium, Hydrogen, Nitrogen) to the fluidizing ability of Geldart-C particles.
- Built a model to explain the effects of fluidizing gases with the focus on gas density and viscosity.

ZnO nanorod for rechargeable zinc batteries | Visiting Student Researcher

06/2017-08/2017

Advisor: Dr. Nian Liu, School of Chemical & Biomolecular Engineering, Georgia Tech

- Synthesized the Zn-Ti-N-O nanostructured material by hydrothermal method as anode for aqueous zinc based rechargeable batteries.
- Characterized the morphology of material by SEM and the crystal structure by XRD.
- Tested the system in coin cells, pouch cells and beaker cells.

HONORS AND AWARDS

- | | |
|---|---------|
| ➤ Collins Fellowship for Graduate Students | 01/2019 |
| ➤ First Prize in Innovation & Imagination Competition of Tianjin University | 05/2017 |
| ➤ Gold Medal and Best Environment Track Nomination Award in iGEM 2016 | 11/2016 |
| ➤ Excellent Student Cadres Scholarship of Tianjin University | 10/2016 |
| ➤ Merit Students Scholarship of Tianjin University | 10/2015 |

PUBLICATION:

- Zhou, Yandaizi, **Haoran Ding**, Jesse Zhu, Yuanyuan Shao. The effect of gas properties on Group C+ fluidized bed reactor. *Chem. Eng. J.* 394 (2020): 125039.
- Zhubo Zhou, Yamin Zhang, Peng Chen, Yutong Wu, Haochen Yang, **Haoran Ding**, Yi Zhang, Zhongzhen Wang, Xu Du, Nian Liu. Graphene oxide-modified zinc anode for rechargeable aqueous batteries. *Chem. Eng. Sci.* 194 (2019): 142-147.
- Yamin Zhang, Yutong Wu, **Haoran Ding**, Yu Yan, Zhubo Zhou, Yong Ding, Nian Liu. Sealing ZnO nanorods for deeply rechargeable high-energy aqueous battery anodes. *Nano Energy* 53 (2018): 666-674.

Google Scholar Page: <https://scholar.google.com/citations?user=4F0sbjkAAAAJ&hl=en>

SKILLS

- **Experimental Skills:** SEM, TEM, EDX, CV, EIS, Battery Cycling, GC, HPLC, NMR, etc.
- **Computer Skills:** Matlab, Aspen Plus, MS Office, OriginLab, Minitab, 3ds Max, etc.

James K. Forder

Ammon Pinizzotto Biopharmaceutical Innovation Center
590 Avenue 1743, Newark, DE 19713

jforder@udel.edu
(302) 437-6471

www.linkedin.com/in/james-forder

EDUCATION

University of Delaware

Ph.D. Candidate, Chemical and Biomolecular Engineering

Newark, DE

Expected Spring 2023

Rutgers University

B.S., Chemical and Biochemical Engineering

GPA: 3.88/4.00

New Brunswick, NJ

May 2018

RESEARCH EXPERIENCE

University of Delaware – Graduate Research Assistant

Sep. 2018 – Present

Advisor: Prof. Christopher J. Roberts

- Used computational and experimental methods to investigate monoclonal antibody physical stability and self-interactions with a focus on understanding and predicting aggregation rates and mechanisms
- Conducted long-term thermal stability studies in pharmaceutically relevant formulations from low to high protein concentration
- Measured protein self-interactions with static and dynamic light scattering across a range of formulation conditions
- Developed and applied coarse-grained Monte Carlo molecular simulations to predict biophysical properties of protein solutions

Rutgers University – Undergraduate Research Assistant

Sep. 2016 – Dec. 2017

Advisor: Prof. Ioannis P. Androulakis

- Developed code to automate parameter sampling and integration of gPROMS, DDDPlus and GastroPlus modeling softwares, allowing for statistical analysis of manufacturing, dissolution, and pharmacokinetics for small molecule drugs

Rutgers University – Undergraduate Research Assistant

Sep. 2015 – May 2016

Advisors: Prof. Marianthi G. Ierapetritou, Prof. Ravendra Singh

- Utilized gPROMS to simulate combined feed-back/feed-forward controls in pharmaceutical manufacturing

PUBLICATIONS

- **Forder, J.K.** et al. Computational Modeling of High-Concentration Protein-Protein Self-Interactions for Monoclonal Antibody Solutions From Well-Behaved to Poorly-Behaved Systems (in preparation)
- Shahfar, H.*; **Forder, J.K.***; Roberts, C.J. Toward a Suite of Coarse-Grained Models for Molecular Simulation of Monoclonal Antibodies and Therapeutic Proteins *J. Phys. Chem. B* **2021**, 125 (14), 3574-3588. [* co-first author]
- **Forder, J.K.**; Smith, M; Wagner, M.; Schaefer, R.J.; Gorky, J.; van Golen, K.L.; Nohe, A.; Dhurjati, P. A Physiology-Based Pharmacokinetic Model for Targeting Calcitriol-Conjugated Quantum Dots to Inflammatory Breast Cancer Cells *Clin. Transl. Sci.* **2019**, 12 (6), 617-624.
- Scherholz, M.L.; **Forder, J.K.**; Androulakis, I.P. A Framework for 2-Stage Global Sensitivity Analysis of GastroPlusTM Compartmental Models *J. Pharmacokinet. Pharmacodyn.* **2018**, 45 (2), 309-327.

PRESENTATIONS

- **Forder, J.K.**, Ilott, A.J., Sahin, E., Roberts, C.J. “Computational modeling of high-concentration protein-protein self-interactions for monoclonal antibody solutions” (Oral Presentation)
 - ACS Spring National Meeting, March 2022
 - ACS Spring Special Session, April 2022

TEACHING EXPERIENCE

University of Delaware – Graduate Teaching Assistant

CHEG 431: Chemical Process Analysis

Sep. 2019 – Dec. 2019

- Assisted with creating and grading homework, helped students learning how to use Aspen Plus

CHEG 667/467: Systems Medicine

Jan. 2020 – May. 2020

- Advised chemical engineering undergraduate students working on independent projects related to medicine, with applications including machine learning, agent-based modeling, PBPK, and big data

Rutgers University – Learning Assistant

Sep. 2015 – May 2018

- Developed lesson plans and instructed students in weekly supplemental classes and/or provided assistance in instruction during lectures of up to 100 students
- General Chemistry for Engineers I (Fall 2015), General Chemistry for Engineers II (Spring 2016, Spring 2018), Mass and Energy Balances (Fall 2016), Biological Foundations of Chemical Engineering (Spring 2017), Climate Change and Energy in the 21st Century (Fall 2017)

INDUSTRIAL EXPERIENCE

POET Biorefining – Plant Engineering Intern

May 2017 – Aug. 2017

- Designed and implemented piping, instrumentation and equipment changes to critical plant processes, assessed financial and production consequences

Mondelēz International – RD&Q Process Engineering Intern

May 2016 – Aug. 2016

- Conducted process troubleshooting on rotary molding and other commercial unit operations, performed pilot scale proof-of-concept trials on experimental food production equipment and materials

SKILLS

- Laboratory techniques: static light scattering, dynamic light scattering, HPLC, size-exclusion chromatography, UV-Vis spectroscopy, differential scanning calorimetry, viscometry, refractometry, densimetry, steady state fluorescence, circular dichroism (far- and near-UV), subvisible particle counting (backgrounded membrane imaging)
- Programming languages: Python, FORTRAN, MATLAB, VBA, AutoIt
- Software: Origin, PyMOL, Wyatt DYNAMICS, Agilent ChemStation, Aspen Plus, Minitab, Microsoft Visio, Microsoft Office

HONORS AND AWARDS

- Rutgers Alumni-Industry Scholarship Apr. 2016 – May 2018
- James Dickson Carr Scholarship Sep. 2014 – May 2018
- Aresty Research Fellowship Sep. 2015 – May 2016

ERICA A. GREEN

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

EDUCATION

University of Delaware, Newark, DE

August 2018 – Present

Ph.D. Candidate, Chemical and Biomolecular Engineering

Carnegie Mellon University, Pittsburgh, PA

May 2015

B.S. Chemical Engineering; Additional Major in Biomedical Engineering

INDUSTRY & RESEARCH EXPERIENCE

Doctoral Researcher, Kelvin H. Lee Lab

University of Delaware, Newark, DE

June 2019 – Present

- Thesis Topic: Development of processes and analytical methods for production and characterization of viral vectors and proteins
- Established transient and stable bioprocesses for production of SARS-CoV-2 receptor binding domain (RBD) protein in HEK293 cells
- Establishing platform HEK293 cell line and analytical methods for characterization of recombinant adeno-associated virus (rAAV) production processes

Associate Engineer, Merck & Co

Manufacturing Leadership Development Rotational Program

Biologics Integrated Process Team, Brinny, Ireland

September 2017 – August 2018

- Supported validation activities for the setup 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 bulk powders to support small molecule drug product development activities
- 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 – 2016

- Increased overall process yield by implementing changes to optimize and reduce quality release sample volumes
- Enabled continuous improvements projects through lab experiments for process and instrument validation, documentation updates, and participation in the shop floor Aseptic Observer program

Undergraduate Research Assistant, Todd M. Przybycien Lab

Carnegie Mellon University, Pittsburgh, PA

September 2014 – May 2015

- Characterized binding kinetics of immunoglobulin G antibodies with multiple forms of polyethylene glycol (PEG) modified protein A by analysis with an Octet affinity system and ultraviolet-visible spectroscopy
- Analyzed relationship between binding capacity and antibody concentration for various PEG modified protein A medias by generation of Langmuir isotherm plots

Manufacturing Intern, Merck & Co

West Point, PA

June – August 2014

- Built an inventory control database to track supply usage in a vaccine formulation/filling facility
- Organized warehouses with a barcoded Kanban card system to maintain stable inventory levels

PEER-REVIEWED PUBLICATIONS

Green, E. A., Hamaker, N. K., & Lee, K. H. High-yielding processes for transient and stable expression of SARS-CoV-2 receptor binding domain in HEK293 cells. *Manuscript in preparation*.

Green, E. A., & Lee, K. H. (2021). Analytical methods to characterize recombinant adeno-associated virus vectors and the benefit of standardization and reference materials. *Current Opinion in Biotechnology*, 71, 65–76.

HONORS & FELLOWSHIPS

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
- Westinghouse Half-Tuition Scholarship 2011 – 2015

LEADERSHIP & OUTREACH

Colburn Club: Chemical Engineering Graduate Student Association Fall 2018 – Present

- Fourth Year Representative (2021-22)
- Vice President (2020-2021)
- Second Year Representative (2019-20)
- First Year Representative (2018-19)

Teaching Assistantships

- University of Delaware: Experimental Methods in Biomolecular Engineering Spring 2021
- University of Delaware: Chemical Engineering Lab I Spring 2020
- Carnegie Mellon University: Biochemistry Spring 2015

Society of Women Engineers Fall 2011 – 2019

Professional Membership

- 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

Collegiate Membership

- President, Carnegie Mellon Section Summer 2014 – 2015
- Freshman Programming Chair, Carnegie Mellon Section Summer 2013 – 2014
- Mentoring Program Chair, Carnegie Mellon Section Summer 2012 – 2013

Carnegie Mellon Admission Council 2015 – 2018

- Performed alumni interviews for prospective Carnegie Mellon freshmen each admissions cycle

CHRISTIAN HEIL

Cell: 412-526-4329 • Email: heil@udel.edu • Newark, DE

EDUCATION

University of Delaware, College of Engineering, Newark, DE
Ph.D. Candidate in Chemical and Biomolecular Engineering

Expected February 2023
GPA: 4.00

Princeton University, College of Engineering, Princeton, NJ
B.S. of Engineering in Chemical and Biological Engineering
Graduated cum laude with a certificate in Engineering Biology

2014 - 2018
GPA: 3.77

SKILLS

Programming Languages: Advanced: Python, Cython

Familiar: C, Fortran, UNIX Shell, Matlab

Programming Tools: NumPy, SciPy, Matplotlib, Pandas, Keras, TensorFlow, LAMMPS, Optical Modeling (Finite-Difference Time-Domain), High-Performance Clusters, Github

RESEARCH EXPERIENCE

Ph.D. Researcher, Department of Chemical and Biomolecular Engineering
Jayaraman Computational Research Group - *University of Delaware*

2018 - Present

Thesis: Computational Study of Self-Assembly, Structure, and Optics of Bio-Inspired Nanoparticles

- Created and extended a method called “Computational Reverse-Engineering Analysis for Scattering Experiments” (CREASE) to characterize nanoparticle assemblies, nanoparticle solutions, and micelle solutions
- Incorporated machine learning (neural networks) to improve CREASE performance and time requirements making the methods suitable for experimentalists without access to high-performance computers
- Published open-source computational package CREASE to promote wider adoption in materials characterization
- Collaborated with experimentalists to validate simulation models and computational methods and to guide soft materials design for optical applications
- Performed optical modeling using finite-difference time domain (FDTD) to link colloidal structure to material color and reflectance spectra
- Developed coarse-grained colloid and polymer models to investigate effects of macromolecular design on polymer conformation and dynamics in bulk and confined systems by applying computational techniques (molecular dynamics simulations)
- Mentored 3 undergraduate and graduate students in technical and professional skills including research design, data analysis, and data presentation

Undergraduate Research and Senior Thesis
Brynildsen Research Group - *Princeton University*

2016 - 2018

- Researched and expanded computational model for nitric oxide clearance rate in acidic solution
- Identified computational model assumptions that were invalid in new conditions and determined most sensitive assumptions
- Investigated additional model inputs and pathways and evaluated importance to ensure match to experimental trends
- Utilized literature research, expert insight, and experimental tests to validate computational model in acidic media

Research Internship

Summer 2016

Dr. Thomas Snelling - *Telethon Kids Institute, Perth, Australia,*

- Designed, developed, and implemented several databases in Medrio, RedCap, and Microsoft Access to store and analyze clinical data for infectious disease team
- Updated and improved existing databases in Medrio and Microsoft Access to allow researchers streamlined access to analyses and graphs

CHRISTIAN HEIL

Cell: 412-526-4329 • Email: heil@udel.edu • Newark, DE

Research Internship

Summer 2016

NTi Technology - *Cornell University Startup*

- Developed a realistic testing model to assess bactericidal efficacy of disinfectant coating
- Conducted comprehensive analysis to identify efficacy trends that allowed comparison between all prototypes and their iterations
- Directed research focus of product features based on analysis of results

OTHER EXPERIENCE

University of Delaware Colburn Club Outreach Group

2018 - Present

- Tutored local middle school children in math courses
- Conducted STEM related demonstrations to encourage STEM interest in middle school children

Engineers Without Borders - Princeton Chapter, Kenyan Team

2014 - 2018

- Managed a team of 7 people to conduct research and develop technical plans for creation of rainwater catching system
- Designed water tank placement to optimize rainwater capture

SELECTED PUBLICATIONS

- **Heil, C. M.** & Jayaraman, A. Machine Learning Augmented Computational reverse-engineering analysis for scattering experiments (CREASE) to determine structural of nanoparticle mixtures and solutions. (under review).
- ***Heil, C. M.**; *Patil, A.; Vanthournout, B.; Bleuel, M.; Singla, S.; Hu, Z.; Gianneschi, N. C.; Shawkey, M. D.; Sinha, S. K.; Jayaraman, A.; & Dhinojwala, A. Modeling Structural Colors from Disordered One-Component Supraballs using Combined Experimental and Simulation Techniques. (under review).
- *Patil, A.; ***Heil, C. M.**; Vanthournout, B.; Bleuel, M.; Singla, S.; Hu, Z.; Gianneschi, N. C.; Shawkey, M. D.; Sinha, S. K.; Jayaraman, A.; & Dhinojwala, A. (2022). Structural Color Production in Melanin-based Disordered Colloidal Nanoparticle Assemblies in Spherical Confinement. *Advanced Optical Materials*, 10(5), 2102162. (*co-first author).
- **Heil, C. M.** & Jayaraman, A. (2021) Computational Reverse-Engineering Analysis for Scattering Experiments of Assembled Binary Mixture of Nanoparticles. *ACS Mater. Au*, 1(2), 140-156.
- *Gartner, T. E.; ***Heil, C. M.**; & Jayaraman, A. (2020). Surface composition and ordering of binary nanoparticle mixtures in spherical confinement. *Molecular Systems Design & Engineering*, 5(4), 864-875. (*co-first author).

