



UNIVERSITY OF DELAWARE  
**ENGINEERING**

Department of Chemical & Biomolecular Engineering

# **DOCTORAL CANDIDATES & POSTDOCTORATES**

**Resume Booklet**  
(2018 - 2019)

University of Delaware



UNIVERSITY OF DELAWARE  
**ENGINEERING**

## **Department of Chemical & Biomolecular Engineering**

### **2018-2019 Resumes**

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January 2019

Dear Friends and Prospective Employers:

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 180 current graduate students, postdocs, and researchers in the department. The excellence of our education and scholarship is especially evident in the graduate program, which continues to be ranked as one of the top ten in the United States.

Students and faculty in the department are driving new research initiatives across the wide range of chemical engineering practice—from biomolecular engineering to energy production and sustainable chemistry. Our efforts include two USA Manufacturing Centers: The first, NIIMBL, is developing to advance the production of some of the most important emerging pharmaceuticals. The second, RAPID, has a major node at Delaware focused on process intensification. These two enterprises add to the strong interdisciplinary programs of the UD-NIST Center for Neutron Science, Delaware Energy Institute, Center for Molecular and Engineering Thermodynamics, Center for Catalytic Science and Technology, and the Center for Biomanufacturing Science and Technology.

Through these broad and often interdisciplinary efforts, as well as faculty hiring and student recruitment, we continue our work to make Chemical and Biomolecular Engineering at Delaware a premier educator of highly qualified doctoral and post-doctoral students. To learn more about these initiatives, the Department, our faculty and their research, and each of these students, I invite you to visit our web site [www.che.udel.edu](http://www.che.udel.edu).

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

The concept and format for the fourth-year research symposium originated with our graduate student organization, the Colburn Club. We are proud of their leadership and are grateful for the energy and creativity they bring to our community of engineering educators, learners, and scholars.

Sincerely,



Eric M. Furst  
Professor and Department Chair

# Daniel J. Beltran-Villegas, PhD

18 Timber Creek Ln.  
Newark • DE 19711  
Phone 443.253.6831 • [daniel.jose.beltran@gmail.com](mailto:daniel.jose.beltran@gmail.com)  
US Permanent Resident

## RESEARCH SCIENTIST

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- Scientific researcher with eleven years of experience in designing materials for novel applications through a combination of computer simulation and theory.
- Experience leading projects from inception to completion, including meeting short- and long-term goals, communicating with collaborators, clients, and wider audiences.
- My values include: drive to meet challenging goals, collaboration with expertise- and experience-diverse teams, commitment to growth, and, above all, ethics.
- My career goal is to become, in the medium-term, a team leader and, in the long-term, a world authority in designing and optimizing new consumer goods and materials.

## RESEARCH EXPERIENCE

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University of Delaware, Chemical & Biomolecular Engineering (2016-present):

- Studied block copolymer and nanoparticle micellization to optimize and control micelle size, shape, and content for cargo delivery and pollutant capture applications through multi-scale Molecular Dynamics simulations (LAMMPS). This work is published in the special edition on Machine Learning and Data Science in Materials Design.
- Computational reverse-engineering of neutron scattering experiments to determine micelle dimensions and polymer chain configurations through genetic algorithm use.

University of Michigan, Chemical Engineering (2012-2016)

- Studied anisotropic (Janus and Lock-Key pairs) particle assembly to design reconfigurable structures for cloaking applications by identifying relevant reaction coordinates and clustering particles according to their local orientation through Brownian Dynamic simulations (own FORTRAN code, HoomD-Blue).

Johns Hopkins University, Chemical & Biomolecular Engineering (2008-2012)

- Developed predictive stochastic dynamic models of colloidal particle assembly for advanced optical applications (photonics, inverse opals).
- Studied colloidal particle dynamics and developed methodologies to directly measure forces for general colloidal applications.

Texas A&M University, Chemical Engineering (2006-2007)

- Studied colloidal particle distributions to measure colloidal forces for general colloidal applications.

Universidad de los Andes, Chemical Engineering (1998-2006)

- Measured blowing agent (CFC's, HFC's) diffusion in polyurethane films to develop models to predict emissions from polyurethane foams.
- Designed an impaction aerosol particle sizer for environmental measurements.

## COMPUTATIONAL/SIMULATION SKILLS

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- Packages used: LAMMPS, HoomD-Blue, GROMACS
- Programming languages: FORTRAN, C++, Matlab, Office
- Scripting: bash, Python
- Windows, MacOS, and Unix-based high-performance computer cluster experience

## EDUCATION

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- Ph.D. Chemical & Biomolecular Engineering, Johns Hopkins University, Baltimore, MD (07/2012)
- M.S. Mechanical Engineering, Universidad de los Andes, Bogota, Colombia (07/2005)
- B.S. Chemical Engineering, Universidad de los Andes, Bogota, Colombia (03/2004)

## LEADERSHIP AND OUTREACH EXPERIENCE

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- Undergraduate Chemical Engineering Instructor, Universidad de los Andes, (2005-2006) (Introductory Chemical Engineering, Transport Phenomena, Modeling and Simulation)
- Undergraduate degree project advising, Universidad de los Andes (2006)
- Graduate, undergraduate and high school student supervising (2008-present)
- Graduate Instructor, Chemical Engineering, University of Michigan (2013-2015)
- Service co-chair, Graduate Student Liaison Committee (GSLC), Johns Hopkins University (2011)

## AWARDS

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- Victor K. LaMer Award for outstanding PhD thesis in colloid and surface chemistry (2014)
- ACS 86th Colloids and Interfacial Science Symposium, Langmuir Student Awards, 2nd place (out of 39 applicants) (2012)
- Paid Internship at Ozone Technical Unit (UTO), Environment Ministry, Colombia (2004-2005)
- Higher Education Quality Examination (ECAES), 5th overall place in Chemical Engineering in Colombia (out of 1073) (2003)

## SELECT PUBLICATIONS (OUT OF 25 PEER-REVIEWED JOURNAL ARTICLES)

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1. **Beltran-Villegas, D.J.**; Jayaraman, A., Assembly of Amphiphilic Block Copolymers and Nanoparticles in Solution: Coarse-Grained Molecular Simulation Study, (2018) *Journal of Chemical and Engineering Data*, In Press.
2. **Beltran-Villegas, D.J.**; Lyubimov, I.; Jayaraman, A., Molecular dynamics simulations and PRISM theory study of solutions of nanoparticles and triblock copolymers with solvophobic end blocks, (2018) *Molecular Systems Design & Engineering*, In Press.
3. De La Cruz-Araujo, R.A.; **Beltran-Villegas, D.J.**; Larson, R.G.; Córdova-Figueroa, U.M., Rich Janus colloid phase behavior under steady shear, (2016) *Soft Matter*. 12:4071-4081. (Cover Story)
4. Colón-Meléndez, L.\*; **Beltran-Villegas, D.J.\***; van Anders, G.; Liu, J.; Spellings, M.; Sacanna, S.; Pine, D.J.; Glotzer, S.C.; Larson, R.G.; Solomon, M.J., Binding Kinetics of Lock and Key Colloids, (2015) *Journal of Chemical Physics*, 142:174909
5. **Beltran-Villegas, D.J.**; Schultz, B.A.; Nguyen, N.H.P.; Glotzer, S.C.; Larson, R.G., Phase Behavior of Janus Colloids Determined by Sedimentation Equilibrium Brownian Dynamics, (2014) *Soft Matter*, 10:4593-4602. (Cover Story)
6. **Beltran-Villegas, D.J.**; Bevan, M.A., Free Energy Landscapes for Colloidal Crystal Assembly, (2011) *Soft Matter*, 7:3280-3285.
7. **Beltran-Villegas, D.J.**; Sehgal, R.M.; Maroudas, D.; Ford, D.M., Bevan, M.A., Fokker-Planck Analysis of Separation Dependent Potentials and Diffusion Coefficients in Simulated Microscopy Experiments, (2010) *J. Chem. Phys.*, 132:044707. (Editor's Choice)

## EDUCATION

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<b>University of Delaware</b> · Newark, DE	<b>2013 – 2018</b>
Ph.D. · Chemical and Biomolecular Engineering · Thesis advisor: Prof. Eleftherios T. Papoutsakis	
<b>North Carolina State University</b> · Raleigh, NC	<b>2010 – 2013</b>
B.S. · Chemical and Biomolecular Engineering · Summa cum laude · Biotechnology minor	
<b>Catawba Valley Community College</b> · Hickory, NC	<b>2008 – 2010</b>
A.S. · Chemistry	