SELECTED PRESENTATIONS

- **Heil, C. M.** & Jayaraman, A. Computational Reverse-Engineering Analysis for Scattering Experiments of Assembled Mixtures of Nanoparticles. Talk – APS March Meeting 2022
- **Heil, C. M.** & Jayaraman, A. Computational study of structure and dynamics of polymers around nanoscale particles in soft materials. Invited talk – DARWIN Computing Symposium 2022
- **Heil, C. M.** & Jayaraman, A. Computational Reverse-Engineering Analysis for Scattering Experiments of Assembled Binary Colloidal Particle Mixtures. Talk – APS March Meeting 2021
- **Heil, C. M.** & Jayaraman, A. Computational Reverse-Engineering Analysis for Scattering Experiments of Assembled Binary Colloidal Particle Mixtures. Talk – AIChE Annual Meeting 2020
- **Heil, C. M.**, Gartner, T. E., & Jayaraman, A. Development of Surface Composition and Ordering During Reverse-Emulsion Assembly of Binary Colloidal Particle Mixtures. Talk – APS March Meeting 2020

Chase Evan Herman

cherman@udel.edu • 417-551-1942

Colburn Laboratory, Office 153; 150 Academy St; Newark, DE 19716

EDUCATION

Ph.D. in Chemical and Biomolecular Engineering Aug 2018 – Present
University of Delaware GPA: 4.0/4.0

B.S. in Chemical Engineering (with Chemistry and Spanish minors) Aug 2014 – May 2018
Missouri University of Science and Technology GPA: 4.0/4.0

RESEARCH EXPERIENCE

University of Delaware, Newark, DE Jan 2019 – Present

Ph.D. Student (under Prof. A.M. Lenhoff)

- Investigation of CHO host-cell protein chromatographic behavior with proteomics and confocal LSM
- Theoretical analysis of impurity behavior in flow-through IEX chromatography with column modeling
- Biophysical modeling of protein IEX adsorption with continuum electrostatics and molecular dynamics
- Group safety coordinator

NSF-REU Intern (under Prof. R.F. Lobo) June – Aug 2017

- Investigation of acid catalysts for Alder-ene reactions for the valorization of biomass derivatives

Missouri University of Science and Technology, Rolla, MO Jan 2016 – May 2017

Undergraduate Researcher (under Prof. S. Barua)

- Development of a PLGA microparticle synthesis method for suspension culture of adherent cells

Carlisle Transportation Products, Springfield, MO Jun – Aug 2015, 2014

R&D Materials Lab Technician (2015), Intern (2014)

- Synthesis of rubber composites for accelerated fatigue studies on power transmission belts

Missouri State University, Springfield, MO Jun 2013 – May 2014

Lab Technician Assistant (under Prof. P.L. Durham)

- Investigation of *Acheta domesticus* protein micronutrient content for biomass valorization

TEACHING EXPERIENCE

University of Delaware, Newark, DE

Teaching Assistant

- Process systems engineering: mathematical modeling and optimization principles Feb – May 2021
- Graduate thermodynamics Aug – Dec 2020

Missouri University of Science and Technology, Rolla, MO

Tutor

- Introductory Spanish courses Aug 2016 – May 2017
- Introductory chemistry Aug – Dec 2015

PUBLICATIONS AND PATENTS

- **C.E. Herman**, X. Xu, S.J. Traylor, S. Ghose, Z.J. Li and A.M. Lenhoff. Behavior of weakly adsorbing protein impurities in flow-through ion-exchange chromatography, *J. Chrom. A* 1664 (2022).
- D. Smith, **C. Herman**, S. Razdan, M.R. Abedin, W.V. Stoecker and S. Barua. Microparticles for suspension culture of mammalian cells, *ACS Appl. Bio Mater.* 2 (2019).
- S. Barua and **C. Herman**. Method of forming microparticles for use in cell seeding, United States Patent No. 10329528 (2019).

PRESENTATIONS AT PROFESSIONAL MEETINGS

- **C.E. Herman**, S. Reed, X. Xu, J. Guo, S.J. Traylor, S. Ghose and A.M. Lenhoff. Aggregate behavior in protein A and ion-exchange chromatography (talk and poster), *PREP* (2022).
- **C.E. Herman**, D.N. Asthagiri and A.M. Lenhoff. Relative roles of electrostatic and hydration contributions to adsorption energy in ion-exchange chromatography (talk), *ACS BIOT* (2022).
- **C.E. Herman**, X. Xu, S.J. Traylor, S. Ghose and A.M. Lenhoff. Impurity behavior in flow-through ion-exchange chromatography (talk), *ACS BIOT* (2021).
- **C.E. Herman**, X. Xu, S.J. Traylor, S. Ghose and A.M. Lenhoff. Impurity behavior in flow-through ion-exchange chromatography (talk), *PREP* (2021).
- **C.E. Herman**, X. Xu, S.J. Traylor, S. Ghose and A.M. Lenhoff. Modeling host-cell protein retention to expedite ion-exchange resin screening for flow-through polishing (talk), *ACS BIOT* (2020).
- **C.E. Herman** and S. Barua. Perfusable cells (poster), *AIChE Annual Student Meeting* (2016).

PROFESSIONAL SOCIETIES

- American Chemical Society (BIOT division)

AWARDS AND HONORS

- Robert Pigford Teaching Assistant Award (2021)
- Ph.D. Candidacy Qualifying Exam Commendation (2019)
- Morton '58 and Donna Collins Chemical Engineering Fellowship (2018)
- Robert Pigford Fellowship (2018)
- Missouri S&T Undergraduate Research Award (2017, 2016)
- AIChE Othmer Sophomore Award of Excellence (2016)
- Missouri S&T Chancellor's Scholar (2014)
- Mu Alpha Theta National Mathematics Honor Society Award (2014)
- Henry Schneider Foundation Award (2014, 2011)

SKILLS

- Lab skills: FPLC (Pro A, IEX), HPLC (SEC), SDS-PAGE, DLS, GC/MS, colorimetric assays, microscopy (bright-field, stereo, and confocal)
- Programming languages: Python, Bash, TCL, MATLAB, Fortran, Mathematica
- Column chromatography modeling (CADET)
- Molecular dynamics (NAMD)
- Statistics: Minitab, JMP, SAS, design of experiments
- Languages: Spanish (elementary proficiency)

Yung Wei (Jessie) Hsiao

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

Phone: (516) 474-8196; Email: ywhsiao@udel.edu; LinkedIn: linkedin.com/in/ywhsiao

Education

University of Delaware (UD)

Ph.D. Candidate for Chemical and Biomolecular Engineering

Newark, DE.

June 2023

Massachusetts Institute of Technology (MIT)

Bachelor of Science in Chemical Engineering

Cambridge, MA.

June 2018

Research Experience

UD | Vlachos Research Group – Graduate Research Assistant

Jan. 2019 – Present

- Design, build, and characterize a continuous flow microfixed-bed column for a two-stage production and separation of a commodity platform chemical, 5-hydroxymethyl furfural. This purification strategy shows potential for >10x capital and energy savings from traditional distillation.
- Synthesize and characterize copper based catalysts for the hydrodeoxygenation of HMF into DMF; catalysts possess high DMF yield and various advantageous for modular distribution

MIT | Chemical Engineering, Brushett Research Group – Undergraduate Researcher

Jan. 2015 – May 2018

- Assembled and conducted carbon dioxide reduction experiment with a biphasic continuous flow carbon dioxide electrolysis reactor coupled with a gas chromatograph to quantify gas products
- Synthesized various metal catalysts and studied their electrochemical activity for the CO₂ reduction reaction

Schlumberger-Doll Research Center, Sensor Physics Department – Intern (two summers)

June – Aug. 2016 & 2017

- Characterized and optimized the performance of a microfluidic sensor that utilizes two-phase Taylor flow to quantify a critical component in oil
- Evaluated the performance of a novel miniaturized high-pressure mass spectrometer on a gas chromatograph for analysis of natural gases, other hydrocarbons, and sulfur compounds.

Publications

- Hsiao, Y. W.; Anastasopoulou, A.; Ierapetritou, M.; & Vlachos, D.G. “Cost and Energy Efficient Cyclic Separation of 5-hydroxymethyl Furfural from an Aqueous Solution.” *Green Chemistry*. (2021)
- Kritikos, A.; Hsiao, Y. W.; Vlachos, D. G.; Ierapetritou, M., & Tsilomelekis, G. “A combined CFD and Experimental Study on the Adsorption of HMF in Carbon-Based Packed Bed Microreactors.” *To be submitted*.
- Hsiao, Y. W., Zhou, J., Xue, Z., Zheng, W., & Vlachos, D. G. “Selective Hydrodeoxygenation of 5-Hydroxymethylfurfural (HMF) to 2,5-Dimethylfuran (DMF) over Carbon Supported Copper Catalysts using Isopropanol as a Hydrogen Donor.” *In prep*.
- Brown, S. M.; Orella, M. J.; Hsiao, Y. W., Roman-Leshkov, Y.; Surendranath, Y.; Martin, B., & Brushett, F. R. “Electron Transfer Limitation in Carbon Dioxide Reduction Revealed by Data-Driven Tafel Analysis.” *ChemRxiv*.

Leadership Activities

UD | Vlachos Lab – Self-Emerged Group Leader

- Assisted in general management of research group (50+ people)
- Collect, organize, and compile quarterly research reports from the subgroup to submit to the U.S. DOE
- Plan and volunteer for annual incoming student recruiting events (twice a year) for 20-40 students

UD | Colburn Club and Vlachos Lab Safety Committee – Committee member

- Organize quarterly safety committee meetings with EHS representatives and professors, and annual ChemInventory audits
- Initiated onboarding equipment and safety trainings for new graduate students

MIT | Gordon-MIT Engineering Leadership Program – Gordon Engineering Leader

MIT | McCormick Dorm House Government – Five chair and mentor positions across 4 years

Awards & Recognitions

- Richard Wool Award for Women in Green Engineering (2021)
- Robert L. Pigford Teaching Assistant Award (2021)
- Pigford Fellow (2018)
- BP Outstanding Performance in Research by a Junior Woman Chemical Engineer (2017)

Teaching & Volunteering

UD | Chemical Process Dynamics and Control & Applied Mathematics for Biomed, Chem, and Biomol. Eng.

UD | Serviam Girls Academy

MIT | Educational Counselor, MIT Alumni Association

Selected Technical Skills

Programming: MATLAB, Python, Java, Visual Basics, FORTRAN

Software: Aspen Plus, Minitab, Origin, CasaXPS

Technical Operations: Liquid Chromatography (HPLC), Gas Chromatography, Mass Spectrometry, X-Ray Diffraction, UV-Vis spectroscopy, Scanning Electron Microscope, Continuous Flow Microreactors, Batch Reactions, Electrochemical techniques, SolidWorks

Soham Jariwala

PH.D. CANDIDATE, CHEMICAL ENGINEERING

@ sdj@udel.edu ORCID 0000-0002-8195-5743 +1 (302) 766-1495 17 Yale Dr, Apt A, Newark, DE 19711

EDUCATION

AUG 2018 PRESENT	University of Delaware, Newark, DE, United States Ph.D. Candidate in Chemical Engineering (4th year) Thesis: Thermodynamically consistent rheological constitutive relations for thixotropic suspensions Advisors: Dr. Antony N. Beris, Dr. Norman J. Wagner Summary of research: <ul style="list-style-type: none">Developed a coarse-grained population balance model to describe the shear rheology of human bloodDesigned a novel Chebychev pseudo-spectral scheme to solve thixotropic constitutive equations in Poiseuille flowExtended a population balance-based thixotropy model to predict accurate aggregate sizes under shear flowsDerived a thixotropy model using non-equilibrium thermodynamics to describe three-dimensional flows Summary of coursework: Mathematical modeling & data analysis; Applied chemical kinetics; Applied mathematics topics; Engineering probability & statistics; Colloid science & engineering; Mathematics of particle systems; Advanced transport phenomena; Numerical methods applied in Chemical engineering; Computing & data science for soft materials.
AUG 2013 AUG 2018	Birla Institute of Technology and Science - Pilani, India BE (Hons.) Chemical Engineering BE (Hons.) Manufacturing Engineering Undergraduate project: Modeling and analysis of transport in enzymatic glucose fuel cells Advisor: Dr. Balaji Krishnamurthy

EXPERIENCE

JUL 2017 JUNE 2018	GE Power, John F. Welch Technology Center, Bangalore, India Research Intern/Co-op Supervisor: Mr. Srinivas Pakkala, Component & Development Test team, GE Power Projects: <ul style="list-style-type: none">Designed a modular supersonic gas ejector to pressurize gas streams to elevated pressures and flow ratesIntegrated design sheets for automating the sizing and selection of components in supercritical coal-fired boilersImproved design of electrostatic precipitator (ESP) using multiscale CFD modeling to increase its efficiency of filtering particulate matter
MAY 2016 JUL 2016	ABB, Bangalore, India Summer Research Assistant Supervisor: Dr. Santosh Dubey, Assistant Professor, UPES Dehradun <ul style="list-style-type: none">Simulated effect of fracking on shale gas flow in the shale rock formationDeveloped a multiscale simulation tool in Fortran 90 for flow in porous media
MAY 2015 JUL 2015	Centre for Fire, Explosives and Environment Safety, DRDO, India Summer Intern Supervisor: Mr. Jawid Naik, Scientist 'D', Defense Research & Development Organization (DRDO, India) <ul style="list-style-type: none">Performed two-phase flow analysis of clean fire suppression agents such as FM-200 (HFC-227 ea)Evaluated empirical two-phase flow models based on pressure drop predictions in fire suppression systems

LEADERSHIP & VOLUNTEER

2020 2022	2022 Gordon Research Seminar on Colloids, Macromolecules and Polyelectrolyte solutions Elected Co-Chair <ul style="list-style-type: none">Organizing an international conference for graduate students, post-docs, and scientists from industry and academiaResponsibilities include fundraising, inviting speakers, scheduling talks, managing fellowships, and reviewing applications
--------------	---

2020	Project Darien: Research & Educational Tools for Mitigating COVID-19 Modeling Team Member <ul style="list-style-type: none"> ➤ Developed an agent-based model to study the effects of mitigation strategies on students living at the University of Delaware campus ➤ Created tools to educate K-12 students about the principles of epidemiology and mitigation of COVID-19 ➤ Assessed the impact of social distancing and masking on infection rates using modeling and data collected from wearable video devices
2016 2017	Hyperloop India Aerodynamics Lead <ul style="list-style-type: none"> ➤ Headed aerodynamics group of the only Indian engineering team to qualify and compete in SpaceX Hyperloop Pod competition weekend II ➤ Designed a Hyperloop prototype to optimize drag, modularity, and bidirectional travel

PUBLICATIONS

1. **Jariwala, S.;** Wagner, N. J.; Beris, A. N., A thermodynamically consistent, microscopically-based, model of the rheology of aggregating particles suspensions. *Entropy* 2022, Submitted.
2. Beris, A. N.; **Jariwala, S.;** Wagner, N. J., Flux-based modeling of heat and mass transfer in multicomponent systems. *Physics of Fluids* 2022, 34, (3), 033113.
3. Armstrong, M.; Pincot, A.; **Jariwala, S.;** Horner, J.; Wagner, N.; Beris, A., Tensorial formulations for improved thixotropic viscoelastic modeling of human blood. *Journal of Rheology* 2022, 66, (2), 327-347.
4. Beris, A. N.; Horner, J. S.; **Jariwala, S.;** Armstrong, M. J.; Wagner, N. J., Recent advances in blood rheology: a review. *Soft Matter* 2021, 17, (47), 10591-10613.
5. **Jariwala, S.;** Horner, J. S.; Wagner, N. J.; Beris, A. N., Application of population balance-based thixotropic model to human blood. *Journal of Non-Newtonian Fluid Mechanics* 2020, 281.
6. **Jariwala, S.;** Krishnamurthy, B., Transport equations in an enzymatic glucose fuel cell. *Chemical Physics Letters* 2018, 692, 7-13.
7. **Jariwala, S.;** Phul, S.; Nagpal, R.; Goel, S.; Krishnamurthy, B., Modeling the performance of enzymatic glucose fuel cells. *Journal of Electroanalytical Chemistry* 2017, 801, (June), 354-359.