## RESEARCH AND WORK EXPERIENCE

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<b>Postdoctoral Researcher</b>	<b>2018 – Present</b>
University of Delaware · Chemical and Biomolecular Engineering	
Principal Investigator: Prof. Eleftherios T. Papoutsakis	
<ul style="list-style-type: none"><li>- Lead an Advanced Research Projects Agency-Energy (ARPA-E) funded project to engineer synthetic <i>E. coli</i> methanotrophs and methylotrophs for the conversion of methane and methanol to more valuable liquid biofuels and chemicals</li><li>- Performed metabolic engineering and synthetic biology type research that involved <i>E. coli</i> strain construction (genetic modifications, plasmid construction), protein engineering (library construction, high-throughput screening), sequencing analysis (RNA-Seq., whole genome sequencing), and bench-scale bioreactor fermentations (including gas fermentation)</li><li>- Supervised and mentored a small group of researchers (PhD students, technicians, and undergraduates) from two Chemical Engineering labs at the University of Delaware</li><li>- Worked in close collaboration with Industrial Microbes (iMicrobes), a small biotechnology company in Emeryville, CA</li></ul>	
<b>Graduate Research Assistant</b>	<b>2013 – 2018</b>
University of Delaware · Chemical and Biomolecular Engineering	
Thesis advisor: Prof. Eleftherios T. Papoutsakis	
Thesis: “Engineering a Synthetic <i>Escherichia coli</i> Methylotroph for Conversion of Methanol to Fuels and Chemicals”	
<ul style="list-style-type: none"><li>- Performed genomic modifications (gene knockouts, knockins) and regulation of gene expression (RNA interference, metabolite responsive promoters)</li><li>- Applied molecular biology techniques for recombinant protein expression and characterization (plasmid construction, protein purification, enzymatic assays)</li><li>- Improved enzymatic function using protein engineering and high-throughput screening (library construction, FACS, sequencing)</li><li>- Performed adaptive laboratory evolution to improve engineered <i>E. coli</i> phenotypes</li><li>- Operated benchtop bioreactors for controlled <i>E. coli</i> fermentations (bioreactor sterilization, pH, DO monitoring)</li><li>- Performed sequencing of engineered and evolved <i>E. coli</i> strains (whole genome sequencing, RNA-Seq., qPCR)</li></ul>	
<b>Undergraduate Research Assistant</b>	<b>2012 – 2013</b>
North Carolina State University · Chemical and Biomolecular Engineering	
Advisor: Prof. Robert M. Kelly	
<ul style="list-style-type: none"><li>- Performed recombinant enzyme purification and characterization (protein chromatography, immunoblot analysis, enzymatic assays)</li><li>- Cultured hyperthermophilic organisms for degradation of lignocellulosic biomass and production of fuels and chemicals</li></ul>	
<b>Special Metals Welding Products Company</b>	<b>2011</b>
A Precision Castparts Corporation Company · Newton, NC	
<ul style="list-style-type: none"><li>- Full-time summer internship as a process engineer</li><li>- Contributed to the review and improvement of ultrasonic cleaning processes</li><li>- Performed tensile testing on wire specimens for process improvement</li></ul>	

## TEACHING EXPERIENCE

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<b>Graduate Teaching Assistant</b>	<b>2015</b>
University of Delaware · Chemical and Biomolecular Engineering	
Instructor: Prof. Prasad Dhurjati	
<ul style="list-style-type: none"><li>- Advised undergraduate seniors in Chemical Engineering Laboratory II: Fermentation and Bioseparation experiment</li><li>- Responsible for teaching bioreactor operation, microfiltration and chromatography to purify proteins upon complete fermentation</li></ul>	
<b>Undergraduate Teaching Assistant</b>	<b>2013</b>
North Carolina State University · Chemical and Biomolecular Engineering	
Instructor: Prof. Robert M. Kelly	
<ul style="list-style-type: none"><li>- Advised undergraduate seniors participating in Protein Purification Laboratory</li><li>- Responsible for teaching protein liquid chromatography and enzyme kinetics to purify and assay thermophilic enzymes</li></ul>	

## PUBLICATIONS AND PATENTS

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1. Diaz, C.A.C., **Bennett, R.K.**, Papoutsakis, E.T., Antoniewicz, M.R., 2018. Deletion of four genes in *Escherichia coli* enables preferential consumption of xylose and secretion of glucose. *Metabolic Engineering*, In Revision.
2. Charubin, K., **Bennett, R.K.**, Fast, A.G., Papoutsakis, E.T., 2018. Engineering *Clostridium* organisms as microbial cell-factories: challenges & opportunities. *Metabolic Engineering*, 50, 173-191.
3. **Bennett, R.K.**, Steinberg, L.M., Chen, W., Papoutsakis, E.T., 2018. Engineering the bioconversion of methane and methanol to fuels and chemicals in native and synthetic methylotrophs. *Current Opinion in Biotechnology*, 50, 81-93.
4. **Bennett, R.K.**, Gonzalez, J.E., Whitaker, W.B., Antoniewicz, M.R., Papoutsakis, E.T., 2018. Expression of heterologous non-oxidative pentose phosphate pathway from *Bacillus methanolicus* and phosphoglucose isomerase deletion improves methanol assimilation and metabolite production by a synthetic *Escherichia coli* methylotroph. *Metabolic Engineering*, 45, 75-85.
5. Gonzalez, J.E., **Bennett, R.K.**, Papoutsakis, E.T., Antoniewicz, M.R., 2018. Methanol assimilation in *Escherichia coli* is improved by co-utilization of threonine and deletion of leucine-responsive regulatory protein. *Metabolic Engineering*, 45, 67-74.

- Whitaker, W.B., Jones, J.A., **Bennett, R.K.**, Gonzalez, J.E., Vernacchio, V.R., Collins, S.M., Palmer, M.A., Schmidt, S., Antoniewicz, M.R., Koffas, M.A., Papoutsakis, E.T., 2017. Engineering the biological conversion of methanol to specialty chemicals in *Escherichia coli*. *Metabolic Engineering*, 39, 49-59.
- Whitaker, W.B., Sandoval, N.R., **Bennett, R.K.**, Fast, A.G., Papoutsakis, E.T., 2015. Synthetic methylotrophy: engineering the production of biofuels and chemicals based on the biology of aerobic methanol utilization. *Current Opinion in Biotechnology*, 33, 165-175.
- Hawkins, A.S., Han, Y., **Bennett, R.K.**, Adams, M.W., Kelly, R.M., 2013. Role of 4-hydroxybutyrate-CoA synthetase in the CO<sub>2</sub> fixation cycle in thermoacidophilic archaea. *Journal of Biological Chemistry*, 288(6), 4012-4022.
- Papoutsakis, E.T., Nicolaou, S., Fast, A.G., Falara, V., **Bennett, R.K.**, Whitaker, W.B., Sandoval, N.R., Gonzalez, J.E., Antoniewicz, M.R., 2018. Synthetic methylotrophy to liquid fuels and chemicals. U.S. Patent No. US 10,059,920 B2.
- Papoutsakis, E.T., **Bennett, R.K.**, Gonzalez, J.E., Whitaker, W.B., Antoniewicz, M.R., 2018. Synthetic methylotrophs and uses thereof. International Publication No. WO 2018/148703 A1. International Application No. PCT/US2018/017913.
- Papoutsakis, E.T., Whitaker, W.B., **Bennett, R.K.**, 2017. Synthetic methylotrophs. International Publication No. WO 2017/123930 A1. International Application No. PCT/US2017/013413.