SELECTED CONFERENCE PRESENTATIONS

1. **S. Jariwala,** M.J. Armstrong, N.J. Wagner, A.N. Beris, Modeling the flow of aggregating suspensions using a multiscale tensor approach, 92nd Society of Rheology Annual Meeting (2021). Oral presentation.
2. **S. Jariwala,** JB Hipp, A.N. Beris, N.J. Wagner, Developing a rheological constitutive model using population balances for thixotropic aggregating suspensions, 18th International Congress on Rheology (2020). Oral presentation.
3. **S. Jariwala,** T. Van de Vyver, N.J. Wagner, A.N. Beris, Modeling and simulating transient flows of thixotropic and viscoelastic fluids in microfluidic tubes, APS Division of Fluid Dynamics Meeting, U13. 005 (2020). Oral presentation.
4. **S. Jariwala,** A Rheological Constitutive Model for Human Blood via Population Balances, Gordon Research Seminar (2020). Poster presentation.

SKILLS

PROGRAMMING	MATLAB, Python, Fortran 90, C, C++, Mathematica, Shell script
OPERATING SYSTEMS	UNIX/Linux, OpenBSD
GEOMETRY MODELING	Creo Parametric, Autodesk Fusion 360, Siemens NX, AutoCAD
SIMULATION PACKAGES	ANSYS Fluent, ANSYS Mechanical, ASPEN Plus, OpenFOAM, ICEM CFD
DOCUMENTATION	L ^A T _E X, Microsoft Office suite

ACHIEVEMENTS

2021	Robert L. Pigford Teaching Assistant Award
2020	Society of Rheology Travel Grant for ICR 2020
2014-2018	BITS Pilani Merit Scholarship

Doyoung Kim

University of Delaware
150 Academy Street, Newark, DE, 19716, USA

E-mail: dykim@udel.edu
Mobile: (+1)-484-280-4959

Education

University of Delaware

Ph. D. Candidate in Chemical and Biomolecular Engineering

Newark, DE, USA

2017 - Present

Hanyang University

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

Cumulative GPA: 3.87/4.0

Seoul, South Korea

2011 - 2017

Research & Work Experience

Graduate Research Assistant

University of Delaware

2017- Present

Newark, DE

Advisor: Prof. Raul F. Lobo

Aug. 2020 – Present

Project: Investigation and Development of Catalytic Depolymerization Processes of Polyolefins

- Developed tungsten-oxide-driven alkane metathesis reaction system for chemical upgrading of polyethylene (PE)
 - Designed batch reactor enabling addition of reactants to air/moisture-sensitive olefin metathesis catalyst
 - Substituted costly & volatile rhenium oxide with tungsten oxide resulting in facile reaction at moderate temperature
- Studying earth-abundant transition metal catalyst for (de)hydrogenation stage in tandem catalysis of alkane metathesis
- Collaborating with polymer experts at UChicago for producing macro-monomer based recyclable PE-like polymer
- Investigating catalytic cracking of polyolefin using Fe-Zeolite and Al-Zeolite
 - Built a customized reactor optimized for studying the thermal/catalytic degradation of plastics at high temperature

Advisor: Prof. Bingjun Xu

Aug. 2017 - Aug. 2020

Project: Synthesis, Characterization, and Application of Zeolite-Encapsulated Platinum Catalysts to Biomass Upgrade

- Synthesized and characterized state-of-the-art zeolite-encapsulated platinum catalysts for biomass upgrade
 - Identified key information that proves the novelty of the properties of catalysts with *in-situ* FTIR using different probe molecules (pyridines, carbon monoxide, deuterated acetonitrile)
- Evaluated the size-selectivity of catalyst and performed tandem reactions with batch reactor

Research Intern

SAMSUNG SDI (Battery R&D Center)

Dec. 2015 – Feb. 2016

Suwon, South Korea

Project: Substitution of a carcinogenic organic additive of Li-ion battery with non-carcinogenic compound

- Conducted the lithium-ion cell performance test and analyzed results
- Developed analysis/cell building skills used in electrochemistry experiments

Publications

- **D. Kim**, RF. Lobo, "Chemical Upgrading of Low-Density Polyethylene via alkane metathesis: substitution of precious metal catalyst with non-precious transition metal catalyst for dehydrogenation step", in preparation
- **D. Kim**, RF. Lobo, "Chemical Upgrading of Low-Density Polyethylene via alkane metathesis: parametric study", in preparation
- **D. Kim**, ZR. Hinton, P. Bai, LSTJ. Korley, TH. Epps, III, RF. Lobo, "Metathesis, Molecular Redistribution of Alkanes, and the Chemical Upgrading of Low-Density Polyethylene", *Appl. Catal. B Environ.*, under review
- H. Cho, **D. Kim**, B. Xu, "Pore Size Engineering Enabled Selectivity Control in Tandem Catalytic Upgrading of Cyclopentanone on Zeolite-Encapsulated Pt Nanoparticles", *ACS Catal.* 2020, 10, 15, 8850–8859
- H. Cho, **D. Kim**, B. Xu, "Selectivity Control in Tandem Catalytic Furfural Upgrading on Zeolite-Encapsulated Pt Nanoparticles through Site and Solvent Engineering", *ACS Catal.* 2020, 10, 8, 4770–4779
- H. Cho, **D. Kim**, S. Li, D. Su, D. Ma, B. Xu, "Molecular-Level Proximity of Metal and Acid Sites in Zeolite-Encapsulated Pt Nanoparticles for Selective Multistep Tandem Catalysis", *ACS Catal.* 2020, 10, 5, 3340–3348
- H. Cho, **D. Kim**, J. Li, D. Su, B. Xu, "Zeolite Encapsulated Pt Nanoparticles for Tandem Catalysis",

J. Am. Chem. Soc., 2018, 140, 41, 13514-13520

Selected Oral Presentation (+ upcoming)

- **D. Kim**, ZR. Hinton, P. Bai, LSTJ. Korley, TH. Epps, III, RF. Lobo, "Metathesis, Molecular Redistribution of Alkanes, and the Chemical Upgrading of Low-Density Polyethylene", *NAM 27*, New York, NY, May 2022
- **D. Kim** and RF. Lobo, "Chemical Upcycling of Polyethylene Using Heterogeneous Alkane Cross-Metathesis", *AIChE 2021 Annual Meeting*, Boston, MA, November 2021

Poster Presentation (presenter underlined)

- H. Cho, **D. Kim**, B. Xu "Molecular Level Proximity of Metal and Acid Sites Drives Selective Multistep Tandem Catalysis", Catalysis Center for Energy Innovation (CCEI) Spring Symposium (2019)

Skills

Experimental Techniques

- FTIR, Raman, TGA-DSC, NMR, XRD, XRF, TEM, SEM, EDX, GC, MS, Batch/Flow reactor operation, Inorganic catalyst synthesis (zeolite, mesoporous aluminosilicate)

Computer Skills

- Mathematical coding (MATLAB, Excel), Microsoft Office, OriginLab, Igor Pro

Honors & Awards

- 2022 Kokes Award (27th North American Catalysis Society meeting) May 2022
- Hanwha Travel Award (Hanwha Solution Corporation (HSC) and Hanwha Total Petrochemical (HTC)) Nov 2021
- B.Sc. in Chemical Engineering, summa cum laude (Hanyang University) 2017
- Recognition for highest achievement (Hanyang University) Spring 2014 – Fall 2016 (semester year)
- External merit awards: Golden Valley Scholarships Fall 2014 – Fall 2016

Leadership Experience

Lab Safety Manager, University of Delaware 2019– 2020

- Quarterly management of lab chemicals
- Annual audit management of chemical inventory

Hanyang ChemE Social Networking Gathering, Hanyang University 2011 – 2017

President 2015

- Organized social gatherings for current students and alumni, promoted undergraduate membership, organized annual events based on monthly membership fee and donations

Group Study Leader 2016

- Led group studies and mentored peers with low grades

Volunteer Experience

Hanyang University Mentorship Program (for high school students) Fall 2015 – 2017

Representative of the Dept. of Chemical Engineering

- Presented and mentored in various high schools on an introduction to the field of Chemical Engineering, served as a mentor to them in small group settings

ICMS 2014, Dept. of Industrial Engineering, Hanyang University Aug. 2014

- Volunteered as a staff at the 4th International Congress of Mathematical Software
- Offered information in English to foreign delegates

Extracurricular Activities

Student Organizations; Soccer club/ male choir, Hanyang University 2011 - 2017

Byung Hee (Brian) Ko

• 79 Ray St, Newark, DE, 19711 • (646) 532-9366 • bhko@udel.edu

EDUCATION

- | | |
|---|---|
| 2017 – present
(Expected:
May 2022) | UNIVERSITY OF DELAWARE , Newark, DE
Ph.D. in Chemical and Biomolecular Engineering
Thesis Advisor: Prof. Feng Jiao |
| 2011 – 2012,
2014 – 2017 | CORNELL UNIVERSITY , Ithaca, NY
B.S. in Chemical and Biomolecular Engineering
Research Advisor: Prof. Yong Lak Joo
• 2 years gap due to military service in South Korea |

RESEARCH EXPERIENCE

- | | |
|--------------|--|
| 2017–present | UNIVERSITY OF DELAWARE
<i>Graduate Research Assistant</i>
Advisor: Prof. Feng Jiao
<ul style="list-style-type: none"> Investigated the influence of gaseous SO₂ and NO_x impurities in electroreduction of CO₂ using various catalysts Demonstrated a room temperature electrochemical NO_x removal technology Studied novel homogeneous copper based bimetallic catalysts for electrochemical reduction of CO to high value C₂₊ chemicals Developed a two-step electrochemical CO₂ conversion technology towards multi-carbon products formation at high reaction rates |
| 2015–2017 | CORNELL UNIVERSITY
<i>Undergraduate Research Assistant</i>
Advisor: Prof. Yong Lak Joo
<ul style="list-style-type: none"> Synthesized highly loaded sulfur cathodes by air-controlled electrospinning and electrospaying for Li-S batteries Studied the effect of different carbon inclusions (e.g., GNR and CNT) in silicon anodes for Li-ion batteries |

TEACHING EXPERIENCE

- | | |
|-------------|---|
| 2018-2019 | Teaching Assistant at University of Delaware
<ul style="list-style-type: none"> CHEG 632: Electrochemical Energy Engineering, CHEG 345: Chemical Engineering Laboratory |
| 2016 | Teaching Assistant at Cornell University
<ul style="list-style-type: none"> CHEME 3130: Chemical Engineering Thermodynamics |
| 2012 – 2014 | Founding Teacher at BSKE (Blue Star Kid's English), Cherwon, Korea
<ul style="list-style-type: none"> Founded an English institute BSKE, to provide education to soldiers' children living in rural area (250 hours total) |

WORK EXPERIENCE

- | | |
|-------------|--|
| 2012 – 2014 | Sergeant, 6th Infantry Division, Republic of Korea Army , Cherwon, Korea
<ul style="list-style-type: none"> Served as a TOW (Tube Launched Optically Tracked Wire Guided Missiles) main shooter in Tow Company, 6th Infantry Division |
|-------------|--|

SKILLS

Laboratory: Electrochemical device testing, X-ray photoelectron spectroscopy (XPS), Gas chromatography (GC), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Spectroscopy (EDS), X-ray Diffraction Analysis (XRD), Brunauer-Emmett-Teller Surface Area Analysis (BET), X-ray Absorption spectroscopy (XAS)

Languages: English (Fluent), Korean (Fluent)

PUBLICATIONS

FIRST AUTHOR

*: Equal contributions

1. S. Overa,* **B. Ko.**,* Y. Zhao,* F. Jiao., Electrochemical approaches for CO₂ conversion to chemicals: a journey towards practical applications, *Accounts of Chemical Research* 55, 638-348 (2022).
2. **B. Ko.**, B. Hasa., H. Shin., Y. Zhao., F. Jiao., Electrochemical reduction of gaseous nitrogen oxides on transition metals at ambient conditions, *Journal of the American Chemical Society* 144, 1258-1266 (2022).
3. T. Li.,* Y. Yao,* **B. Ko.**,* Z. Huang,* Q. Dong,* J. Gao., W. Chen., J. Li., S. Li., X. Wang., R. Shahbazian-Yassar., F. Jiao., L. Hu., Carbon-supported high-entropy oxide nanoparticles as stable electrocatalysts for oxygen reduction reactions, *Advanced Functional Materials* 2010561 (2021).
4. **B. Ko.**, B. Hasa., H. Shin., E. Jeng., S. Overa., W. Chen., F. Jiao., The impact of nitrogen oxides on electrochemical CO₂ reduction, *Nature Communications* 11, 5856 (2020).
5. **B. Ko.**, F. Jiao., Well-defined model CO₂ electroreduction catalyst, *Chem* 6, 1506-1507 (2020).
6. C. Yang,* **B. Ko.**,* S. Hwang., Z. Liu., Y. Yao., W. Luc., M. Cui., A. Malkani., T. Li., X. Wang., J. Dai., B. Xu., G. Wang., D. Su., F. Jiao., L. Hu., Overcoming immiscibility toward bimetallic catalyst library, *Science Advances* 6, eaaz6844 (2020).
7. W. Luc.,* **B. Ko.**,* S. Kattel., S. Li., D. Su., J. G. Chen., F. Jiao., SO₂-induced selectivity change in CO₂ electroreduction, *Journal of the American Chemical Society* 141, 25, 9902-9909 (2019).

CO-AUTHOR

8. T. Feric., S. Hamilton., **B. Ko.**, G. Lee., S. Verma., F. Jiao., A. Park., Highly tunable syngas product ratios enabled by nanoscale hybrid electrolytes in electrochemical CO₂ reduction on a silver nanoparticle catalyst (*In preparation*).
9. B. Hasa., D. Tian., **B. Ko.**, S. Overa., P. Dimitrakellis., C. Bae., F. Jiao., The impact of anion-exchange membrane on carbon monoxide electroreduction performance (*In preparation*).
10. S. Overa., B. Shrimant., D. Tian., **B. Ko.**, H. Shin., C. Bae., F. Jiao., Enhancing acetate selectivity by coupling anodic oxidation in carbon monoxide electroreduction (*Submitted*).
11. E. Jeng., Z. Qi., A. Kashi., S. Hunegaw., Z. Huo., J. Miller., L. Bayu., **B. Ko.**, H. Shin., S. Ma., K. Kuhl., F. Jiao., Scalable gas diffusion electrode fabrication for electrochemical CO₂ reduction using physical vapor deposition methods, *ACS Applied Materials & Interfaces* 15 (6), 7731-7740 (2022).
12. C. Yang., Q. Wu., W. Xie., X. Zhang., A. Brozena., J. Zheng., M. Garaga., **B. Ko.**, Y. Mao., S. He., Y. Gao., P. Wang., M. Tyagi., F. Jiao., R. Briber., A. Albertus., C. Wang., S. Greenbaum., Y. Hu., A. Isogai., M. Winter., K. Xu., Y. Qi., L. Hu., Copper-coordinated cellulose ion conductors for solid-state batteries, *Nature* 598, 590-596 (2021).
13. B. Hasa., M. Jouny., **B. Ko.**, B. Xu., F. Jiao., Flow electrolyzer mass spectrometry with a gas diffusion electrode design, *Angewandte Chemie International Edition* 60, 3277-3282 (2021).
14. M. Jouny., J. Lv., T. Cheng., **B. Ko.**, J. Zhu., W. Goddard., F. Jiao., Formation of carbon-nitrogen bonds in carbon monoxide electrolysis, *Nature Chemistry* 11, 846-851 (2019).
15. W. Luc., X. Fu., J. Shi., J. Lv., M. Jouny., **B. Ko.**, Y. Xu., Q. Tu., X. Hu., J. Wu., Q. Yue., Y. Liu., F. Jiao., Y. Kang., Two-dimensional copper nanosheets for electrochemical reduction of carbon monoxide to acetate, *Nature Catalysis* 2, 423-430 (2019).
16. G. Shoorideh., **B. Ko.**, A. Berry., M. Divvela., Y. Kim., Z. Li., B. Patel., S. Chakrapani., Y. Joo., Harvesting interconductivity and intraconductivity of graphene nanoribbons for a directly deposited, high-rate silicon-based anode for Li-ion batteries, *ACS Applied Energy Materials* 1, 3, 1106-1115 (2018).
17. J. Lee., **B. Ko.**, J. Kang., Y. Chung., Y. Kim., W. Halim., J. Lee., Y. Joo., Facile and scalable fabrication of highly loaded sulfur cathodes and lithium-sulfur pouch cells via air-controlled electrospray, *Materials Today Energy* 6, 255-263 (2017).

PRESENTATIONS

1. **B. Ko.**, F. Jiao., Electrochemical reduction of gaseous nitrogen oxides on transition metals at ambient conditions, *American Chemical Society*, San Diego, CA (2022)
2. **B. Ko.**, F. Jiao., CO₂ electrolysis for sustainable chemical production, *American Chemical Society*, San Diego, CA (2022)
3. **B. Ko.**, F. Jiao., The impact of NO_x on CO₂ electroreduction, *American Chemical Society*, Atlanta, GA (2021)
4. **B. Ko.**, F. Jiao., The impact of gaseous impurities in CO₂ electroreduction (poster), *SUNCAT Summer Institute*, virtual (2021)
5. **B. Ko.**, W. Luc., F. Jiao., SO₂-induced selectivity change in CO₂ electroreduction (poster), *North American Catalysis Society Meeting*, Chicago, IL (2019)
6. **B. Ko.**, J. Lee., Y. Joo., Facile and scalable development of highly loaded sulfur cathodes and large-sized lithium-sulfur pouch cells by gas-assisted electrospinning and electrospraying process (poster), *Engineering Learning Initiatives*, Ithaca, NY (2017)

AWARDS

2022	Graduate Student Travel Award, University of Delaware
2021	I&EC Division Graduate Student Award, American Chemical Society
2021	Saurabh A. Palkar Award for Mentoring, University of Delaware
2020	Hamilton Company Syringe Grant Program Award, Hamilton Company
2019	Professional Development Award, University of Delaware
2016	Engineering Learning Initiative (ELI) Research Award, Cornell University

Sophia J. Kurdziel

University of Delaware • 221 Academy Street • Newark, DE 19711

skurd@udel.edu

Education

University of Delaware, College of Engineering, Newark, DE

Ph.D. Candidate in Chemical Engineering

August 2018 – Present

Advisor: Dr. Dionisios G. Vlachos

Columbia University, The Fu Foundation School of Engineering and Applied Science, New York, NY

B.S. in Chemical Engineering

August 2014 – May 2018

Adam R. Greenbaum Memorial Scholar • Tau Beta Pi Engineering Honor Society

Research Experience

Graduate Research Assistant

Spring 2019 – Present

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

Vlachos Research Group

- Constructed linear vibrational frequency correlations for diffusion and dehydrogenation reactions on transition-metal surfaces using density functional theory (DFT).
- Extended previous theory developed for vibrational scaling of chemisorbed species to rationalize transition-state vibrational scaling relationships (TSVSRs).
- Demonstrated thermochemical property scaling as a potential extension of TSVSRs, enabling quick estimation of pre-exponentials and temperature corrections to DFT-obtained electronic energies.

Research Intern, DOE Science Undergraduate Laboratory Internships (SULI) Program

Summer 2017

SLAC National Accelerator Laboratory, Menlo Park, CA

Supervisor: Dr. Elizabeth C. Miller

- Built and improved an *operando* cross-sectional lithium sulfur battery developed for X-ray characterization of sulfur species at the Stanford Synchrotron Radiation Lightsource.

Research Fellow, MRSEC Research Experience for Undergraduates (REU) Program

Summer 2016

Department of Chemical Engineering, Columbia University, New York, NY

Esposito Research Group

- Investigated the properties of few- to mono-layer molybdenum disulfide for use as a photocatalyst.

Undergraduate Research Assistant

Spring 2016 – Spring 2018

Department of Chemical Engineering, Columbia University, New York, NY

Esposito Research Group

Senior Thesis: Investigating the Performance and Transport Properties of Membrane Coated Electrocatalysts

- Tested planar silicon oxide | platinum electrodes for hydrogen evolution reaction activity and quantitatively assessed the mass transport losses associated with proton and hydrogen diffusion.

Publications

- **Kurdziel, S. J.**, Lansford, J. L., Vlachos, D. G. Prediction of Transition-State Scaling Relationships and Universal Transition-State Vibrational and Entropic Correlations for Dehydrogenations. *J. Phys. Chem. C* 125 (36), 19780–19790 (2021).
- Lansford, J. L.*, **Kurdziel, S. J.***, Vlachos, D. G. Scaling of Transition State Vibrational Frequencies and Application of *d*-Band Theory to the Brønsted–Evans–Polanyi Relationship on Surfaces. *J. Phys. Chem. C* 125 (13), 7119–7129 (2021). *equal contribution ****selected for journal cover**
- Labrador, N. Y., Songcuan, E. L., De Silva, C., Chen, H., **Kurdziel, S. J.**, Ramachandran, R. K., Detavernier, C., Esposito, D. V. Hydrogen Evolution at the Buried Interface between Pt Thin Films and Silicon Oxide Nanomembranes. *ACS Catal.* 8 (3), 1767–1778 (2018).

Selected Presentations

- **Kurdziel, S. J.**, Lansford, J. L., Vlachos, D. G. Universal Vibrational and Entropic Scaling Relationships for Dehydrogenations. *AIChE Annual Meeting*, Boston, MA, November 2021.
- **Kurdziel, S. J.**, Lansford, J. L., Vlachos, D. G. Vibrational Scaling Relationships for Transition States. *Virtual AIChE Annual Meeting*, November 2020.

Teaching and Outreach Experience

Graduate Teaching Assistant

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

- Chemical Engineering Laboratory I – Thermodynamics Unit Spring 2021
- Chemical Engineering Thermodynamics I Fall 2020

Colburn Club Outreach Coordinator, *University of Delaware, Newark, DE* Fall 2021 – Present

- Organize outreach program with Shue-Medill Middle School; volunteer since 2019.

General Counselor/Robotics Instructor, *The Fresh Air Fund, Camp ABC, Fishkill, NY* Summer 2015

Read Ahead Mentor, *P.S. 036 Margaret Douglas, New York, NY* 2014 – 2018

English Language Arts and Mathematics Tutor, *P.S. 125 Ralph Bunche, New York, NY* 2014 – 2015

Skills

- **Programming, Modeling, and Simulation:** Python, MATLAB, Unix shell, VASP, LOBSTER, Materials Studio, Aspen Plus
- **Productivity and Design Software:** Microsoft Office, Adobe Illustrator and Photoshop, GNU Image Manipulation Program, Origin

Jason Lee

jasl@udel.edu
Fallston, MD 21047

EDUCATION

University of Delaware

Ph.D. Chemical and Biological Engineering

August 2017 - (Expected) December 2022

University of California, Berkeley

M.S. Chemical and Biological Engineering

August 2012 - Dec 2015

GPA:3.54

University of Massachusetts Amherst

B.S. Chemical Engineering, B.S. Biochemistry

September 2008 - May 2012

GPA:3.83

EXPERIENCE

University of Delaware

Ph.D. Candidate – Advisor: Raul F. Lobo

Aug 2017-Present

Thesis: Mechanistic Understanding of Hydrocarbon Dehydrogenation and Cyclization in Acid Zeolites

- Developed reaction networks and kinetic models to determine differences in dehydrogenation selectivity between Ga- and In-CHA zeolite catalysts using density functional theory (DFT) calculations
- Developed a kinetic model and detailed mechanism for conjugated triene cyclization in FAU zeolite
- Predicted crystal structures to assist structural characterization efforts (Rietveld refinement)
- Calculated reaction thermodynamics and kinetics to help guide experimental work of collaborators
- Automated computations and data analysis using BASH scripts, MATLAB, PYTHON
- Designed experiments to measure kinetic parameters in batch-scale reactor systems
- Characterized catalysts and products using GC-MS, NMR, XRD, gas adsorption, TGA

Lawrence Berkeley National Lab

Graduate Research Assistant – Advisor: Wendy L. Queen

Sept 2012-Dec 2015

Thesis: Gas adsorption in metal organic frameworks (MOFs) for carbon capture and sequestration

- Identified structural features of metal organic frameworks (MOFs) responsible for high carbon dioxide uptake using x-ray crystallography, neutron powder diffraction, and gas adsorption
- Synthesized single crystals and assessed quality using optical microscopy, SEM, thermal analysis (TGA, DSC), powder x-ray diffraction, and BET surface area analysis
- Collaborated with facility scientists and support staff to design, build, and evaluate equipment for dosing single crystals with gas *in situ* on lab and synchrotron x-ray diffraction equipment
- Trained and mentored undergraduates in handling cryogenics, gas cylinders, strong acids/bases
- Presented posters and talks at meetings on carbon capture and microporous materials

3M Corporation, Corporate Research Process Lab

Process R&D Intern

May 2011-Aug 2011

- Evaluated a prototype coextruder for lab scale testing of materials and process conditions
- Identified and resolved issues with heat transfer in the extruder through minor modifications and changes to standard operating procedures (SOPs), preventing a costly redesign
- Supported R&D staff by preparing and analyzing polymer mixtures using DSC and TGA
- Summarized project findings in a presentation and written report to senior R&D staff

SELECTED AWARDS

Phillip and Ruth Evans Chemical Engineering Fellowship

May 2022

PEER-REVIEWED PUBLICATIONS

7. Y. Yuan, **J.S. Lee**, R.F. Lobo. (2022). “Ga+-Chabazite Zeolite: A Highly Selective Catalyst for Nonoxidative Propane Dehydrogenation”. (*In Review*)
6. J. Pan, **J.S. Lee**, M. Li, B.A. Trump, R.F. Lobo. (2022). “Comparative Investigation of Ga- and In-CHA in the Non-Oxidative Ethane Dehydrogenation Reaction”. *J. Catal.* (*In Revision*)
5. **J.S. Lee**, S. Caratzoulas, R.F. Lobo. (2021). “Carbocation-mediated cyclization of Trienes in Acid Zeolites”. *J. Phys. Chem. A*. 125(19), 4062-9. DOI: 10.1021/acs.jpca.0c11574
4. **J.S. Lee**, B. Vlaisavlievich, D.K. Britt, C.M. Brown, M. Haranczyk, B. Smit, J.R. Long, W.L. Queen. (2015). “Understanding Small Molecule Interactions in Metal-Organic Frameworks: Coupling Experiment with Theory”. *Adv. Mater.* 27(38), 5785-96. DOI: 10.1002/adma.201500966
3. W.L. Queen, M.R. Hudson, E.D. Bloch, J.A. Mason, M.I. Gonzalez, **J.S. Lee**, D. Gygi, J.D. Howe, K. Lee, T.A. Darwish, M. James, V.K. Peterson, S.J. Teat, B. Smit, J.B. Neaton, J.R. Long, C.M. Brown. (2014). “Comprehensive study of carbon dioxide adsorption in the metal organic frameworks $M_2(\text{dobdc})$ ($M = \text{Mg, Mn, Fe, Co, Ni, Cu, Zn}$)”. *Chem. Sci.*, 5, 4569-4581.
2. W.L. Queen, **J.S. Lee**, M.I. Gonzalez, S.J. Geier, J.A. Mason, J.R. Long, C.M. Brown, M.R. Hudson, S.J. Teat. (2013). “Correlations Between Structure and Gas-Adsorption/Separation Properties of Metal Organic Frameworks”. *Am. Crystallography Assoc. Transactions*, 44, 120-126.
1. **J.S. Lee**, H.L. Rodriguez-Luccioni, J. Mendez, A.K. Sood, G. Lopez-Berestein, C. Rinaldi, M. Torres-Lugo. (2011). “Hyperthermia induced by magnetic nanoparticles improves the effectiveness of the anticancer drug cis-diamminedichloroplatinum”. *J. Nanosci. Nanotechnol.*, 11, 4153-7.

SELECTED PRESENTATIONS

4. **J.S. Lee**, S. Caratzoulas, R.F. Lobo. “Carbocation-mediated cyclization of Trienes in Acid Zeolites”. *Northeast Corridor Zeolite Association*. Virtual Conference. Dec 4, 2020. (Virtual Poster)
3. **J.S. Lee**, S. Caratzoulas, R.F. Lobo. “Carbocation-mediated cyclization of Conjugated Trienes in Acid Zeolites: A DFT Investigation”. *Northeast Corridor Zeolite Association*. Houston Hall, University of Pennsylvania. Dec 6, 2019. (Poster)
2. **J.S. Lee**, S. Caratzoulas, R.F. Lobo. “Hydrocarbon Cyclization in Acid Zeolites: A Combined Computational and Experimental Study”. *26th North American Catalysis Society Meeting*. Chicago, IL. June 23-28, 2019. (Poster)
1. **J.S. Lee**, E.D. Bloch, J.A. Mason, M.I. Gonzalez, J.D. Howe, K. Lee, S.J. Teat, J.B. Neaton, B. Smit, J.R. Long, C.M. Brown, W.L. Queen. “An Experimental and Theoretical Approach to the Study of CO_2 adsorption in an extensive family of metal organic frameworks, $M_2(\text{dobdc})$ ”. *Energy Frontier Research Center, Center for Gas Separations All Hands Meeting*. Berkeley, CA. December 4-5, 2014. (Presentation)

ACTIVITIES AND HOBBIES

Teaching Assistant: Mass and Heat Transfer (UD Spring 2020), Systems Biology (UD Fall 2019)
Intro to Chem. Engin. (UCB Fall 2012), Process Design (UC Berkeley Spring 2013)

Educational Outreach: Volunteer for Arduino at the Bay Area Maker Faire 2016

Organizer for in-dorm STEM events during job as a UMASS Amherst resident assistant

Other: Running, Cooking/Grilling, Scale Modelling, Designing 3D-printed and Laser-cut toys/art using CAD

Seungyeon ("Lina") Lee

+1-512-484-4511 • linalee@udel.edu
www.linkedin.com/in/lina--lee

EDUCATION

EDUCATION

Ph.D., Chemical Engineering, August 2018 – Present (expected 2023)

University of Delaware, Newark, Delaware

Advisors: Prof. Dionisios Vlachos and Dr. Stavros Caratzoulas

M.S. in Energy, June 2018

Texas A&M University, College Station, Texas

B.S., Chemical Engineering, May 2014

The University of Texas, Austin, Texas

RESEARCH EXPERIENCE

RESEARCH EXPERIENCE

Hydroformylation Reaction on atomically dispersed Rh and heteroatom pairs supported on γ -Al₂O₃

- Investigated ethylene hydroformylation and hydrogenation reaction on Rh single atom supported on oxides using Density-Functional Theory calculations and first-principles microkinetic modeling
- Investigated the molecular structure of Rh-ReO_x and Rh-WO_x on Al₂O₃ with experimental validation to draw structure-active relationship for enhanced activity

Support dependence of atomically dispersed Rh for Hydroformylation Reaction

- Investigated hydroformylation activity of atomically dispersed Rh across oxide supports
- Correlated Rh(CO)₂ frequencies, charge transfer from Rh to CO, support to Rh, and energy barrier of the rate-limiting step to hydroformylation activity
- Showed the support dependency of hydroformylation activity stems from the strong metal-support interaction, which depends on the support basicity/acidity properties

Conversion of biomass-derived Furfuryl alcohol (FA) on single atom doped TiO₂

- Investigated selective hydrodeoxygenation (HDO) on metal-doped TiO₂ via reverse Mars-van Krevelen mechanism using *ab initio* methods
- Investigated the stability and CO probe FTIR frequencies of redistributed Pt_n/TiO₂ (n=1~5) via CH₃I/CO mixture

PROFESSIONAL EXPERIENCE

PROFESSIONAL EXPERIENCE

Jul 2014 – 2017

Process Engineer (Offshore Engineering)

Samsung Heavy Industries

One of world's largest offshore Engineering Procurement Construction (EPC) company

BP Mad Dog Phase 2 Floating Production Unit (Gulf of Mexico, 2021)

- Resolved Flare System design concerns with three SHI teams and engineering subcontractor team located in Korea and the United States
- Reduced total blowdown volume to 85% of FEED design capacity during detail engineering phase in concordance with international regulations and client's needs
- Performed hydraulic line sizing and discrepancy check of topside oil and gas processing system to outline possible optimization aspects and to predict expected cost increase prior to contract