## PRESENTATIONS

- Bennett, R.K.**, Papoutsakis, E.T. Engineering a Synthetic Methanol Utilization Pathway in *Escherichia coli* for Examining Metabolic Bottlenecks Associated with Developing Synthetic Methylotrophs. *AIChE Annual Meeting*, 2018. Pittsburgh, PA. (Oral)
- Bennett, R.K.**, Gonzalez, J.E., Antoniewicz, M.R., Papoutsakis, E.T., Greenfield, D., Clarke, L., Helman, N., Jones, S., Hestmark, K., Zhu, B. Engineering Phenotypic Improvements of Synthetic *Escherichia coli* Methylotrophs through Metabolics Engineering and Directed Evolution. *Metabolic Engineering 12*, 2018. Munich, Germany. (Poster)
- Bennett, R.K.**, Gonzalez, J.E., Rohllhill, J., Hagel, B.V., Har, G., Agee, A., Antoniewicz, M.R., Greenfield, D., Clarke, L., Helman, N., Jones, S., Hestmark, K., Zhu, B., Papoutsakis, E.T. Synthetic Methylotrophy: From Methane & Methanol to Liquid Fuels & Chemicals. *ARPA-E Energy Innovation Summit*, 2018. Washington, D.C. (Poster)
- Bennett, R.K.**, Gonzalez, J.E., Antoniewicz, M.R., Papoutsakis, E.T. Synthetic Methylotrophy: Engineering Methanol Metabolism in a Nonnative Host. *Biochemical and Molecular Engineering XX*, 2017. Newport Beach, CA. (Poster)
- Bennett, R.K.**, Gonzalez, J.E., Rohllhill, J., Hagel, B.V., Whitaker, W.B., Falara, V., Jones, J.A., Sandoval, N.R., Price, V., Koffas, M.A., Antoniewicz, M.R., Chen, W., Papoutsakis, E.T. Synthetic Methylotrophy: Engineering *Escherichia coli* for Methanol Metabolism. *ARPA-E Energy Innovation Summit*, 2017. Washington, D.C. (Poster)
- Gonzalez, J.E., **Bennett, R.K.**, Rohllhill, J., Hagel, B.V., Whitaker, W.B., Falara, V., Jones, J.A., Sandoval, N.R., Price, V., Koffas, M.A., Antoniewicz, M.R., Chen, W., Papoutsakis, E.T. Investigating the Importance of Amino Acid Metabolism in Synthetic Methylotrophy. *ARPA-E Energy Innovation Summit*, 2017. Washington, D.C. (Poster)
- Bennett, R.K.**, Gonzalez, J.E., Koffas, M.A., Antoniewicz, M.R., Chen, W., Papoutsakis, E.T. Synthetic Methylotrophy: Engineering *Escherichia coli* for Methanol Metabolism. *ARPA-E REMOTE Annual Meeting*, 2017. Houston, TX. (Oral)
- Bennett, R.K.**, Gonzalez, J.E., Rohllhill, J., Hagel, B.V., Whitaker, W.B., Falara, V., Jones, J.A., Sandoval, N.R., Price, V., Koffas, M.A., Antoniewicz, M.R., Chen, W., Papoutsakis, E.T. Synthetic Methylotrophy: Engineering *Escherichia coli* for Methanol Metabolism. *ARPA-E REMOTE Annual Meeting*, 2017. Houston, TX. (Poster)
- Gonzalez, J.E., **Bennett, R.K.**, Rohllhill, J., Hagel, B.V., Whitaker, W.B., Falara, V., Jones, J.A., Sandoval, N.R., Price, V., Koffas, M.A., Antoniewicz, M.R., Chen, W., Papoutsakis, E.T. Investigating the Importance of Amino Acid Metabolism in Synthetic Methylotrophy. *ARPA-E REMOTE Annual Meeting*, 2017. Houston, TX. (Poster)
- Bennett, R.K.**, Sandoval, N.R., Papoutsakis, E.T. Identifying NAD-Dependent Methanol Dehydrogenases for Synthetic Methylotrophy. *AIChE Annual Meeting*, 2016. San Francisco, CA. (Poster)
- Bennett, R.K.**, Sandoval, N.R., Papoutsakis, E.T. Identifying NAD-Dependent Methanol Dehydrogenases for Synthetic Methylotrophy. *Metabolic Engineering 11*, 2016. Awaji Island, Japan. (Poster)
- Whitaker, W.B., **Bennett, R.K.**, Falara, V., Sandoval, N.R., Price, V., Palmer, M.A., Gonzalez, J.E., Jones, J.A., Antoniewicz, M.R., Koffas, M.A., Chen, W., Papoutsakis, E.T. Engineering Synthetic Methylotrophy for Liquid Fuel Production: Engineering Growth of *E. coli* on Methanol. *UD Microbial Systems Symposium*, 2016. Newark, DE. (Poster)
- Bennett, R.K.**, Papoutsakis, E.T. Synthetic Methylotrophy: Engineering *Escherichia coli* for Biofuel Production. *UD Winter Research Review*, 2016. Newark, DE. (Poster)
- Whitaker, W.B., **Bennett, R.K.**, Chen, L., Steinberg, L., Falara, V., Sandoval, N.R., Price, V., Raeszadeh, M., Dong, M., Gonzalez, J.E., Jones, J.A., Antoniewicz, M.R., Bahnson, B., Koffas, M.A., Chen, W., Papoutsakis, E.T. Synthetic Methylotrophy to Liquid Fuel. *ARPA-E REMOTE Annual Meeting*, 2015. San Diego, CA. (Poster)

## HONORS AND AWARDS

- Poster Award (Runner-Up) · <i>Metabolic Engineering 12</i>	2018
- Robert L. Pigford Teaching Assistant Award · <i>UD</i>	2016
- Dean's List · <i>NCSU</i>	2010 – 2013
- College of Engineering Scholarship · <i>NCSU</i>	2010 – 2012
- Excellence in Organic Chemistry Award · <i>CVCC</i>	2010
- High Honor Graduate · <i>CVCC</i>	2010
- Rotaract Club Scholarship · <i>CVCC</i>	2008 – 2010

## ORGANIZATIONS AND OUTREACH

- Graduate Recruiting Volunteer · <i>UD</i>	2015, 2016
- American Institute of Chemical Engineers	2010 – 2018
- Society for Biological Engineering	2016 – 2018
- Golden Key International Honour Society	2012 – 2013
- Gainesville State College Annual Mathematics Tournament	2009, 2010
- Rotaract Club	2008 – 2010

# Casper Brady

Department of Chemical & Biomolecular Engineering, University of Delaware  
150 Academy Street • Colburn Laboratory • Newark, Delaware, 19716

[cbrady@udel.edu](mailto:cbrady@udel.edu)

## Education

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<b>University of Delaware</b>	<b>Newark, DE</b>
• PhD Chemical Engineering	2015 – Present
<b>New Mexico Institute of Mining and Technology</b>	<b>Socorro, NM</b>
• B.S. Chemical Engineering with Highest Honors	2011 – 2015

## Research Experience

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<b>Graduate Research Assistant</b>	<b>2015 - Present</b>
<i>Xu Research Group</i> , University of Delaware	<b>Newark, DE</b>

### Advised by Dr. Bingjun Xu

- Studied coupling dehydrogenation of light alkanes to selective hydrogen oxidation via chemical looping for above equilibrium dehydrogenation conversion.
- Developed a sulfur resilient catalyst for steam reforming of jet fuels.
- Designed and validated a novel one-vessel reactor system for the  $\text{Na}_2\text{CO}_3\text{-MnO}_x$  thermochemical water splitting cycle.
- Constructed, wrote LabView code for, and assembled physical electronics for five high temperature microreactors, two catalyst prep furnaces, and a solid oxide fuel cell test rig.

<b>Research Intern</b>	<b>May 2014 – Aug. 2015</b>
<i>Diagnostic Science and Engineering Group</i> , Sandia National Laboratories	<b>Albuquerque, NM</b>

### Advised by Lisa Mondy, and Dr. Christine Roberts

- Elucidated model parameters for dynamic multi-phase polyurethane foam mold filling models via kinetic, pulsed pressurization and high-speed imaging experiments of reacting foams.
- Populated a global model of polyurethane mold filling via combined analysis of high-speed imaging, rheologic, calorimetric and ATR-FTIR data.
- Developed LabView and Matlab programs for data collection during foam mold filling experiments and image analysis of the dynamic structure of reacting foams.

<b>Undergraduate Research Assistant</b>	<b>Oct. 2013 - May 2014</b>
<i>Department of Biology</i> , New Mexico Institute of Mining and Technology	<b>Socorro, NM</b>

### Advised by Dr. Snezna Rogelj

- Synthesized gold nanoparticles for use in colorimetric assays.
- Tested colorimetric assays for detection of endocrine disrupting compounds using gold nanoparticles and aptamers.

<b>Research Intern</b>	<b>May 2013 – Aug. 2013</b>
<i>Repository Performance Group</i> , Sandia National Laboratories	<b>Carlsbad, NM</b>

- Contributed to virial thermodynamic models of complex high salinity brines via anoxic liquid phase equilibration tests.
- Performed analysis of brines via ICP-AES and organic carbon combustion analysis.



## Teaching Experience

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### Graduate Teaching Assistant:

Spring 2017

- CHEG 345: Chemical Engineering Laboratory I
  - Supervised undergraduate students in performing batch kinetic studies on the iodination of acetone.
  - Guided undergraduate students in fitting kinetic data, error analysis, and Aspen simulations.

## Publications

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M.J. Gilkey, **C. Brady**, D.G. Vlachos, B. Xu, *Characterization of Oxidation States in Metal/Metal Oxide Catalysts in Liquid-Phase Hydrodeoxygenation Reactions with a Trickle Bed Reactor*, Industrial & Engineering Chemistry Research 57 (2018) 5591-5598.

**C. Brady**, B. Murphy, B. Xu, *Enhanced Methane Dehydroaromatization via Coupling with Chemical Looping*, ACS Catalysis 7 (2017) 3924-3928.

L. Mondy, **C. Brady**, M. Soehnel, C. Roberts, B. Shelden, R. Rao, M. Celina, N. Giron, K. Long, E. Russick *Experiments to Populate and Validate a Processing Model for Polyurethane Foam: Additional Data for Structural Foams*, Sandia National Laboratories, SAND2015-0538.