RESEARCH EXPERIENCE

Aug 2017 –
Aug 2018

Masters Program, Prof. Stratos Pistikopoulos

Texas A&M University

Thesis title: “Develop a framework for energy carrier supply chain optimization incorporating conventional and renewable production technologies”

- Created and evaluated the supply chain model of renewable energy-driven ammonia or methanol production using GAMS based on the latest available data
- Propose optimal construction locations of solar energy driven ammonia plant in the United States based on evaluation of total cost, environmental impact, or combination

Jan 2013 –
May 2014

Research Assistant, Prof. Steven Bryant

University of Texas

- Investigated synergistic effects of combined nanoparticles and surfactant to produce stable oil-in-water emulsions for potential use in Enhanced Oil Recovery or mobility control
- Designed and executed experiments to analyze the formation/breaking mechanism of emulsion under high shear conditions
- Characterized rheological properties and stabilities of oil-in-water emulsions
- Presented a talk and a poster at the 2014 Nanoparticles for Subsurface Engineering (NSE) Presentation of the Department of Petroleum Engineering

PRESENTATION (CONFERENCES)

S. Lee, J. Qi, P. Christopher, D. Vlachos and S. Caratzoulas, Theoretical Insights into Ethylene Hydroformylation on Atomically Dispersed Rh-oxide pair sites on γ -Al₂O₃ support. 2021 AIChE Annual Meeting

S. Lee, A. Patra, P. Christopher, D. Vlachos and S. Caratzoulas, Theoretical Insights into Ethylene Hydroformylation on Atomically Dispersed Rh-ReO_x / γ -Al₂O₃: Reaction mechanism and influence of ReO_x promoters. 2021 Catalysis Club of Philadelphia (CCP) March Meeting

S. Lee, J. Qi, P. Christopher, D. Vlachos and S. Caratzoulas, Theoretical Insights into Ethylene Hydroformylation on Atomically Dispersed Rh-ReO_x / γ -Al₂O₃. 2020 AIChE Annual Meeting

PUBLICATIONS

- S. Lee, A. Patra, P. Christopher, D. Vlachos and S. Caratzoulas, “Theoretical study of ethylene hydroformylation on atomically dispersed Rh/Al₂O₃ catalysts: Reaction mechanism and influence of ReO_x promoters”, *ACS Catal.* 2021, 11, 9506–9518
- I. Ro*, J. Qi*, S. Lee*, M. Xu, X. Yan, Z. Xia, G. Zakem, A. Morales, J. Chen, X. Pan, D. Vlachos, S. Caratzoulas, and P. Christopher, *Bifunctional heterogeneous pair site catalyst* (accepted)
- Y. Wang, S. Lee, Z. Weiqing, and D. Vlachos. *Higher Loadings of Pt Single-Atom and Clusters over Reducible Metal Oxides: Application to C-O Bond Activation*
- J. Qi, S. Lee, S. Caratzoulas, D. Vlachos and P. Christopher, *Support dependency of atomically dispersed Rh for Hydroformylation Reaction* (in preparation)

AWARD

Richard Wool Award for Women in Green Engineering

2021

ACTIVITIES

Korean Graduate Student Association – Co-president

2021-present

Planned and executed social events for the Korean Community of the university

Colburn club – International student representative

2020-2021

Planned and executed social events for the department

Recruitment for the Vlachos group (>40)

2019-2021

Organized information sessions, lab tours, and one-on-one mentoring sessions with first year students

Stephanie Matz

1 Heather Hill Ln
Elkton, MD 21921
smmatz@udel.edu
(920) 205-0173

Education

University of Wisconsin-Madison

B.S. in Chemical Engineering and Biochemistry, December 2013

University of Delaware

Ph.D. in Chemical Engineering, Winter/Spring 2023 (Expected)

Experience

Graduate Researcher, University of Delaware – Yan Group 2018 to Present

- Develop novel chemical-electrochemical CO₂ separator using anion exchange membranes for scrubbing air in various applications such as life support systems and direct air capture.
- Perform single-cell and stack testing to optimize operating conditions and design for CO₂ removal to meet end-user constraints and requirements.
- Design and fabricate the prototype of electrochemical CO₂ separator stack using a shorted membrane to decrease cost, weight, and volume per potential market needs.
- Design CO₂ module test station to meet operating window requirements and allow for indirect shorted membrane diagnostics.
- Responsible for maintenance and repairs of fuel cell test stations, instruments, and sensors.
- Prepare and present quarterly reports of project milestones to government funding sources.
- Serve as group safety officer to ensure lab and lab members meet EHS safe practice criteria by performing inspections, attending safety meetings, and communicating safe practices.
- Serve as lab manager whose duties include group member onboarding, lab procurement and chemical purchasing, updating chemical inventory, and writing standard operation procedures.

Field Technical Advisor I/II, Honeywell UOP 2015 to 2018

- Full-time, global travel position to provide on-site technical knowledge to customers during key operation times including startups, re-starts, and turnarounds.
- Lead teams of engineers at customer locations to ensure a process unit is prepared for startup including detailed inspection of equipment and piping, commissioning of equipment, training of operation personnel, catalyst loading, and overseeing the startup.
- Troubleshoot and optimize processes to meet stringent product specifications.
- Develop and implement procedures for a safe successful startup of the gas or refinery process.
- Review of safety interlock system logic and instrumentation control to ensure proper control schemes were implemented.
- Technical expert in various refining and gas processing technologies including reformers, isomerization, pressure swing adsorption, and acid gas removal.
- Train new engineers individually on-site and in a classroom group setting on procedures for inspection, commissioning, startup, and troubleshooting on technologies within my expertise.

Development Engineer – R&D Development Engineer, Honeywell UOP 2014 to 2015

- Develop experimental procedures for catalyst scale-up assessment in support of stage-gate process.
- Optimize process conditions for novel catalyst formulations at pilot plant scale.
- Support first sale of novel catalyst to commercial scale customer as part of cross-functional team.
- Author internal documentation on assessment of catalyst application, optimization, and operation.
- Mentor new engineering graduates as they transition to the career development program, guiding them on program requirements and integration into company culture.

Development Engineer – Process Design Engineer, Honeywell UOP

2014

- Specify equipment and safety system sizing requirements for various refining technologies.
- Design utility systems including nitrogen, flare, and cooling water for various refineries and processes per ASME standards.
- Communicate directly with vendors for detailed design of utility systems including flare and cooling water systems.
- Simulate refinery processes using Aspen and Unisim modeling software.
- Lead a team to ensure systematic updates of internal SharePoint sites and develop cross-functional internal training for SharePoint.

Chemical Engineering Co-op, Virent, Inc.

2012 to 2013

- Development and optimization of process conditions for novel catalyst formulations at pilot plant scale.
- Oversee design and equipment acquisition of specialized pilot plant to allow for processing of highly viscous material.
- Hands-on operation of pilot plant equipment including instrument repair, maintenance, and tuning.
- Present experimental results to company leadership, executive management, and investors.

Skills

- Six Sigma Green Belt certified
- Downstream oil and gas technologies, mass and energy balances, piping hydraulics, equipment inspection, troubleshooting
- Electrochemical system preparation and operation: membrane casting, electrode fabrication, polarization curves, limiting current analysis, electro impedance spectroscopy (EIS), prototyping and device fabrication
- Proficient with Matlab, Labview, AutoCAD, Aspen, Unisim, VBA, C++, and Python

Honors/Activities

Honors – NSF Honorable Mention (2019)

Fellowships – Robert L. Pigford Fellowship, Phillip & Ruth Evans Fellowship

Activities – Colburn Club (2018-Present) – At-Large Rep, 2nd Year Rep; EmPOWER Mentor (2019-Present); Delaware Ducks Youth Ice Hockey Assistant Coach (2021-Present)

Publications and Conferences

- Shi, L., Y. Zhao, **S. Matz**, S. Gottesfeld, *et al.* (2022). "A Shorted Membrane Electrochemical Cell Powered by Hydrogen to Remove CO₂ from the Air for Hydroxide Exchange Membrane Fuel Cells." Nature Energy.
- **Matz, S.**, *et al.* (2021). "Demonstration of Electrochemically-Driven CO₂ Separation Using Hydroxide Exchange Membranes." Journal of The Electrochemical Society **168**(1).
- Shi, L., B.P. Setzler, K. Hui, C.M. Weiss, **S. Matz**, Y. Xue, *et al.* (2020). "Editors' Choice – Uncovering the Role of Alkaline Pretreatment for Hydroxide Exchange Membrane Fuel Cells." Journal of The Electrochemical Society **167**(14).
- **Matz, S.**, *et al.* (in revision). "Electrochemically-Driven CO₂ Removal using Anion Exchange Membranes for Spacecraft Cabin Air Revitalization." 51st International Conference on Environmental Systems [Conference Paper].
- **Matz, S.**, *et al.* (in revision). "Hydrogen-powered Electrochemically-driven CO₂ Removal from Air Containing 400 to 5,000 ppm CO₂." Journal of The Electrochemical Society.
- **Matz, S.**, *et al.* (2021, October 10-14). *Enhancing Electrochemically-Driven CO₂ Separation (EDCS) Using Hydroxide Exchange Membranes* [Conference Presentation]. 240th ECS Meeting, Digital.
- **Matz, S.**, *et al.* (2020, October 4-9). *Development of Electrochemically-Driven CO₂ Separation (EDCS) for Transport Hydroxide Exchange Membrane Fuel Cells* [Conference Presentation]. ECS PRiME 2020, Digital.

Joshua Meisenhelter

joshmeis@udel.edu • (717) 668 7710

OBJECTIVE

To obtain a research scientist position, working in the field of biomaterials.

RESEARCH AND WORK EXPERIENCE

Doctoral Research Assistant, University of Delaware

2018 – ongoing

Advisor: Dr. Christopher J. Kloxin, Chemical and Biomolecular Engineering

Thesis Title: “Development of Coiled-coil Peptides as a Nanoparticle Core”

- Synthesized peptides through solid-phase peptide synthesis and modified peptides on resin through orthogonal chemistries
- Characterized peptides to determine molecular weight, secondary structure, oligomerization state, and conjugation chemistry through mass spectroscopy, high-pressure liquid chromatography, circular dichroism, and gel electrophoresis.
- Synthesized small molecules and non-natural amino acids for use in modification of peptides to be used in various bio-conjugations and stapling reactions through traditional and “click” chemistries.

Undergraduate Research Assistant, Penn State University

2017-2018

Advisor: Dr. Manish Kumar and Dr. Hasin Feroz

- Growth of E. Coli for the expression and harvesting of membrane bound transport proteins
- Screened purification conditions for membrane proteins through traditional ultracentrifugation methods and developed non-ultracentrifugation membrane-based methods
- Characterized purified proteins through gel-electrophoresis and western blot
- Synthesized lipid vesicles with purified membrane-bound transport proteins integrated into the vesicle for characterization of ion transport

RESEARCH SKILLS

- **Solid-phase peptide synthesis and modification**
- **Liquid Chromatography (HPLC, Flash, FPLC, IEX)** for purification of peptides and small molecules
- **Liquid-chromatography mass spectroscopy (LC-MS)** to characterize peptides and small molecules
- **Circular Dichroism (CD)** to characterize protein secondary structure
- **Gel electrophoresis** to characterize proteins in both native and denatured states
- **Multi-angle dynamic light scattering (DLS)**
- **Design and execute chemical reactions** to synthesize organic compounds
- **1D Nuclear magnetic resonance (NMR) spectroscopy**
- **Ultra violet-visible light (UV-Vis) spectroscopy**
- **E. Coli growth** for protein expression
- **Membrane protein purification** from E. Coli
- **Western blot**
- Proficient in **Microsoft Office** suite

EDUCATION

B.S., Chemical Engineering, Pennsylvania State University, University Park. State College, PA	2014 – 2018
Ph.D., Chemical and Biomolecular Engineering, University of Delaware. Newark, DE	2018-Present

PUBLICATIONS

1. Feroz, H., **Meisenhelter, J.**, Jokhadze, G., Breuning, M., Kumar, M. “Rapid Screening and scale-up of ultracentrifugation-free membrane-based procedures for purification of His-tagged membrane proteins” *Biotechnol. Prog.* 2019, 35: e2859 DOI: 10.1002/btpr.2859
2. **Meisenhelter, J.**, Langenstein, M., Pochan, D., Saven, J., Kloxin, C. “Truncated coiled-coil peptides as a building block for hierarchical material synthesis” – *in preparation*.

Nicholas Joseph Oliveira

101 Dennis Drive
Elkton, MD 21921

(860) 249-4303
Njo@udel.edu
www.linkedin.com/in/NJOliveira

Education

University of Delaware

Ph.D. Chemical Engineering

August 2018-Present

University of Connecticut

B.S. Honors Chemical Engineering

B.A. German Language

August 2013-May 2018

Experience

The Bingjun Xu and Yushan Yan Labs

January 2019-Present

- Spectro-electrochemical techniques to study Hydrogen oxidation and CO reduction mechanisms
- Optimization of a state-of-the-art continuous electrochemical CO₂ removal device

UCONN Research Assistant: The Willis Lab

August 2015–May 2018

- Developed models to simulate light waves in dielectric media for high efficiency lighting
- Designed a prototype spatial ALD device for electrochemical and solar devices

Fraunhofer Institute for Solar Energy Systems

March 2017-August 2017

- Tested various materials to prevent Bipolar Plate corrosion in Fuel Cell Stacks
- Designed test apparatus to measure corrosion through electrochemical fundamentals

MSU Research Assistant (REU Student):

May 2015 – August 2015

- Received National Science Foundation funding for computational and experimental research in grain growth and the mechanical properties of compacted powdered steel (FC-0205)

Teaching Experience

GAANN ITChE Teaching Fellow

January 2022 – December 2022

- Mentoring on teaching techniques and opportunities teaching undergraduate classes

Thermodynamics I

Fall 2020

- 4 hours of office hours/week lecturing and reviewing material from class

Process Control

Fall 2019

- 2 hour office hours and developed process design labs using MATLAB Simulink

Junior Lab

Spring 2018

- Undergraduate TA experience, redesigning hands-on reactor modeling labs

Peer-Reviewed Publications

1. Rebollar, L., Intikhab, S., **Oliveira, N. J.**, Yan, Y., Xu, B., McCrum, I. T., Snyder, J. D. & Tang, M. H. “Beyond adsorption” descriptors in hydrogen electrocatalysis. *ACS Catal.* **10**, 14747–14762 (2020).
2. Malkani, A. S., Li, J., **Oliveira, N. J.**, He, M., Chang, X., Xu, B. & Lu, Q. Understanding the electric and nonelectric field components of the cation effect on the electrochemical CO reduction reaction. *Sci. Adv.* **6**, (2020).
3. Yang, X., Nash, J., **Oliveira, N. J.**, Yan, Y. & Xu, B. Understanding the pH Dependence of Underpotential Deposited Hydrogen on Platinum. *Angew. Chemie - Int. Ed.* **58**, 17718–17723 (2019).
4. Chang, X., Vijay, S., Zhao, Y., Oliveira, N., Chan, K., and Xu, B. Understanding the Complementarities of Surface-Enhanced Infrared and Raman Spectroscopies in CO

Nicholas Joseph Oliveira

101 Dennis Drive
Elkton, MD 21921

(860) 249-4303
Njo@udel.edu
www.linkedin.com/in/NJOliveira

Adsorption and Electrochemical Reduction. *Nature Communications* Accepted

Conference Presentations

1. **Nicholas J Oliveira**, Bingjun Xu, and Yushan Yan, Evidence for the Lack of Caffeine Specific Adsorption and Its Impact on Water Structure to Increase HOR/HER Activity on Pt *Meet. Abstr. MA2021-02* 1484
2. **Nicholas J Oliveira**, Arnav Malkani, Bingjun Xu, and Yushan Yan, Understanding Electric and Non-Electric Field Effects on Electrochemical Double Layer Restructuring for the Model Platinum HOR 2020 *Meet. Abstr. MA2020-02* 3161

Awards

Robert L. Pigford Fellow

August 2018-July 2019

Graduate school year 1 fellowship

GAANN ITChE Fellow

January 2022 – December 2022

Graduate teaching fellowship

Organizations

The Electrochemical Society

Member

EmPOWER Mentor University of Delaware

Mentor promoting awareness of mental health issues in graduate school

Colburn Club University of Delaware

Professional organization for graduate chemical engineering students. Positions held: Outreach coordinator, vice president, and 4th year representative

Middle School Mathematics Tutor

JONATHAN KARL OTTEN

PhD Candidate, 4th Year, Papoutsakis Lab
University of Delaware

jkotten@udel.edu
(919) 559-0541

EDUCATION

Candidate, Doctor of Philosophy	Chemical & Biomolecular Engineering Robert A. Pigford Fellow Recipient, Saurabh A. Palkar Graduate Award for Mentoring University of Delaware	2023, expected
Bachelor of Science	Chemical & Biomolecular Engineering Biomolecular Concentration; Minor in Biotechnology University Honors Program; National Merit Scholar North Carolina State University	2018

PROFESSIONAL INTERESTS

Seeking a career in industrial biotechnology research and development.

RESEARCH FOCUS

In the Papoutsakis Group, my focus is on the interaction of *Clostridia* species in syntrophic cocultures. In coculture conditions, different species of industrially-relevant species can interact in novel, mutually-beneficial ways to improve chemical production as they share intracellular metabolites, enzymes, and genetic material. My specific area of expertise is bioreactor design, operation, and optimization. I operate the lab's existing bioreactors and specify the requirements for new systems, whether they are obtained from a supplier or built with my own custom designs. Through these bioreactor experiments, which I have performed alongside undergraduate research assistants that I've trained, as well as other work in genetic engineering and fluorescent microscopy, we have gained greater understanding of how microbes behave in cocultures for sustainable chemical production.

PUBLISHED WORKS

0. (submitted) Otten, J.K.; Zou, Y.; and Papoutsakis, E.T. 2022. The potential of hexanoate production using *Clostridium kluyveri* monocultures and syntrophic co-cultures with *Clostridium acetobutylicum* or *Clostridium saccharolyticum*.
1. Straub, C.T.; Bing, R.B.; Otten, J.K.; Keller, L.M.; Zeldes, B.M.; Adams, M.W.W.; Kelly, R.M. 2020. Metabolically engineered *Caldicellulosiruptor bescii* as a platform for producing acetone and hydrogen from lignocellulose. *Biotechnol and Bioengr.* **117**: 3799-3808.
2. Straub, C.T.; Schut, G.; Otten, J.K.; Keller, L.M.; Adams, M.W.W.; Kelly, R.M. 2020. Modification of the glycolytic pathway in *Pyrococcus furiosus* and the implications for metabolic engineering. *Extremophiles.* **24**: 511-518.
3. Straub, C.T.; Khatibi, P.A.; Otten, J.K.; Adams, M.W.W.; Kelly, R.M. 2019. Lignocellulose solubilization and conversion by extremely thermophilic *Caldicellulosiruptor bescii* improves by maintaining metabolic activity. *Biotechnol. and Bioengr.* **116**: 1901-1908.
4. Zeldes, B.M.; Straub, C.T.; Otten, J.K.; Adams, M.W.W.; Kelly, R.M. 2018. A synthetic enzymatic pathway for extremely thermophilic acetone production based on the unexpectedly

thermostable acetoacetate decarboxylase from *Clostridium acetobutylicum*. Biotechnol and Bioengr. **115**: 2951-2961.

5. Straub, C.T.; Counts, J.A.; Nguyen, D.M.N.; Wu, C.H.; Zeldes, B.M.; Crosby, J.R.; Conway, J.M.; Otten, J.K.; Lipscomb, G.L.; Schut, G.J.; Adams, M.W.W.; Kelly, R.M. 2018. Biotechnology of extremely thermophilic archaea. FEMS Microbiol Rev. **42**: 543-578.

PRESENTATIONS

0. (accepted) Otten, J.K. 2022. Syntrophic cocultures of *Clostridium* organisms to produce isopropanol and C6-C8 alcohols and carboxylic acids. Biochemical & Molecular Engineering XXII: The Dawn of a New Era.
1. Otten, J.K.; Charubin, K.; Dahle, M.; Foster, C.; Willis, N.; Hill, J.; Maranas, C.; Papoutsakis, E.T. 2021. Syntrophic co-cultures of *Clostridium* organisms to produce higher alcohols and other C6-C8 metabolites. DOE Genomic Science Program Annual Principal Investigator Meeting.
2. Charubin, K.; Foster, C.; Otten, J.K.; Dahle, M.; Willis, N.; Maranas, C.; Papoutsakis, E.T. 2020. Syntrophic co-cultures of *Clostridium* organisms to produce higher alcohols and other C6-C8 metabolites. DOE Genomic Science Program Annual Principal Investigator Meeting.
3. Papoutsakis, E.T.; Charubin, K.; Otten, J.K.; Streett, H. 2019. Direct cell-to-cell exchange of matter in synthetic *Clostridium* syntrophies enabling CO₂ fixation and an expanded metabolic space. Biochemical and Molecular Engineering XXI.
4. Charubin, K.; Otten, J.K.; Streett, H.; Foster, C.; Dahle, M.; Antoniewicz, M.; Maranas, C.; Papoutsakis, E.T. 2019. Syntrophic co-cultures of *Clostridium* organisms to produce higher alcohols and other C6-C8 metabolites. DOE Genomic Science Program Annual Principal Investigator Meeting.

TA EXPERIENCE

UD CHEG 420, Biochemical Engineering, Dr. Papoutsakis	Spring 2021
UD CHEG 345, Chemical Engineering Laboratory I, Dr. Buttrey & Dr. Enszer	Spring 2020

STUDENTS MENTORED

Yin Zou	Undergrad, Chemical Engineering, University of Delaware	2021-present
Peter (Henry) Lindvall	Undergrad, Chemical Engineering, University of Delaware	2022-present
Michael Dunn	Undergrad, Chemical Engineering, NC State University	2017-2018
John Mrozek	Undergrad, Chemical Engineering, NC State University	2017-2018
Demond Ferguson	Undergrad, Chemical Engineering, NC State University	2018

Haeun Shin

haeun@udel.edu | linkedin.com/haeun-shin

Education

- | | |
|--|--------------|
| University of Delaware | 2018-Present |
| • Ph.D. Candidate in Chemical and Biomolecular Engineering
Advisor: Dr. Feng Jiao | |
| Chonnam National University , South Korea | 2015-2017 |
| • Master of Science in Advanced Chemicals and Engineerings
Advisor: Dr. Wan-Jin Lee | |
| • Bachelor of Science in Applied Chemical Engineering
<i>Cum Laude</i> | 2011-2015 |

Research Experience

Graduate Research Assistant, University of Delaware

Advisor: Dr. Feng Jiao

Project: Sustainable production of chemicals from electrochemical carbon dioxide/monoxide reduction.

- Demonstrated comprehensive reaction mechanism of acetate formation with rational designs of catalyst and reaction to steer selectivity in electrochemical reduction of CO.
- Performed techno-economic analysis evaluating market feasibility of electrochemical reduction of CO and identifying key technologies for production cost reduction.
- Synthesized 2D copper catalyst and studied halide ion effect in determining morphology for selectivity improvement studies in electrochemical reduction of CO.

Graduate Research Assistant, Chonnam National University

Advisor: Dr. Wan-Jin Lee

Thesis: “Multi-shelled Cobaltite Hollow Microspheres for Lithium Ion Battery Anodes”

Project: Design of nanostructured anode materials for lithium ion batteries.

- Demonstrated high catalyst stability and rate capability by synthesizing multi-shelled cobalt oxide anodes for lithium ion batteries.
- Synthesized hollow-structured materials *via* hard and soft template-based synthesis method.
- Designed hierarchical metal oxides growth on various substrates *via* electrophoretic deposition method.
- Prepared woven-like materials embedding metal oxides *via* electrospinning method.

Teaching Experience

Graduate Teaching Assistant, University of Delaware

- | | |
|--|-----------|
| • Chemical Engineering Lab II | 2019-2020 |
| - Operated virtual plant-scale distillation columns and helped students explore the impact of design variables during pentane/hexane separation. | |
| - Created lab materials to help understanding of esterification process and set up pilot-scale operation for bio-diesel production from soybean oil. | |

Guest Lecturer, Chemical Engineering Thermodynamics, University of Delaware

- | | |
|--|------|
| • Lectured one session on the introduction of thermodynamics in electrochemistry | 2020 |
|--|------|

Publications

- (1) Heenen, H.H.*; **Shin, H***; Kastlunger, G; Overa, S; Gauthier, J.A.; Jiao, F; Chan, K, “Mechanism for Acetate Formation in CO₂ Reduction on Cu: Selectivity Trends with pH and Nanostructuring Derive from Mass Transport” (in preparation)
- (2) Overa, S; Crandall, B; Shrimant, B; Tian, D; Ko, B; **Shin, H**; Bae, C; Jiao, F, “Enhancing Acetate Selectivity by Coupling Anodic Oxidation in Carbon Monoxide Electroreduction” (*under review*)
- (3) Ko, B; Hasa, B; **Shin, H**; Zhao, Y; Jiao, F, “Electrochemical Reduction of Gaseous Nitrogen Oxides on Transition Metals at Ambient Conditions” *J. Am. Chem. Soc.*, 2022, **144**, 1258.
- (4) **Shin, H***; Hansen, K.U.*; Jiao, F, “Techno-Economic Assessment of Low-Temperature Carbon Dioxide Electrolysis” *Nat. Sustain.*, 2021, **4**, 911.
- (5) Xia, R; Tian, D; Kattle, S; Hasa, B; **Shin, H**; Ma, X; Chen, J; Jiao, F, “Electrochemical Reduction of Acetonitrile to Ethylamine” *Nat. Commun.*, 2021, **12**, 1949.
- (6) Ko, B; Hasa, B; **Shin, H**; Jeng, E; Overa, S; Chen, W; Jiao, F, “The Impact of Nitrogen Oxides on Electrochemical Carbon Dioxide Reduction” *Nat. Commun.*, 2020, **11**, 5856.
- (7) **Shin, H**; Lee, W, “Ultrathin Mesoporous Shell Co₃O₄ Hollow Spheres as High-performance Electrode Materials for Lithium-ion Batteries” *Mater. Chem. Phys.*, 2018, **214**, 165.
- (8) Hwang, H; **Shin, H**; Lee, W, “Effects of Calcination Temperature for Rate Capability of Triple-shelled ZnFe₂O₄ Hollow Microspheres for Lithium Ion Battery Anodes” *Scientific Reports*, 2017, **7**, 46378.
- (9) **Shin, H**; Lee, W, “Multi-shelled MgCo₂O₄ Hollow Microspheres as Anodes for Lithium Ion Batteries” *J. Mater. Chem. A*, 2016, **4**, 12263.

* These authors contributed equally

Activities and Awards

- | | |
|--|--------------|
| • President, Korean Graduate Student Association, University of Delaware | 2021-Present |
| • Richard Wool Award for Women in Green Engineering, University of Delaware | 2022 |
| • Mentoring Undergraduate Researcher in catalyst synthesis, University of Delaware | 2021 |
| • Best Paper Award, Chonnam National University | 2017 |
| • Sinyang Cultural Foundation Scholarship | 2015-2017 |
| • Cum Laude Honors, Chonnam National University | 2015 |

Skills

Experimental Cyclic Voltammetry (CV), Gas Chromatography (GC), Mass Spectroscopy (MS), Nuclear Magnetic Resonance Spectroscopy (NMR)

Characterization Scanning Electron Microscopy (SEM), Atomic Force Microscope (AFM), Energy Dispersive X-ray Spectroscopy (EDX), X-ray Powder Diffraction (XRD), X-ray Fluorescence (XRF), *operando* XAS

Software MATLAB, OriginLab, AutoCad, Adobe Illustrator, MestReNova, ChemDraw, Origin, AutoCad, Microsoft Office, iWork

Language Korean, English

Eric B. Steinman

Steinman@udel.edu • (954) 821-8175 • www.linkedin.com/in/SteinmanEB

113 W Park Place, Newark, DE, 19711

SUMMARY

Resourceful Ph.D. candidate with diverse research background who is hoping to improve efficiency and sustainability in an industrial setting through innovation.

EDUCATION

Doctor of Philosophy in Chemical Engineering

August 2017 – May 2023 (expected)

Cumulative GPA — 3.37/4.00

University of Delaware, Newark, DE

Bachelor of Science in Chemical Engineering

August 2013 – May 2017

Cumulative GPA— 3.52/4.00, *cum laude*

University of Florida, Gainesville, FL

RESEARCH EXPERIENCE

Ph.D. Candidate

August 2017 – Present

Advised by Marat Orazov

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

- Demonstrated novel process for consecutive oxidative dehydrogenation and benzene alkylation to simplify separations, improve thermodynamics, and mitigate coking

Advised by Raul Lobo and Bingjun Xu

- Investigated binary oxides for selective hydrogen combustion for chemical looping to mitigate equilibrium limitations in methane dehydroaromatization
- Designed, built, and modified automated flow reactor and pulsed reactor systems

Research Assistant

January 2016 – July 2017

Advised by Ranganathan Narayanan

University of Florida, Department of Chemical Engineering (Gainesville, FL)

- Operated and troubleshot Rayleigh-Benard and Benard-Marangoni cells to test theoretical predictions about competing effects of convection, gravity, and surface tension
- Measured fluid properties (solubility, viscosity, surface tension) of complex partially miscible mixture to support microgravity experiments
- Designed and built temperature-controlled surface tensiometer for a fraction of retail cost

Research Assistant

March 2015 – May 2017

Advised by Alexander Angerhofer

University of Florida, Department of Chemistry (Gainesville, FL)

- Studied kinetics of the oxidase pathway of *B. subtilis* OxDC and its mutants for applications to mitigate kidney stones and reduce scaling in the pulp and paper industry
- Designed airtight system for accurately injecting small quantities of enzyme solution

Researcher

June 2011 – July 2011

Advised by Maulik Shah and Bruce Tilley

STaRS Florida (Gainesville, FL)

- Developed test to rapidly differentiate Histoplasmosis from similarly presenting lung infections (e.g. tuberculosis) using PCR with selective and nested primers
- Studied effectiveness of ionophores in inhibiting the growth of citrus greening disease

Eric B. Steinman

Steinman@udel.edu • (954) 821-8175 • www.linkedin.com/in/SteinmanEB

113 W Park Place, Newark, DE, 19711

LEADERSHIP

Board Member

November 2021 – Present

Delaware Sustainable Chemistry Alliance (Newark, DE)

- Designed programming and planned events for professional development and networking for graduate students, local startups, and legacy chemical companies
- Researched market, participated in discussion, and reached out to stakeholders to prepare Delaware's response to the US DOE's \$8 billion Hydrogen Hub RFI and RFP
- Recruited speakers, publicized event, and helped organize for Catalyzing Change STEM Talent Conference that brought in more than \$75,000 in revenue
- Served as liaison between the University of Delaware graduate students and DESCAs

Senator

May 2018 – May 2019

Graduate Student Government (Newark, DE)

- Passed resolutions to improve graduate student life and sustainability on campus
- Persuaded university to continue to run shuttles to pick up stranded graduate students when the university closes due to inclement weather
- Successfully lobbied university to provide funding to graduate student organizations (\$500 base per organization with additional funds available for special events)

Senator-Elect

September 2017 – May 2018

Graduate Student Government (Newark, DE)

- Informed chemical engineering graduate students about upcoming GSG events & opportunities
- Served as department's senator when the senator was unavailable

OTHER EXPERIENCE

Web Designer

December 2014

Goode Compliance International (Miramar, FL)

- Recreated company website after its security was compromised
- Wrote, edited, organized, and updated text, graphics, menus, and more
- Improved testimonial sliders, interactive maps, social media, search engine optimization

Quality Engineering Intern

May 2014 – August 2014

Goode Compliance International (Miramar, FL)

- Wrote, revised, and updated internal files including SOPs, forms, trainings, and logs
- Submitted Requests for Analysis (RFA) as post-market surveillance for St. Jude Medical

PUBLICATIONS

- Steinman and Orazov, "Ethylbenzene Production by Consecutive Oxidative Dehydrogenation of Ethane and Benzene Alkylation", in preparation

SKILLS

- Software Proficiency — Python, MATLAB, LabVIEW, C, WordPress, ImageJ, Zoom, Excel, PowerPoint, Word, Igor
- Laboratory Skills — GC, flow reactor, pulsed reactor, XRD, XRF, TGA, MS, hydrothermal synthesis, physisorption, in situ DRIFTS, UV-VIS, gel electrophoresis, PCR, viscometry, bacterial cell culture

Roshaan Surendhran

(973)-910-9635 | roshaansuren@gmail.com | linkedin.com/in/roshaan-surendhran-a16993116

Education

University of Delaware (UD), Newark, DE

August 2018 – 2023 (expected)

Doctoral Student, Chemical Engineering

University at Buffalo (UB), Buffalo, NY

August 2014 – May 2018

Bachelor of Science, Chemical Engineering - GPA: 3.94 (Summa cum laude)

Bachelor of Science, Chemistry (double major)

Research Experience

Graduate student, UD, Department of Chemical and Biomolecular Engineering

August 2018 – Present

P.I: Dr. Marat Orazov.