## Presentations (Presenter Underlined)

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**C. Brady**, X. Chang, E. Steinman, S. Du, B. Xu, *Natural Gas Upgrading via Coupling of Dehydrogenation with Chemical Looping*, Presented at RAPID Poster Session at the AIChE Annual Meeting, Pittsburgh, PA, October, 2018 (Poster)

**C. Brady**, B. Xu, *Activating Methane by Combining Dehydroaromatization with Chemical Looping*, Presented at the North American Catalysis Society 25<sup>th</sup> Meeting, Denver, CO, June 2017 (Poster)

**C. Brady**, G. Soehnel, M. Soehnel, B. Shelden, C. Roberts, L.A. Mondy, *Experiments to Interrogate Polyurethane Foam Bubble Growth*, Presented at The Society of Rheology 86th Annual Meeting, Philadelphia, PA, October, 2014 (Poster)

## Expertise

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**Research:** Zeolite catalysis, Metal oxide redox chemistry, Heterogenous catalysis for light alkane upgrading, Thermochemical water splitting.

**Experimental:** Gas phase flow microreactor design, construction, and control, online gas chromatography, online mass spectrometry, LabView programming.

## Proficiencies

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**Materials Synthesis & Characterization:** Hydrothermal zeolite synthesis, Perovskite synthesis (sol gel combustion and reactive sintering), FTIR Spectroscopy (in vacuo transmission and diffuse reflectance), Glove box work, XRD, XPS, Pulsed chemisorption, Solid oxide fuel cell fabrication.

**Programming, Simulation and Prototyping:** Matlab, Aspen, ChemCad, Python, AutoCad, Automated image analysis, Basic vacuum chamber maintenance and operation, Basic circuit design and fabrication, 3D Printing.

# Kamil Charubin

123 Arielle Drive  
Newark, DE 19711  
(860) 356-6298  
[kamilcha@udel.edu](mailto:kamilcha@udel.edu)

## Education

***Ph.D. Candidate, Chemical Engineering*** ***2015 – Present***  
University of Delaware, Newark DE  
Overall GPA: 3.96/4.00

***B.S. Chemical Engineering*** ***2010 – 2015***  
***Minor: Molecular and Cell Biology***  
University of Connecticut, Storrs CT  
Overall GPA: 3.95/4.00

## Research Experience

***Ph.D. Candidate, Papoutsakis Lab*** ***2015 – Present***  
Principal Investigator: Dr. E. Terry Papoutsakis  
University of Delaware, Newark DE

- Studying synthetic co-cultures of bacteria from the *Clostridium* genus for improved production of biofuels and commodity chemicals.
- Experience with bacterial cell culture (aerobic and anaerobic), cloning (*E. coli*, *Clostridia*), bacterial fermentations, microscopy, flow cytometry, GC-MS, HPLC.

***Undergraduate Research Assistant, Nieh Laboratory*** ***2013 – 2015***  
Principal Investigator: Dr. Mu-Ping Nieh  
University of Connecticut, Storrs CT

- Studied the stability of phospholipid-based liposomes and nanodiscs by examining the rate of spontaneous lipid transfer between well-defined nanoparticles.
- Experience with DSC, DLS, and fluorescence spectroscopy.

## Publications

**Charubin K.**, and Papoutsakis E.T. *Direct cell-to-cell exchange of matter in a synthetic Clostridium syntrophy enables CO<sub>2</sub> fixation, superior metabolite yield, and an expanded metabolic space.* Metabolic Engineering, 2018.

**Charubin K.**, Bennett R.K., Fast A.G, Papoutsakis E.T. *Engineering Clostridium organisms as microbial cell-factories: challenges & opportunities.* Metabolic Engineering, 2018.

Xia Y., **Charubin K.**, Marquardt D., Heberle F.A., Katsaras J., Tian J., Cheng X., Liu Y., Nieh M.P. *Morphology-Induced Defects Enhance Lipid Transfer Rates.* Langmuir, 2016.

Xia Y., Li M., **Charubin K.**, Liu Y., Heberle F.A., Katsaras J., Jing B., Zhu Y., Nieh M.P. *Effects of nanoparticle morphology and acyl chain length on spontaneous lipid transfer rates.* Langmuir, 2015.

## **Patents**

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International Patent: PCT/US17/48176. E.T. Papoutsakis, K. Charubin, A. Mitkas, (08/30/2017). *Synthetic Co-cultures and Uses Thereof.*

## **Presentations**

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**Charubin K.**, Papoutsakis E.T. *Investigation of unique interspecies interactions in a synthetic and syntrophic Clostridium co-culture.* 2018 Annual AIChE Meeting, Pittsburgh PA. Oral Presentation.

**Charubin K.**, Papoutsakis E.T. *Improved Fermentation Performance with a Synthetic & Syntrophic Clostridium Co-culture.* 2018 Metabolic Engineering 12, Munich Germany. Poster.

**Charubin K.**, Papoutsakis E.T. *Alcohol Production Using a CO<sub>2</sub>-Fixing Synthetic Clostridium Co-culture.* 2017 Annual AIChE Meeting, Minneapolis MN. Oral Presentation.

**Charubin K.**, Papoutsakis E.T. *Solvent Production using CO<sub>2</sub> - Fixing Synthetic Clostridium Co-culture.* 2016 Clostridium XIV Conference, Hannover NH. Poster.

## **Volunteering and Other**

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***Algebra Tutor*** **2017 – 2018**

Shue-Medill Middle School, Newark DE

- Tutored algebra to 6<sup>th</sup> grade students at a local middle school.

***Sussex County Science Night*** (hosted by DBI) **2016**

Millsboro Middle School, Millsboro DE

- Supervised middle school students during a hands-on strawberry DNA extraction activity.
- Discussed current trends and issues in biotechnology with students and parents.

***Math Tutor, Quantitative Learning Center*** **2014 – 2015**

University of Connecticut, Storrs CT

- Tutored undergraduate students in multiple subjects such as Business Math, Calculus (I, II, Multivariable), and Differential Equations.

***Mentor, UCONN Mentor Connection Program*** **2014**

University of Connecticut, Storrs CT

- Supervised 3 high-school students during their summer research project.
- Taught high school students the principles and the correct operation of DSC and DLS instruments.

# (Lily) Ziwei Cheng

200 W Creek Village Dr., Apt. F3, Elkton, MD 21921

Phone: (302)-290-2989, Email: lzcheng@udel.edu

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## PROFESSIONAL SUMMARY

Four years' expertise in analytical methods development, heterogeneous catalysis, biomass conversion, and material characterization. Research experience in batch and flow reactor operations, analytical chemistry and catalyst synthesis.

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## EDUCATION

**Ph.D. Candidate (Chemical Engineering), University of Delaware, Newark, DE** *August 2014-Present*

Advisor: Prof. Dionisios G. Vlachos

GPA: 3.25/4.00

**B.S. (Chemical and Engineering), Georgia Institute of Technology, Atlanta, GA** *August 2011-May 2014*

Advisor: Prof. Charles A. Eckert

GPA: 3.70/4.00

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## RESEARCH EXPERIENCE

**Graduate Research Assistant, University of Delaware, Newark, DE** *August 2014-July 2019*

**Thesis project: Valorization of Biomass-derived Humins**

- Investigated for the first time the effects of solvent properties on humins dissolution
- Developed the first analytical methods to determine molecular weights and analyze macromolecular structure
- Measured particle size, growth rate and morphology of nucleating and growing humins using X-ray and dynamic light scattering
- Converted humins to valuable chemicals through catalytic hydrotreatment

**Thesis project: Process Intensification for the Conversion of Biomass to Renewable Chemicals**

- Compared glucose dehydration to 5-hydroxymethylfurfural (HMF) in batch, flow and microwave reactors
- Synthesized hydrophobic metal on carbon catalysts for dimethylfuran production
- Characterized the hydrophilicity of carbon, metal oxide and zeolite materials

**Undergraduate Research Assistant, Georgia Institute of Technology, Atlanta, GA** *January 2013-May 2014*

**Project: Suzuki Coupling of Basic Nitrogen-containing Substrates**

- Optimized reaction conditions for best yield by varying temperature, pH, CO<sub>2</sub> and salt addition

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## SKILLS

Analytical methods development

Mass Spectrometry (LC/MS, GC/MS, ESI-MS, MALDI-ToF)

Liquid Chromatography (HPLC, GPC/SEC)

Gas Chromatography (GC-FID/TCD)

Catalyst synthesis

Small angle neutron/X-ray scattering, XRD

Light scattering (SLS, DLS)

SOP and proposal writing

Batch, flow and microwave reactor operations

Adsorption/surface area analysis/Porosimetry

X-ray Photocorrelation Spectroscopy

FT-IR, NMR, UV-Vis, Elemental analysis, XRF

TGA, DSC

Titration (Karl-Fischer)

AspenPlus, MATLAB, IgorPro, Minitab

Microsoft Office, OriginLab, ChemDraw

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## Certificates

Engineering Intern (E.I.T.)

*January 2017*

## AWARDS

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Thomas L. Gossage International Enrichment Scholarship *May 2014*

## ACTIVITIES

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Mentor with Colburn Club *September 2018-Present*

Lab Safety Committee Member *March 2018-Present*

Vice president at Georgia Tech Ballroom Dance Club *January 2014-May 2014*

## TEACHING EXPERIENCE

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**Teaching Assistant, Topics in Energy and the Environment** *September 2017- December 2017*

- Critiqued essays and provide personalized feedback for 20 students
- Evaluated 2 oral presentations per student

**Teaching Assistant, Introduction to Chemical Engineering** *February 2017- May 2017*

- Facilitated in-class discussions for 120 students
- Led weekly office hours
- Graded four quizzes and one homework

## PRESENTATIONS

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**Structural Analysis of Humins Formed in the Brønsted-Catalyzed Dehydration of Fructose** *November 2017*

Oral presentation, AIChE Annual Meeting

**Catalytic Hydrotreatment of Humins in Methanol over a Rh/C Catalyst** *November 2017*

Poster presentation, Catalysis Club of Philadelphia Annual Student Poster Contest

**Structural Analysis of Humins Formed in the Brønsted-Catalyzed Dehydration of Fructose** *June 2017*

Poster presentation, North American Catalysis Society Meeting

## ACCEPTED PROPOSALS

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Mechanistic Study of Humins Formation and Growth *February 2017*

Cheng, Z.; Vlachos, D. G., Argonne National Lab APS Proposal ID# 50977, 2 days on Ultra Small Angle X-ray Scattering Instrument

## PUBLICATIONS

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1. Cheng, Z.; Liu, S.; Saha, B.; Vlachos, D.G., Catalytic Hydrotreatment of Humins to Bio-oil in Methanol over Supported Metal Catalysts. **ChemSuSChem**. DOI: 10.1002/cssc.201801535.
2. Cheng, Z.; Everhart, J.; Tsilomelekis, G.; Nikolakis, V.; Saha, B.; Vlachos, D.G., *Structural Analysis of Humins Formed in the Brønsted Acid-Catalyzed Dehydration of Fructose*, **Green Chemistry**, 2018, 20, pp 997 – 1006. **Cover Art**.
3. Liu, S.; Dutta, S.; Zheng, W.; Gould, N. S.; Cheng, Z.; Xu, B.; Saha, B.; Vlachos, D. G., *Catalytic Hydrodeoxygenation of High Carbon Furylmethanes to Renewable Jet-fuel Ranged Alkanes over a Rhenium Modified Iridium Catalyst*. **ChemSusChem**, 2017, 10, pp 3225-3234. **Cover Art**.
4. Wang, C.; Wiener, C. G.; Cheng, Z.; Vogt, B. D.; Weiss, R. A., *Modulation of the Mechanical Properties of Hydrophobically Modified Supramolecular Hydrogels by Surfactant-Driven Structural Rearrangement*. **Macromolecules**, 2016, 49 (23), pp 9228–9238.
5. Tsilomelekis, G.; Orella, M. J.; Lin, Z.; Cheng, Z.; Zheng, W.; Nikolakis, V.; Vlachos, D. G., *Molecular Structure, Morphology and Growth Mechanisms and Rates of 5-hydroxymethyl furfural (HMF) Derived Humins*, **Green Chemistry**, 2016,18 (7), pp1983-1993.
6. Senter, C; Rumble, A; Medina-Ramos, W; Houle, D; Cheng, Z; Gelbaum, C; Fisk, J; Holden, B; Pollet, P; Eckert, C.A., *The Effects of CO<sub>2</sub> Pressure and pH on the Suzuki Coupling of Basic Nitrogen Containing Substrates*, **Organic & Biomolecular Chemistry**, 2014, 12 (38), pp 7598-7602.

## Kimberly A. Dennis

345 McFarland Drive  
Newark, DE 19702

704-280-3092  
kadennis@udel.edu

### EDUCATION

Ph.D. Candidate, Chemical Engineering, May 2020  
MChE., Chemical Engineering, May 2018  
University of Delaware, Newark, DE

B.S., Chemical Engineering, Minor in Spanish, May 2015  
*Magna cum laude*  
North Carolina State University, Raleigh, NC

### RESEARCH EXPERIENCE

#### Department of Chemical and Biomolecular Engineering, UD

Advisor: Eric M. Furst

Graduate Research Assistant

08/2015-present

- **Thesis:** Industrial applications of diffusing wave spectroscopy
- Developed and validated novel pressure cell for high-pressure light scattering measurements
- Developed setup for paint drying light scattering measurements
- Performed passive microrheology experiments on polymer solutions and colloidal suspensions

#### Department of Chemical and Biomolecular Engineering, NCSU

Advisors: Peter S. Fedkiw and Saad A. Khan

Research Assistant

05/2015-07/2015

Undergraduate Research Assistant

05/2013-05/2015

- Investigated galactomannans as silicon anode binders for novel polymer composites
- Electrospun polyacrylonitrile, graphene oxide, and tin (IV) chloride to create new structures to improve lithium-ion battery performance
- Assembled half-cells and analyzed electrochemical performance
- Performed polymer rheology

#### National Science Foundation Polymer REU, Colorado School of Mines

Advisor: Keith B. Neeves

Research Intern

05/2014-07/2014

- Performed microfluidic flow assays using whole blood to analyze clot growth and deformation
- Micropatterned type 1 fibrillar collagen
- Analyzed flow formed clots using confocal microscopy and ImageJ software

### PUBLICATIONS

M.K Dufficy, **K.A. Dennis**, P.S. Fedkiw, S.A. Khan, Guar hydrogel binders for silicon nanoparticle anodes: a case study of binder rheology on electrode performance, 2019 (in preparation).

M. Lehmann, A.M. Wallbank, **K.A. Dennis**, A.R. Wufsus, K.M. Davis, K. Rana, K.B. Neeves, On-chip recalcification of citrated whole blood using a microfluidic herringbone mixer. *Biomicrofluidics*, 2015, 9(6): 064106.

### SELECTED PRESENTATIONS

**K.A. Dennis**, Y. Gao, A. Phatak, E.M. Furst, High-pressure linear viscoelasticity measurements of polymer solutions and gels, *The Society of Rheology 90th Annual Meeting*, 2018, Houston, TX.

**K.A. Dennis**, Y. Gao, A. Phatak, E.M. Furst, High-pressure linear viscoelasticity measurements of polymer solutions and gels, *20th Mid-Atlantic Soft Matter Workshop*, 2018, Washington, DC.

**K.A. Dennis**, Y. Gao, A. Phatak, E.M. Furst, High-pressure linear viscoelasticity measurements of polymer solutions and gels, *American Chemical Society: Colloid and Surface Science Symposium*, 2018, State College, PA.

**K.A. Dennis**, Y. Gao, A. Phatak, E.M. Furst, High-pressure linear viscoelasticity measurements of polymer solutions and gels, *Gordon Research Seminar and Conference*, 2018, Ventura, CA. (Poster)

**K.A. Dennis**, Y. Gao, A. Phatak, E.M. Furst, High-pressure linear viscoelasticity measurements of polymer solutions and gels, *The Society of Rheology 89th Annual Meeting*, 2017, Denver, CO.

## TEACHING EXPERIENCE

### Department of Chemical and Biomolecular Engineering, UD

CHEG 600 Graduate Teaching Assistant Fall 2018

- Assisted Prof. Thomas Epps in Introduction to Polymer Science and Engineering
- Gave 2 lectures on step polymerization equations and glass transition temperature
- Developed weekly homework solutions and rubrics
- Graded homework each week
- Held office hours for 1.5 hours/week

CHEG 304 Graduate Teaching Assistant Spring 2018

- Assisted Profs. Doug Buttrey and Josh Enszer in Random Variability in Chemical Processes
- Developed weekly homework solutions and rubrics
- Held office hours for 2 hours/week
- Supervised 4 homework graders

## WORK EXPERIENCE

### University Tutorial Center, NCSU

Tutor Mentor 08/2012-11/2014

- Supervised tutors by observing tutoring sessions and co-leading group training meetings for 1-8 hour(s)/week

Tutor 08/2011-11/2014

- Tutored students in chemistry by meeting for 2-4 hours/week

Summer Start Peer Coordinator 07/2012, 07/2013

- Aided professional staff by observing tutoring sessions and supervising tutors for 20 hours/week

## ACTIVITIES AND OUTREACH

Gordon Research Seminar (GRS) Chair 02/2020

- Elected graduate student chair of 2020 GRS: Colloidal, Macromolecular and Polyelectrolyte Solutions

Fusion Running Club 11/2018-present

- Participated and volunteered in local running races

New Castle County science fair judge 03/2018

- Judged high school chemistry posters and middle school best of show

Research Mentor 02/2018-08/2018

- Mentored and trained undergraduate student and 2018 Summer Scholar in rheometry and passive microrheology