- ❖ Developed and implemented strategies for synthesizing zeolite encapsulated metal catalysts.
- ❖ Constructed batch reactors for reaction and catalyst testing under medium and high-pressure conditions.
- ❖ Applied size-selective hydrogenation catalysts in biomass reforming via tandem systems.

Undergraduate Researcher, UB, Department of Chemistry

August 2016 – May 2018

P.I: Dr. David C. Lacy.

- ❖ Successfully synthesized and studied iron based inorganic complexes for dioxygen activation.
- ❖ Characterized manganese-based clusters for photochemical water splitting using simulations.

Skills

Wet lab experience: Synthesis of inorganic materials and zeolite catalysts, spectroscopic, X-Ray and physical methods for material characterization, catalyst evaluation in pressurized batch reactor systems, method development and quantitative analysis with high-pressure liquid chromatography and gas chromatography.

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

Publications and Presentations

- ❖ Cannella, A. F.; **Surendhran, R.**; MacMillan, S. N.; Gupta, R.; Lacy, D. C. Electronically varied manganese tris-arylacetamide tripodal complexes. *J. Coord. Chem.* **2019**, 72, pp 1287-1297
- ❖ **Surendhran, R.**; D'Arpino, A.; Sciscent, B.; Cannella, A. F.; Friedman, A. E.; MacMillan, S. N.; Gupta, R.; Lacy, D. C. Deciphering the Mechanism of O₂ Reduction with Electronically Tunable non-heme Iron Enzyme Model Complexes. *Chem. Sci.* **2018**, 9, pp 5773-5780.
- ❖ Kadassery, K. J.; Dey, S. K.; Cannella, A. F.; **Surendhran, R.**; Lacy, D. C. Photochemical Water Splitting with Organomanganese Complexes. *Inorg. Chem.* **2017**, 56, pp 9954-9965.
- ❖ **Surendhran, R.** Synthetic non-heme iron system for dioxygen activation, WNY-ACS Undergraduate Research Symposium, April 2018.

Awards and Honors

- ❖ Robert L. Pigford Teaching Assistant Award, 2022
- ❖ Morton and Donna Collins Chemical Engineering Fellowship, 2019
- ❖ University at Buffalo-CAS Outstanding Senior in Chemistry, 2018
- ❖ Outstanding Chemical & Biological Engineering Major from ACS WNY, 2018.
- ❖ Joseph & Louise K. Tufariello Award for Academic Excellence in Chemistry, 2018.
- ❖ CBE Junior Academic Excellence Award, 2017.
- ❖ Alan Cutler Undergraduate Award, 2017.
- ❖ Ralph F. Theuer Scholarship, 2017.
- ❖ CAS Experiential Learning Award for Summer 2017.
- ❖ CURCA Undergraduate Research Award, Fall 2016 – Spring 2017.

Outreach Involvements:

- ❖ Outreach coordinator for UD CBE Colburn Club, Fall 2021 – Fall 2022. Organized after-school math tutoring program for 6th grade students
- ❖ Tutor (part-time) for the Division of Athletics, UB. Spring 2017 – Spring 2018
- ❖ Volunteer for SiE (Science is Elementary) outreach program during Fall 2014 - Spring 2016 at Westminster Charter Elementary School in Buffalo, NY.

ALANA C. SZKODNY

aszkodny@udel.edu | (908) 419 - 0811 | [linkedin.com/in/alana-c-szkodny](https://www.linkedin.com/in/alana-c-szkodny)

EDUCATION

University of Delaware, College of Engineering, Newark, DE August 2017 – December 2022 (expected)
Candidate for Doctor of Philosophy in Chemical and Biomolecular Engineering (CBE)
Overall GPA: 3.89

Cornell University, College of Engineering, Ithaca, NY Graduated May 2014
Bachelor of Science in Chemical and Biomolecular Engineering
Minor: Biomedical Engineering
Overall GPA: 3.67 Dean's List six semesters

RESEARCH AND INDUSTRY EXPERIENCE

Graduate Research Assistant, Kelvin H. Lee Lab January 2018 - Present
University of Delaware, Department of Chemical and Biomolecular Engineering, Newark, DE
Thesis Project: Identification of "difficult-to-express" monoclonal antibody (mAb) frameworks to alleviate expression bottlenecks in Chinese hamster ovary (CHO) cells

- Independently developed thesis project idea, background, goals, and experimental approach
- Improved workflows for cell growth, transient protein expression, and culture analysis at well-plate scales (culture volume < 1mL) to enable parallel screening of large panels of antibodies
- Established pipelines for computational analysis of antibody mutations using published energy force field-based modeling approaches in Linux/Bash, Python, and R
- Measured the productivity of 178 systematically chosen single amino acid mutations in a model IgG1 mAb to identify distinct combinations of primary sequence mutations and molecular contexts that impact expression
- Designed, generated, and characterized a stable CHO cell line capable of recombinase-mediated cassette exchange through CRISPR/Cas9-mediated targeted integration of a landing pad at a defined genomic locus
- Gained experience with mammalian cell culture, single cell cloning, flow cytometry, molecular cloning and plasmid design, qPCR and ddPCR analysis, fluorescent microscopy, Western blotting, and bioinformatics

Associate Scientist, Downstream Process Development (DPD) July 2014 – August 2017
GlaxoSmithKline, Biopharm CMC, King of Prussia, PA

- Designed, optimized, and validated purification unit operations for large scale production of mAb therapies
- Performed process development and process validation (PV) for a new, commercial-scale tangential-flow ultrafiltration (TFUF) unit operation for an FDA-approved mAb product
 - Experimentally established target values for critical process parameters, validated a small-scale model, and established proven acceptable ranges for process parameters
 - Collaborated with manufacturing colleagues to correctly implement and document the new process; provided in-person support during critical runs
 - Developed a new approach for process validation of TFUF unit operations in line with the ICH Q11 guidelines; presented the approach at ACS BIOT 2017
- Supported other process development activities such as resin lifetime studies, development of a cation-exchange chromatography step, large-scale demonstrations of proposed processes (purification of 50L – 200L of cell culture broth), and investigations into process deviations as a result of raw material impurities
- Participated in a process validation working group to establish guidelines for consistent execution of PV workflows across projects
- Served on the DPD Safety Team to perform regular lab inspections, address safety concerns, establish safety procedures, and instill a positive safety culture in the department

Research Assistant, DeLisa Research Group February 2012 – May 2014
Cornell University, School of Chemical and Biomolecular Engineering, Ithaca, NY

- Participated in ongoing research projects focusing on engineering *E. coli* to produce humanized antibodies for future applications as biopharmaceutical products
- Collaborated with graduate student to develop and perform experiments and analyze data

TEACHING EXPERIENCE

- Fraser and Shirley Russell Teaching Fellow**, University of Delaware February 2021 – May 2021
- Co-taught a sophomore-level undergraduate chemical engineering course (CHEG 304: Random Variability in Chemical Processes) and assisted in transitioning the course to a virtual format due to the COVID-19 pandemic
 - Prepared and presented course content for six lectures covering hypothesis testing and regression analysis
 - Contributed content to lectures about effective scientific communication, good design principles for data visualization, and the use of statistics in the biopharmaceutical industry
 - Drafted homework and exam problems, created solution sets, interfaced with students at office hours, and reviewed student project reports to provide feedback on technical writing and data analysis
- Graduate Teaching Assistant**, University of Delaware
- CHEG 304: *Random Variability in Chemical Processes* February 2019 – May 2019
- CHEG 445: *Chemical Engineering Laboratory II* August 2018 – December 2018

LEADERSHIP

- EmPOWER**, University of Delaware
- Lead Mentor* July 2020 – Present
- Managing 20+ peer mentors for CBE EmPOWER, a peer-support group dedicated to supporting and advocating for the mental health and wellness of graduate students
 - Coordinating and assisting with programming, such as first-year peer mentoring, panel discussions, mental health trainings, and community building events; actively expanding programming to address a wider range of graduate student needs within CBE and across all departments in the College of Engineering
- Peer Mentor* August 2019 – Present
- Mentoring first-year graduate students and helping with their transition into graduate school by providing support, answering questions, and sharing department and university resources
- Outreach Director**, Colburn Club, University of Delaware August 2017 – August 2019
- Coordinated monthly science demonstrations for 6th grade students at Shue-Medill Middle School in Newark, DE through the CBE graduate student organization, Colburn Club
 - Expanded outreach activities to the greater Philadelphia area by coordinating participation in the Philadelphia Science Festival for the first time in April/May 2019
- Coordinator**, DPD Outreach, GlaxoSmithKline May 2016 – August 2017
- Coordinated department participation in an established 8-week summer science program in collaboration with the Montgomery County Opportunities Industrialization Center (OIC) in Norristown, PA

PUBLICATIONS AND PRESENTATIONS

Szkodny, A.C., Lee, K.H. (in press). Biopharmaceutical Manufacturing: Historical Perspectives and Future Directions. *Annual Review of Chemical and Biomolecular Engineering*.

Szkodny, A.C., Lee, K.H. 2022. "Identification of "Difficult-to-Express" mAb Frameworks to Alleviate Expression Bottlenecks in CHO Cells," Paper presented to the Division of Biochemical Technology of the American Chemical Society (ACS BIOT), San Diego, CA, March 20 - 24, 2022.

Szkodny, A., Molek, J., Goklen, K.E. 2017. "Scalable and Representative: Improved Approaches to Process Characterization for a Tangential-Flow Ultrafiltration Unit Operation," Paper presented to the Division of Biochemical Technology of the American Chemical Society (ACS BIOT), San Francisco, CA, April 2 - 6, 2017.

Robinson, M., Ke, N., Lobstein, J., Peterson, C., **Szkodny, A.**, et al. Efficient expression of full-length antibodies in the cytoplasm of engineered bacteria. *Nature Communications* 6, 8072 (2015).

AWARDS AND HONORS

- Phillip and Ruth Evans Chemical Engineering Fellowship**, University of Delaware 2021
- Robert L. Pigford Teaching Assistant Award**, University of Delaware 2020
- Robert L. Pigford Fellowship**, University of Delaware 2017
- Exceptional Science Award**, GlaxoSmithKline R&D 2016
- A. Szkodny 2

Will Thompson

wathomp@udel.edu • AP Bio Lab 345, 590 Ave. 1743, Newark, DE 19713 • (918) 404-6966

EDUCATION

University of Delaware (UD), Newark, DE

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

GPA: 3.55/4.00

University of Oklahoma (OU), Norman, OK

B.S. in Chemical Engineering, *summa cum laude*

Minors: Chemistry, English Writing

GPA: 4.00/4.00

RESEARCH EXPERIENCE

UD | Graduate Research Assistant | Papoutsakis Group

Fall 2018 – Present

- Investigated structure-function relationships and miRNA cargo profiles in extracellular vesicles derived from both platelet-producing megakaryocytes and Chinese hamster ovary cells.
- Analyzed the impact of vesicle production methods (shear stress, harvest procedure, etc.) on the cellular phenotypes affected by the aforementioned vesicles.
- Performed *in vivo* studies to evaluate vesicle delivery and efficacy in murine models.
- Served as group Safety Liaison, monitoring compliance and conducting quarterly safety inspections across three laboratories.

OU | Undergraduate Research Assistant | Sikavitsas Group

Spring 2016 – Spring 2018

- Investigated the standardization of mesenchymal stem cell differentiation in flow perfusion bioreactors by monitoring various biochemical markers.
- Wrote and received an Undergraduate Research Opportunities Program (UROP) grant from the OU Honors College to study the viability of alamarBlue as a non-invasive indicator of cellularity and cell type in cultures of rat mesenchymal stem cells.

ANL | Student Research Participation (SRP) Intern | Talamo Group

Summer 2017

- Worked in the Nuclear Engineering Division at Argonne National Laboratory using MATLAB scripts to estimate neutron detector deadtime via the backward extrapolation method.
- Analyzed the effect of various deadtime models on the estimated effective multiplication factor of the Kyoto University Critical Assembly.

TEACHING EXPERIENCE

UD | Dept. of Education GAANN Fellowship

2022 – Present

- A teaching experience combining theoretical training with classroom efforts in CHEG 112.

UD | Teaching Assistant

2020 – 2021

- Cell Culture Biomanufacturing (CHEG 667 / 867) & Intro to Chemical Engineering (CHEG 112).

OU | Dean's Leadership Council

2016 – 2018

- Served as a peer mentor for three sections of Freshman Engineering Experience (ENGR 1411).

OU | Chevron-Phillips Mentor

2018

- Acted as a teaching assistant for the undergraduate fluid mechanics course (CH E 3113).

Moore High School | Assistant Debate Coach

2015 – 2017

- Coached and judged ~15 local high school students in competitive speech and debate.
- Coached three students to four national qualifications and one student to a state championship.

Cameron University Debate Institute | Junior Staffer

2014

- Prepared and gave lectures, provided relevant research, and judged debates for ~30 students.

PUBLICATIONS

CY Kao, J Jiang, **W Thompson**, E Papoutsakis, "miR-486-5p and miR-22-3p enable megakaryocytic differentiation of hematopoietic stem and progenitor cells without thrombopoietin," *Int. J. Mol. Sci.*, *under revision for resubmission*.

W Thompson, E Papoutsakis, "Impacts of mechanical stress on extracellular vesicles," *in preparation*.

J Belliveau, **W Thompson**, E Papoutsakis, "The miRNA landscape of the extracellular vesicles generated by Chinese hamster ovary cells under normal and stressed conditions," *in preparation*.

SELECT CONFERENCE PRESENTATIONS

J Belliveau, **W Thompson**, E Papoutsakis, "Exploring the Space of CHO Extracellular Vesicles (EVs) & their Potential Applications," AMBIC Conference, July 2021, Lowell, MA. *Poster Presentation*.

J Belliveau, **W Thompson**, E Papoutsakis, "Exploring Endogenous and Exogenous Cargo Transport via Extracellular Vesicles in CHO Cultures," AMBIC Conference, December 2019, College Park, MD. *Poster Presentation*.

J Belliveau, **W Thompson**, CY Kao, E Papoutsakis, "Exploring the Space of CHO Extracellular Vesicles (EVs) & their Potential Applications," AMBIC Conference, December 2019, College Park, MD. *Poster Presentation*.

J Belliveau, **W Thompson**, E Papoutsakis, "Exploring the Space of CHO Extracellular Vesicles & their Potential Applications," AMBIC Conference, June 2019, Boston, MA. *Poster Presentation*.