Member of the Society of Rheology 01/2017-present

EmPOWER Program 09/2016-present

Lead Mentor 09/2018-present

Mentor 09/2017-present

- Founding member of **Empathetic Peers Offering Wisdom, Encouragement, and Resources**
- Worked with team to create low-barrier peer-support group for graduate students
- Received 7 hours of training in active listening, de-escalation, and suicide prevention
- Organized departmental seminars on mindfulness and public speaking
- Mentored 3 first year chemical engineering graduate students each year

AiChE Liaison 09/2016-08/2018

- Facilitated interaction between graduate and undergraduate students
- Hosted graduate school and research panels for undergraduate students

## HONORS AND AWARDS

First Place in 2018 Environmental Health and Safety Poster Competition

Society of Rheology Travel Grant for 89th Annual Meeting in Denver, CO

Member of University Scholars Program and Omega Chi Epsilon

Dean's List: Fall 2010-Fall 2014

# PIERRE DESIR

310 East Park Place, Newark, DE 19711  
(347) 948-2684 | [pdesir@udel.edu](mailto:pdesir@udel.edu)

## EDUCATION

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**University of Delaware**, 2015 – present

Ph.D. candidate, Chemical and Biomolecular Engineering

Thesis Advisor: Prof. Dionisios G. Vlachos

**CUNY City College of New York**, 2012 – 2015

GPA 3.89

B.E., Chemical and Biomolecular Engineering

Summa cum laude: minor in Math and concentration in Nuclear Engineering

**St. Francis College**, 2010 – 2011

GPA 3.84

Major: Chemistry

## RESEARCH AND WORK EXPERIENCE

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**Graduate Research Assistant**, *University of Delaware*, 2015 – present

Thesis Advisor: Prof. Dionisios G. Vlachos

Thesis Title: “Microreaction Engineering for Process Intensification in Biomass Processing”

- Designed and characterized single-phase and multiphase continuous flow microreactors for process intensification in the fast production of a platform chemical, 5-hydroxymethyl furfural (HMF)
- Optimized the HMF yield from fructose with an increase in productivity by a factor of  $\times 10 - 1000$  in an in-house built flow microreactor with millisecond-scale mixing at 4 s reaction time

**Research & Development Intern**, *Life-Glo Company*, June 2015 – Aug 2015

- Directed and managed a group of 4 interns in lab safety and development of experimental procedures
- Designed and synthesized a chemically reactive paint exploiting the chemiluminescence of peroxyoxalates
- Designed and built a lab-scale sparger reactor to analyze and quantify the chemiluminescence reaction between luminol and cigarette smoke

**Undergraduate Researcher**, *CUNY City College of New York*, 2013 – 2015

Research Advisor: Dr. Raymond Tu

- Synthesized surfactant stabilized microbubbles for drug delivery with an average diameter size of 580 nanometers
- Designed amphiphilic alpha-helical peptides mimicking biological transmembrane proteins to stabilize the lipid monolayer of microbubbles
- Developed a method of characterizing the size distribution of nano-scaled bubbles using a Particle Laser Scattering Analyzer

## TEACHING EXPERIENCE

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**Graduate Teaching Assistant**, *University of Delaware*, Aug 2017 – May 2018

- Organized and directed help sessions for groups of undergraduate sophomore students in Chemical Engineering at the University of Delaware focusing on Classical Thermodynamics (Thermo I and II)



- Graded weekly homework and term projects for a group of 84 - 90 undergraduate students
- Held training courses on Matlab coding of phase equilibrium and Aspen simulations of separation processes

## SKILLS

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- Single and multiphase capillary microreactor design and optimization
- Kinetic and reactor modeling in Matlab
- Confocal microscopy imaging for microfluidic flow characterization
- Product quantification by High Pressure Liquid Chromatography (HPLC)
- Tensiometry measurements using a Langmuir-Blodgett Trough
- Analysis of peptide secondary structure via Circular Dichroism
- Particle Laser Scattering
- Strong skills in Microsoft Word, Excel, PowerPoint

## LEADERSHIP EXPERIENCE

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**Graduate Student Chapter Secretary, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE), 2016 – 2017**

- Organized monthly seminars where industry and academia speakers gave professional development talks to minority graduate students in the Chemistry and Chemical and Biomolecular Engineering departments at the University of Delaware

**Vice-President, Omega Chi Epsilon Lambda Chapter, 2014 – 2015**

- Organized detailed budget for chapter events and wrote proposals to request funding for club activities
- Designed a set of scientific experiments to promote STEM learning to a group of 33 minority students from the Bronx Park Middle School

## SELECTED AWARDS

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- Second Place Winner at the 2014 Materials Research Society Fall Meeting Undergraduate Poster Competition, Boston, MA, December 2014
- First Place Winner in the Materials Engineering and Sciences, Group II, at the 2014 AIChE Undergraduate Poster Competition, Atlanta, GA, November 2014

## SELECTED ORAL PRESENTATIONS

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- **Pierre Desir** (2017), "*Process Intensification for the Aqueous Phase Dehydration of Biomass-derived Carbohydrates*", AIChE 2017 Annual Meeting, Minneapolis, MN, October 2017 (oral)
- **Pierre Desir** (2018), "*Two-Phase Microreactor Design for the Reactive Extraction of Biomass Derivatives*", AIChE 2018 Annual Meeting, Pittsburgh, PA, October 2018 (oral)

## PUBLICATIONS

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- Joseph V. Badami, **Pierre Desir**, Raymond S. Tu, "*Integration of Surface-Active, Periodically Sequenced Peptides into Lipid-Based Microbubbles*". *Langmuir*, **2014**, 30 (29), pp 8839–8847. Publication Date (Web): July 2, 2014
- **Pierre Desir**, Basudeb Saha, Dionisios G. Vlachos, "*Ultrafast Flow Chemistry for the Acid-Catalyzed Conversion of Fructose*". *In Review*, **2018**

# Camil A. C. Diaz

[cacdiaz@udel.edu](mailto:cacdiaz@udel.edu) • 150 Academy St, Newark, DE 19716 • (302) 831-8960

**SUMMARY** I seek to leverage my background in metabolic engineering and modeling microbial metabolism to develop sustainable, bio-based chemicals for commercial and agricultural applications.

## EDUCATION

Ph.D. Candidate, Chemical and Biomolecular Engineering 2014 – present  
University of Delaware

B.S. Chemical Engineering, Honors Program 2009 – 2013  
Stanford University

## RESEARCH EXPERIENCE

**Doctoral Researcher, University of Delaware** Jan 2014 – present

**Advisor: Professor Maciek Antoniewicz, Chemical and Biomolecular Engineering**

- **Thesis:** Engineering nitrogen self-sufficient cocultures through adaptive evolution and network modeling
- Constructed and validated metabolic network model for *A. vinelandii*. Performed the first instance of <sup>13</sup>C-metabolic flux analysis (<sup>13</sup>C-MFA) of an aerobic diazotroph.
- Systematically designed and characterized an array of nitrogen self-sufficient cocultures involving *A. vinelandii* paired with various strains of cyanobacteria and *E. coli* capable of secreting carbon substrates.
- Performed first instance of <sup>13</sup>C-MFA of a diazotrophic coculture, enabling identification of otherwise unobservable cross-fed nutrients. Revealed that *A. vinelandii* shares up to 85% of its fixed N supply with coculture partner.
- Engineered *E. coli* to convert 33 Cmol% of imported xylose into glucose as a suitable, cross-fed substrate in cocultures. Employed adaptive evolution to increase growth rate by 76% and enable continuous glucose production under N-limitation. Identified genetic basis of emergent altruism through whole-genome sequencing and comparative genomics.

**U.S. Fulbright Fellow, International Rice Research Institute** Nov 2013 – Aug 2014

**Advisor: Dr. Inez Slamet-Loedin, Plant Breeding, Genetics, and Biotechnology**

- **Objective:** Development of iron-fortified, cisgenic indica rice with Genetic Transformation Lab (GTL)
- Streamlined high-throughput assay to quantify iron content in rice endosperm.
- Quantified effect of drought, salinity, and elevated CO<sub>2</sub> on grain nutrition via ICP-OES to assess implications of climate change on biofortification.

**Undergraduate Honors Research Assistant, Stanford University** Jun 2011 – Oct 2013

**Advisor: Professor Elizabeth Sattely, Chemical Engineering**

- **Thesis:** Metabolism of dietary, anticancer glucosinolates by the gut microbe, *Bacteroides thetaiotaomicron*
- Designed and implemented high-throughput screen of a transposon mutant library containing >7500 clones.
- Identified minimum cluster of microbial genes required to metabolize target plant anticancer compounds.

## AWARDS

Junior Researcher Grant, 12<sup>th</sup> Metabolic Engineering Conference, Munich, Germany June 2018  
Richard Wool Award for Women in Green Engineering, Chemical and Biomolecular Engineering, U. of Delaware April 2018  
Professional Development Award, University of Delaware April 2016, 2017  
NSF Graduate Research Fellowship Program, Honorable Mention April 2015, 2016  
Pigford Award, Dept. of Chemical and Biomolecular Engineering, University of Delaware Aug 2014  
U.S. Fulbright Research Fellowship, Philippines Nov 2013  
Bio-X Post-Baccalaureate Research Fellowship, Stanford June 2013  
Honors Research Award in Chemical Engineering, Stanford May 2013  
American Inst. of Chemical Engineers Distinguished Service Award, Stanford May 2013  
**Second Place**, Oral Research Presentation, AIChE Western Regionals Conference, San Diego April 2013  
Stanford Vice Provost for Undergraduate Education, Research Fellowship June 2012, 2011

## PUBLICATIONS

1. Diaz CAC, Bennet RK, Papoutsakis ET and Antoniewicz MR. (2019). "Deletion of four genes in *E. coli* enables preferential consumption of xylose and secretion of glucose." *Metabolic Engineering* **52**: 168-177.

# Camil A. C. Diaz

2. Diaz CAC. (2014). "Healthier rice varieties: High-iron and high-zinc rice." Department of Communications and Publication Services, International Rice Research Institute (IRRI).

## SELECT ORAL PRESENTATIONS

1. Diaz CAC, Bennet RK, Papoutsakis ET and Antoniewicz MR. (March 2019). "Deletion of four genes in enables preferential consumption of xylose and secretion of glucose as a valuable cross-fed nutrient in synthetic cocultures." *Biochemical Technology Division, American Chemical Society 256<sup>th</sup> National Meeting & Exposition*, Orlando, Florida, USA.
2. Diaz CAC and Antoniewicz MRA. (March 2018). "Engineering nitrogen self-sufficient cocultures." **INVITED TALK.** *Madison Microbiome Meeting*, Madison, Wisconsin, USA.
3. Diaz CAC and Antoniewicz MRA. (Aug 2017). "*Quid pro quo*: Engineering nitrogen self-sufficient cocultures." Photosynthetic and Non-Conventional Organisms in Metabolic Engineering Session, *Society for Industrial Microbiology and Biotechnology (SIMB) Annual Meeting*, Denver, Colorado, USA.
4. Diaz CAC, Klein AP, Sirk S, and Sattely ES. (Aug 2014). "A prominent gut microbe activates anticancer compounds from plants: Metabolism of glucosinolates by *B. theta* and opportunities for engineering beneficial plant-microbe interactions in the human gut." *13th International Association of Plant Biotechnology Congress*, Melbourne, Australia.
5. Diaz CAC. (June 2014). "Biotechnology research at the International Rice Research Institute towards healthier rice." **INVITED TALK.** Thomas Jefferson Information Center, U.S. Embassy, Manila, Philippines
6. Diaz CAC, Torrizo, L, Barrios, M, Quick, WP, Henry, A, Sajise, A, Gregorio, G, and Slamet-Loedin, IH. (May 2014). "Biofortification in the face of climate change: Effect of drought and increased CO<sub>2</sub> levels on the iron and zinc content of rice grains." *44th Crop Science Society of the Philippines Conference*, Cebu City, Philippines.
7. Diaz CAC, Klein AP and Sattely ES. (April 2013). "Activation of plant anticancer compounds by the gut microbiota: Metabolism of glucosinolates by *Bacteroides thetaiotaomicron* and implications for human health." **SECOND PLACE.** *Research Paper Competition*, American Institute of Chemical Engineers (AIChE) Western Regionals Conference, San Diego, USA.

## SELECT POSTER PRESENTATIONS:

1. Diaz CAC and Antoniewicz MRA. (Nov 2018). "Engineering altruism in nitrogen self-sufficient cocultures of *Azotobacter vinelandii* and *E. coli*." *International Conference on Microbiome Engineering*, Boston, Massachusetts, USA.
2. Diaz CAC and Antoniewicz MRA. (June 2018). "The taming of the germ: Engineering cooperation in nitrogen self-sufficient cocultures." *Metabolic Engineering 12*, Munich, Germany.
3. Diaz CAC and Antoniewicz MRA. (Aug 2017). "*Quid pro quo*: Engineering nitrogen self-sufficient cocultures." *SIMB Annual Meeting*, Denver, Colorado, USA.
4. Diaz CAC and Antoniewicz MRA. (June 2016). "Powering Nitrogen Fixation: the Metabolism of the Aerobic Diazotroph, *Azotobacter vinelandii*, as revealed by <sup>13</sup>C-metabolic flux analysis." *Metabolic Engineering 11*, Kobe, Japan.
5. Diaz CAC, Klein AP and Sattely ES. (Aug 2013). "A Gut microbe-plant interaction generates anticancer compounds: Metabolism of glucosinolates by *Bacteroides thetaiotaomicron* and implications for human health." *Bio-X Interdisciplinary Initiatives Symposium*, Stanford University, Stanford, USA.

## TEACHING EXPERIENCE

Teaching Assistant for Thermodynamics Unit, Chemical Engineering Laboratory I Spring 2016

## MENTORING EXPERIENCE

Nathaniel Hamaker, PhD Rotation Student, Chemical Biology Interface Program Jan – March 2017  
Project: "Harnessing cyanobacterial metabolism towards engineering carbon self-sufficient cocultures."

## LEADERSHIP AND SERVICE AT UNIVERSITY OF DELAWARE

President (2016-2017), Graduate Student Body, Dept. of Chemical and Biomolecular Engineering Sept 2014 – Sept 2018  
Founding Member, Colburn Club STEM Outreach Program March 2015 – May 2018  
Chair, Graduate Women In Engineering May 2016 – May 2018  
Graduate Representative, Dean Search Committee, College of Engineering, January – May 2018  
Graduate Representative, Graduate Diversity Committee, College of Engineering January 2017 – present

## SKILLS

- Metabolic network construction, isotopic labeling experiment design, and <sup>13</sup>C flux analysis to characterize metabolism.
- Adaptive laboratory evolution. Novel quantification methods of heterogeneous populations.
- Molecular biology, recombinant DNA techniques. Transposon mutagenesis, high-throughput screening of mutant libraries.
- Whole-genome sequencing, comparative genomics to identify genotypic sources of phenotypic variation.
- Design of experiments. Microbial cell culture. Characterization of cell biomass composition and overall physiology.
- GC-MS, LC-MS, ICP-OES to identify and quantify microbial and plant metabolites.

# Glenn Ferreira

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## EDUCATION

**University of Delaware**, Newark DE

*PhD Candidate in Chemical & Biomolecular Engineering, Sept 2014-2Q2019 (expected)*

- Cumulative GPA: 4.00/4
- Thesis: Predictive Models of Antibody Biophysical Properties and Aggregation
- Advisor: Chris J. Roberts

**Massachusetts Institute of Technology**, Cambridge MA

*MS in Chemical Engineering Practice, September 2010*

- Cumulative GPA: 4.64/5
- Frank Hall Thorp Fellowship recipient

**Tufts University School of Engineering**, Medford MA

*BS in Chemical Engineering, May 2009*

- Graduated *Summa Cum Laude* with high thesis honors
- Cumulative GPA: 3.80/4, GPA in major: 3.94/4

## RESEARCH AND WORK EXPERIENCE

**University of Delaware**, Newark, DE

*Graduate Researcher, September 2014-Present*

- Investigated role of monoclonal antibody protein-protein interactions and unfolding thermodynamics in aggregation rates and mechanism
- Evaluated long-term monoclonal antibody aggregation as a function of solution conditions at pharmaceutically relevant conditions
- Predicted biophysical properties using Molecular Dynamic & Monte Carlo Simulations
- Tuned coarse-grained molecular models to prediction experimental protein-protein interactions quantitatively
- Correlated short-term (accelerated) and long-term protein stability using activation energy measurement and Arrhenius extrapolation
- Analyzed origin of protein-protein interactions at fragment, domain, and residue level
- Performed *in silico* protein sequence mutation to optimize molecular behaviors
- Advised undergraduate student in evaluation of Hofmeister salts on protein stability
- Laboratory Techniques: Protein Characterization and Stability Experiments, SLS, DLS, DSC, HPLC/UPLC, SEC, HIC, UV-VIS (2<sup>nd</sup> Deriv.), Densitometry, Refractometry
- Computational Skills: Monte Carlo & Molecular Dynamics Simulation, MATLAB, JMP

**Bristol-Myers Squibb**, New Brunswick, NJ

*Research Scientist, Late Phase Chemical Development, May 2013-September 2014*

- Researched, developed, and implemented organic processes (chemical reaction, crystallization, purification, etc.) to supply active pharmaceutical ingredient (API) and process knowledge for BMS drug pipeline
- Led pilot plant activities, and prepared cGMP documentation
- Represented the chemical development in program-focused cross-functional teams to achieve goals including: campaign sizing/scheduling for clinical material requirements, developing target API powder properties for formulations
- Scaled-up production for glass-plants (1-10kg) and pilot plants (10-500kg)
- Collaborated with drug product colleagues to balance desired API powder properties against process throughput optimization

*Associate Research Scientist, Late Phase Chemical Development, Sept 2010-May 2013*

- Optimized organic chemical processes for quality, yield, process robustness, cycle time, and safety using sound laboratory development, plant data, experience, and process analytical technology (PAT)
- Managed undergraduate intern studying crystallization seed evaluation project
- Created and executed Design of Experiments (DoE) to elucidate several unit operations
- Utilized Multivariate Analysis and visualization to data using MATLAB and JMP
- Modeled and developed multi-dimensional design space for a liquid-liquid extraction unit operation to ensure API quality and minimize yield loss

**MIT School of Chemical Engineering Practice**, Cambridge, MA

*Emissions Control of Halogenated VOCs by Activated Carbon Adsorption, June 2010*

Novartis Pharmaceutical, East Hanover, NJ

- Designed carbon adsorption column allowing use of chlorinated VOCs at pilot plant scale using experiments and MATLAB modeling

*Removal of Soluble Palladium and Iron by Fixed-Bed Adsorption, July 2010*

Novartis Pharmaceutical, East Hanover, NJ

- Led team to remove spent catalyst metals from pharmaceutical intermediate solution

*Evaluation of Spray Processes for Production of Fluoride Phosphors, August 2010*

Cabot Corporation, Albuquerque, NM

- Utilized DoE to minimize HF production and maximize brightness of fluoride IR-upconverting phosphors for covert taggant security applications

**Tufts University Thesis with High Honors and Senior Project**, Medford, MA

*Cobalt and Iron Nanocrystals as Combustion Catalyst for Propulsion Applications, 2008-2009*

Advisor: Maria Flytzani-Stephanopoulos

- Developed and tested nanoscale oxidation catalysts for jet propulsion applications

*Biodiesel Production and Purification, 2008-2009*

- Performed bench scale and scale up experiments for biodiesel production

**Holcim (US) Inc**, Waltham, MA

*Process and Environmental Engineering Internship, Summer 2008*

**UMass Medical School**, Worcester, MA

*Research Internship in Tariq Rana Lab: P-TEFb role in HIV replication, Summer 2006*

*Lab Assistant in Michael Czech Molecular Biology Research Lab, Summer 2005*

## **SELECT PUBLICATIONS, PRESENTATIONS, AND PATENTS**

**Ferreira, G;** Shahfar, H; Sathish, H; Remmele, R; Roberts, C.J. Protein-Protein Interaction Analysis and Electrostatic Fingerprinting of Monoclonal Antibodies. In Preparation. 2019

**Ferreira, G;** Calero-Rubio, C; Sathish, H; H; Remmele, R; Roberts, C.J. Electrostatically Mediated Protein-Protein Interactions for Monoclonal Antibodies: a Combined Experimental and Coarse-Grained Molecular Modeling Approach. J. Pharm. Sci. 2018,

**Ferreira, G;** Samra, H; Remmele, R; Roberts, C.J. Towards Predictive Models of Antibody Biophysical Properties and Aggregation. ACS National Meeting, San Francisco, CA, 2017.

La Cruz, T; [et al. including **Ferreira, G**]; Conlon, D. Preparation of the HIV-Attachment Inhibitor BMS-663068. Part 9. Active Pharmaceutical Ingredient Process Development and Powder Properties. Org. Process Res. Dev. 21 (2017) 1174–1185.

Savage, S; [et al. including **Ferreira, G**]; Hobson, L. Hepatitis C Virus Inhibitors: Methods for Making Asunaprevir, Useful Treatment of Hepatitis C Virus (HCV) Infection, and Its Intermediates. US Patent Number: WO 2015200305 A1, December 2015.

**Ferreira, G;** Hallow, D; Fenster M; Mack B; Lou S; Domagalski N; Hobson L. Use of Design of Experiments (DoE) and Empirical Modeling in Liquid-Liquid Extraction Design Space Development. AIChE Annual Meeting, San Francisco, CA, November 2013.

4 additional conference presentations not listed

# Eden M. Ford

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(302) 831-4528

## EDUCATION

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**Ph.D. Candidate in Chemical Engineering** August 2015 – present

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

**B.S. in Chemical-Biological Engineering** August 2011 – June 2015

*Massachusetts Institute of Technology, Cambridge, MA*  
Department of Chemical Engineering

## RESEARCH & INDUSTRIAL EXPERIENCE

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**Graduate Research Assistant** August 2015 – present

*University of Delaware, Department of Chemical and Biomolecular Engineering*  
*Advisor: Prof. April M. Kloxin*

Developing a hydrogel-based scaffold that mimics aspects of the structure and biochemical content of healing bone to recruit endogenous human mesenchymal stem cells (hMSCs) and regulate their function and fate to promote improved bone healing.

**R&D Intern, Product Development** June – August 2014

*Boston Scientific Corporation, Maple Grove, MN*  
*Supervisor: Dr. Maggie Zeng*

Evaluated the polymer aging kinetics of a fully bioabsorbable drug-eluting stent (in early stages of development) at varying temperature and relative humidity to determine shelf life.

**Undergraduate Research Assistant** June – August 2013

*Massachusetts Institute of Technology, Department of Chemical Engineering*  
*Primary Investigator: Prof. Klavs Jensen*

Optimized the functionality of a microfluidic biosensor to detect biological and chemical toxins in the blood prior to the appearance of physiological symptoms.

**Undergraduate Research Assistant** June – December 2012

*Massachusetts Institute of Technology, Department of Chemical Engineering*  
*Primary Investigator: Prof. Robert Langer*

Investigated the use of a contact lens as an ocular drug delivery device and showed that stable drug release can be maintained for a month with this method of glaucoma treatment.

## RESEARCH SKILLS

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### Cell Culture and Bioengineering

Mammalian cell culture, 3D cell culture, bioreactor-based cell culture, cell transfection, immunostaining (IF), colorimetric assays, fluorescent and confocal microscopy, agarose gel electrophoresis, PCR.

### Materials Synthesis and Characterization

Solid-phase peptide synthesis, polymer end-group modification, HPLC, <sup>1</sup>H-NMR, rheology, mass spectrometry (ESI), UV-Vis spectrometry, differential scanning calorimetry

### Miscellaneous

MATLAB, COMSOL, AutoCAD, Microsoft Office, Minitab, Spanish (Intermediate)

## PUBLICATIONS

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A.M. Hilderbrand, **E.M. Ford**, *et al.* "Multifunctional collagen mimetic materials for controlled cell culture" *Manuscript in preparation.*

S.J. Ma, **E.M. Ford**, L.A. Sawicki, B.P. Sutherland, N.I. Halaszynski, B.J. Carberry, N.J. Wagner, A.M. Kloxin, C.J. Kloxin "Surface chemical functionalization of wrinkled thiol-ene elastomers for cellular alignment of human mesenchymal stem cells" *Manuscript in Preparation.*

M.S. Rehmann, K.M. Skeens, P.M. Kharkar, **E.M. Ford**, E. Maverakis, K.H. Lee, A.M. Kloxin "Tuning and predicting mesh size and protein release from step growth hydrogels" *Biomacromolecules.* 2017. 18, 3131-3142.

J.B. Ciolino, C.F. Stefanescu, A.E. Ross, B. Salvador-Culla, P. Cortez, **E.M. Ford**, K.A. Wymbs, S.L. Sprague, D.R. Mascoop, S.S. Rudina, S.A. Trauger, F. Cade, D.S. Kohane "In vivo performance of a drug-eluting contact lens to treat glaucoma for a month" *Biomaterials.* 2014. 35, 432-439.

## PRESENTATIONS AND POSTERS

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**E.M. Ford**, *et al.* "Incorporating hierarchical structure within hydrogel biomaterials using multifunctional collagen mimetic peptides toward directing stem cell fate" Oral presentation at: MRS Fall Meeting & Exhibit (2018 November 25-30, Boston, MA).

**E.M. Ford**, *et al.* "Incorporating hierarchical structure within hydrogel biomaterials using multifunctional collagen mimetic peptides" Poster presented at: 15<sup>th</sup> Annual CBER Biomechanics Research Symposium (2018 May 18, Newark, DE).

**E.M. Ford**, *et al.* "Multifunctional biomaterials with structural complexity" Poster presented at: 14<sup>th</sup> Annual CBER Biomechanics Research Symposium (2017 May 12, Newark, DE).

**E.M. Ford**, *et al.* "Aging effects on absorbable stent integrity" Oral presentation at: Boston Scientific Corporation, Summer Research Presentations (2014 August 15, Maple Grove, MN).

## HONORS AND AWARDS

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<b>Research Poster Presentation Winner</b>	<b>May 2018</b>
<b>NSF SBE2 IGERT Fellowship</b>	<b>February 2017 - Present</b>
<b>Robert L. Pigford Fellowship</b>	<b>August 2015 - 2016