ORGANIZATIONS & ACTIVITIES

- | | |
|---|-----------------------|
| • UD Colburn Club (Graduate Org. for CBE Department) | 2018 – Present |
| ◦ First Year Rep. (2018 – 2019), Elementary Tutor (2018 – 2020) | |
| • UD Graduate Student Government – CBE Department Senator | 2019 – 2021 |
| • OU American Institute of Chemical Engineers (AIChE), Student Chapter | 2014 – 2018 |
| ◦ Secretary (2017 – 2018), Intramural Chair (2016 – 2017) | |
| • OU College of Engineering Academic Grade Appeals Panel | 2016 – 2018 |
| • OU Tau Beta Pi, Oklahoma Alpha Chapter | Inducted 2016 |
| • OU Debate Team | 2014 – 2015 |

SELECT HONORS & AWARDS

- | | |
|---|-------------|
| • Robert L. Pigford Teaching Assistant Award – CBE Department, UD | 2022 |
| • Outstanding Senator – Graduate Student Government, UD | 2020 |
| • Laird Fellowship Finalist – College of Engineering, UD | 2019 |
| • Morton '58 and Donna Collins Chemical Engineering Fellowship – CBE Department, UD | 2018 |
| • Robert L. Pigford Fellowship – CBE Department, UD | 2018 |
| • Letzeiser Honor List (Top 26 Graduating Seniors) – OU | 2018 |
| • 2018 Outstanding Male Ally – Women in Engineering Program, OU | 2018 |
| • Second Place Jeopardy Team – Mid-America Student Regional Conference, AIChE | 2018 |
| • National Merit Scholarship – OU | 2014 |
| • National Champion, Extemporaneous Commentary – National Speech & Debate Association | 2014 |

SKILLS & SPECIALTIES

- **Laboratory:** primary & immortalized mammalian cell culture, flow cytometry, PCR, RNA extraction, immunostaining, western blotting, nanoparticle tracking analysis, dynamic light scattering, confocal microscopy, cell transfection, murine injection and histology.
- **Software:** VBA, MATLAB, Aspen Plus, LabVIEW, LOOP-PRO, Minitab, MS Suite.

EDUCATION**University of Delaware**

Fall 2018 - Present

Ph.D. Candidate, Chemical and Biomolecular Engineering

North Carolina State University

2013 - 2017

B.S., Chemical Engineering

Goodnight Scholar

Minor, Italian Studies

University Valedictorian

Engineering Entrepreneurs Program

EXPERIENCE*Doctoral Candidate, Graduate Research Assistant, University of Delaware*

Fall 2018 - Present

Faculty Advisor: Prof. Catherine A. Fromen

- Engineering an *in vitro* platform for personalized pulmonary drug delivery and evaluation. This project is highly multidisciplinary and combines 3D printing, aerosol formulation, and mechanical systems. *Patent Pending. U.S. Patent Application Serial No.: 63/278,131.*
- Maintained a T cell manufacturing flow cell for collaborative cell therapy project through NIIMBL <https://niimbl.force.com/s/pc31-132>
- Developed software for generating and characterizing 3D printed lattice structures
- Learned and implemented statistical analysis methods for diverse datasets (pubs. 1-3)
- Mentored 5 undergraduate students in research methods and extracurricular endeavors
- Designed lab visual identity and communications materials for presentations and posters
- Established lab data management practices and network storage with automated archiving
- Skills: teamwork, communication, project management, data organization, data analysis, statistics, data visualization, scientific computing, technical writing, programming, Microsoft Office, R, Python, CAD, 3D printing, Arduino, troubleshooting, aerosol characterization, cell culture maintenance

Laboratory Associate, VaporPulse Technologies

Apr - Aug 2018

- Developed 2 atomic layer deposition (ALD) processes for commercialization
- Introduced CAD workflow and component library for prototyping reactor designs and custom tooling

Undergraduate and Post-Baccalaureate Researcher, NC State

May 2015 - Apr 2018

Faculty Advisor: Prof. Gregory N. Parsons

Research topics:

- Atomic layer deposition for corrosion protection; reactor design and control (pub. 4)
- Zirconium hydroxide and zirconium-polymer networks for catalytic applications
- Metal-organic frameworks for catalytic degradation of chemical warfare agents (pub. 5)
- Solution-based flame-retardant coatings for textile substrates

Materials Laboratory Co-Op, Robert Bosch LLC (Robert Bosch GmbH)

May - Aug 2016

- Performed characterization on failed components, customer returns, and test samples across automotive and consumer products manufacturing sites in the Americas
- Engaged supply partners to establish two thermoplastic specifications based on process capability (Cpk)

PUBLICATIONS

*2020 Journal metrics listed for graduate work

Peer-reviewed publications

1. **Woodward, I. R.** & Fromen, C. A. Scalable, process-oriented beam lattices: generation, characterization, and compensation for open cellular structures. *Additive Manufacturing*, 102386 (2021). **Open Access.** [Journal Impact: 10.998]
2. **Woodward, I. R.**, Attia, L., Patel, P. & Fromen, C. A. Scalable 3D-printed lattices for pressure control in fluid applications. *AIChE Journal*, e17452 (2021). **Invited for 2021 Futures Issue.** [Journal Impact: 3.993]
3. Kolewe, E. L.*, Stillman, Z.*, **Woodward, I. R.*** & Fromen, C. A. Check the gap: Facemask performance and exhaled aerosol distributions around the wearer. *PLoS ONE* 15, e0243885 (2020). * equal contribution [Journal Impact: 3.24]
4. Fusco, M. A., **Woodward, I. R.**, Oldham, C. J. & Parsons, G. N. Enhanced Corrosion Protection of Copper in Salt Environments with Nanolaminate Ceramic Coatings Deposited by Atomic Layer Deposition. *ECS Transactions*. **85**, 683–691 (2018).
5. Zhao, J., Lee, D. T., Yaga, R. W., Hall, M. G., Barton, H. F., **Woodward, I. R.**, Oldham, C. J., Walls, H. J., Peterson, G. W., Parsons, G. N. Ultra-Fast Degradation of Chemical Warfare Agents Using MOF-Nanofiber Kebabs. *Angewandte Chemie International Edition*. **55**, 13224-13228 (2016).

PRESENTATIONS

Omitted. Please contact for more information.

HONORS AND AWARDS

Merck Emerging Talent Symposium – Selected Poster Presentation	Nov 2021
PhRMA Foundation Predoctoral Fellowship Finalist	Sep 2020
Robert L. Pigford Teaching Assistant Award	April 2020
Honorable Mention – NSF Graduate Research Fellowship Program	March 2020
Recognition of Excellence – Qualifying Exam	Aug 2019
Collins Fellow	Jan - Aug 2019
Goodnight Scholar (Undergraduate Full Scholarship, Professional Development, Service)	2013 - 2017
Valedictorian, <i>Summa Cum Laude</i>	May 2017

2 nd Place Final Pitch, Engineering Entrepreneurs Program	Order of the Engineer
Senior Class Speaker, Goodnight Scholars Program	Gamma Kappa Alpha (Italian)
Introductory Speaker, NC State Founders' Day Dinner	Phi Kappa Phi (Interdisciplinary)
Invited Presentation, Bosch Junior Management Program	Tau Beta Pi (Engineering)

LEADERSHIP, SERVICE, AND SELECT EXPERIENCE

NCSU Chemical Engineering Alumni Mentor	October 2021 - Present
UD Chemical Engineering EmPOWER Peer Mentor, Website Manager	July 2020 - Present
Graduate Teaching Assistant, <i>Vaccines and Immunoengineering</i>	Feb - June 2020
Graduate Teaching Assistant, <i>Process Dynamics and Control</i>	Aug - Dec 2019
Algebra Tutor and Science Demo Presenter, UD CBE Outreach	Sep 2018 - Mar 2020
*†Team Member, Trinidad & Tobago Alternative Service Break	Mar 2016
*Guest Lecturer, 3D Technology Consultant, <i>Lilongwe, Malawi</i>	July 2015
*†Study Abroad, <i>Florence, Italy</i>	June 2014
* <i>International</i>	† <i>Awarded funding</i>

Mingchun Ye (He/Him/His)

mcye@udel.edu

302-668-9518

150 Academy Street

Newark, DE 19716

Education

University of Delaware

Ph.D., Chemical Engineering

Newark, DE

expected 2023

Tianjin University

B.Eng., Applied Chemistry; GPA 3.78/4.0

Tianjin, China

July 2018

Distinguished graduates of Tianjin University;

Samsung Scholarship; “Zhoukou Shanghui” Scholarship;

Merit Student of Tianjin University

Selected Research Experience

University of Delaware

PhD researcher

- Developed a green synthesis of a biomass-based compound for polymers
- Optimized reaction conditions and identified ultra-fast reaction rate conditions
- A facile product separation method was proposed and tested
- Identified the reaction mechanism
- Proposed and conducted experiments on the compound for other useful materials

Tianjin University

Undergraduate Researcher

- Developed cathode material for rechargeable aluminum-ion battery with highest reported power density at that time
- Performed charging-discharging tests for the battery stability
- Assembled 3 types of cells (pouch, Swagelok, coin) and analyzed charge-discharge curve
- Characterized material structures and analyzed its correlation with performance

Selected Leadership Experience

University of Delaware

Teaching Assistant

(Feb 2020-June 2020 & Feb 2021-June 2021)

- Assisted in teaching 2 semesters of undergraduate lab courses
- Prepared materials including instruments, chemicals, safety training, practice questions
- Led weekly laboratory and/or problem-solving and discussion sections for students

- Supervised students in in-person lab section, reviewed and graded their draft reports, offered suggestions

Tianjin University Student Chapter of AIChE

President

(July 2017- July 2018)

- “Outstanding Student Chapter award” by AIChE
- Held the 2nd AIChE Chem-E-Car Competition in China (500+ attendees)
- Led the Tianjin University Chem-E-Car team to attend the 10th World Congress of Chemical Engineering (WCCE 2017) and competition held there in Barcelona, Spain
- Manage the operation of the Student Chapter (50+ members)
- Acquired total funding of ~¥ 850,000 (~\$133,000) for instrument and travel
- Coordinated activities with other AIChE student chapters in China
- Hosted school-wide lectures and industry meetings

Co-Founder and Vice President

(March 2016 – July 2017)

- “Outstanding Student Chapter award” by AIChE
- Held the 1st AIChE Chem-E-Car Competition in China (~300 attendees)
- Participated the Tianjin University Chem-E-Car Team (1st team in China) and attended the global competition in 2016 AIChE Annual Student Conference
- Participate in the establishment of the Chapter and Co-Manage the operation (~40 members)

Skills

Languages: Mandarin Chinese (native), English (fluent), German (elementary)

Computer: ASPEN Plus, C++, MATLAB, Microsoft office, Minitab, Origin etc.

Lab: GC, HPLC, LC-MS, liquid and solid-state NMR, UV-Vis, TGA, DSC, IR, Raman, SEM, TEM, Physisorption and Chemisorption

Publications

Ye, M., Kuo, M.J. and Lobo, R.F. “Oxidative coupling of 2-methyl furoate: A scalable synthesis of dimethyl 2,2'-bifuran-5,5'-dicarboxylate” *Applied Catalysis A*, General 619 (2021) 118138

Cho, H.J., Kuo M.J., **Ye, M.**, Kurz, Y., Yuan, Y. and Lobo R.F. “Selective Synthesis of 4,4'-Dimethylbiphenyl from 2-Methylfuran” *ACS Sustainable Chem. Eng.* 2021, 9, 8, 3316–3323

Long, Y., Li, H., **Ye, M.**, Chen, Z., Wang, Z., Tao, Y., Weng, Z., Qiao, S.Z. and Yang, Q.H. “Suppressing Al dendrite growth towards a long-life Al-metal battery” *Energy Storage Materials* 2021, 34, 194-202

Li, H., Tao, Y., Zhang, C., Liu, D., Luo, J., Fan, W., Xu, Y., Li, Y., You, C., Pan, Z.-Z., **Ye, M.**, Chen, Z., Dong, Z., Wang, D.-W., Kang, F., Lu, J., Yang, Q.-H., “Dense Graphene Monolith for High Volumetric Energy Density Li–S Batteries” *Adv. Energy Mater.* 2018, 8, 1703438.

Xue Zong

xzong@udel.edu | +1 (302)-516-9203 | www.linkedin.com/in/xue-zong

Education

University of Delaware, Newark, DE

August 2018 – June 2023 (expected)

Ph.D. Candidate in Chemical and Biomolecular Engineering, GPA: 3.76/4.00

Thesis Advisor: Prof. Dionisios G. Vlachos

Tianjin University, Tianjin, China

August 2014 – July 2018

Bachelor of Engineering (Chemical), GPA: 3.84/4.00

Awards: The National Academic Awards (China)

Skills

Programming & Database

Python, Java, JavaScript, HTML, SQL, Bash, MATLAB

Data Analytics & Visualization

Python (Pandas, NumPy, Scipy, seaborn, matplotlib, Scikit-learn)

Software & Tools

Git, TensorFlow, Microsoft Office

Research Experiences

Graduate Research Assistant, University of Delaware

Newark, DE

Thesis Advisor: Prof. Dionisios G. Vlachos

January 2019 - Present

Thesis: Machine-learning-aided Multiscale Modeling of Structure-Sensitive Catalytic Reactions

- Constructed features and compared various machine learning regression models (linear, kernel and tree ensemble) to design a reduced model for predicting adsorption energies of small adsorbates on metal surfaces
- Demonstrated a superior performance and transferability of the model in prediction accuracy compared to existing ones and further applicability in screening potential catalyst materials
- Developed innovative computational methodology to predict catalyst kinetic activity by integrating quantum theory, multiscale kinetic modeling, and uncertainty quantification
- Quantified uncertainty in a structure-dependent kinetic model using statistical analysis to reconcile the discrepancy in published experimental data
- Implemented new features in a Python software for automated descriptor selection and volcano curve generation; completed the documentation and results visualization
- Provided critical peer reviews for three journal articles

Undergraduate Visiting Scholar, Georgia Institute of Technology

Atlanta, GA

Research Advisor: Dr. Sven H. Behrens

June 2017 – June 2018

- Performed experiments to form and characterize a newly developed stable capillary foams for industrial deinking
- Evaluated the effect of material, the surface charge of the colloidal particles, and extend of particle flocculation on the stability of the capillary foam

Undergraduate Researcher, Tianjin University

Tianjin, China

Research Advisor: Prof. Zhongyi Jiang

September 2016 – June 2017

- Fabricated a novel, high performance mixed matrix membrane (MMM) by incorporating ZIF-67 nanoparticles into polymers of intrinsic microporosity (PIM) membranes
- Investigated the influence of ZIF-67 loading content on the polymer properties to achieve defect-free MMM membrane
- Enhanced both permeability and selectivity of the PIM membrane and surpassed the Robeson upper bound for CO₂/CH₄ separation

Teaching & Leadership Experiences

University of Delaware

Newark, DE

Graduate Teaching Assistant

January 2020 – December 2020

- Led labrotary sessions to analyze the process dynamics of simulations and graded laboratory reports for a class of 80 undergraduate students
- Delivered a range of teaching activities including holding review sessions and grading quizzes, written assignments, midterms and finals
- Assisted professors with the development of appropriate teaching materials and administrative tasks

Undergraduate Research Mentor

Summer 2020, Summer 2021 - Present

- Coached one undergraduate research assistant and convened weekly meetings to track research progress
- Supervised one undergraduate student developing machine learning models and guided with winning 1st place of poster competition in AIChE Annual Meeting 2021

Data Science Training Workshop

July 2020

- Arranged and trained 20 graduate students to apply data science techniques into research. Topics included dimensionality reduction, classification and regression models.

Publications

- **Zong, X.** and Vlachos, D. G. Learning structure-sensitive scaling relations for small species adsorption on platinum surfaces. (Submitted)
- **Zong, X.** and Vlachos, D. G. Uncertainty Quantification of Published Experimental Data for Structure-Sensitive Catalytic Reactions. (In preparation)
- Lym, J., **Zong, X.** and Vlachos, D. G. Automated Descriptor Selection and Volcano Curve Generation Using the DescMAP Software. (In preparation)
- Wu, X., Liu, W., Wu, H., **Zong, X.**, Yang, L., Wu, Y., Ren, Y., Shi, C., Wang, S. and Jiang, Z. (2018) Nanoporous ZIF-67 embedded polymers of intrinsic microporosity membranes with enhanced gas separation performance. *Journal of Membrane Science*.

Conference Presentations

- **Zong, X.** & Vlachos, D. G. Uncertainty Quantification of Catalyst Structure Effects on Kinetics, American Institute of Chemical Engineers (AIChE) Annual Meeting, Bostom, MA, November, 2021. Oral presentation.
- **Zong, X.** & Vlachos, D. G. Structure Effects on Microkinetic Modeling of Complete Methane Oxidation, American Chemical Society (ACS) Fall, August, 2021 (virtual). Oral presentation.
- **Zong, X.** & Vlachos, D. G. Experimental Data Variability in Heterogeneous Catalytic Reactions, American Institute of Chemical Engineers (AIChE) Annual Meeting, November, 2020 (virtual). Poster.

DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING

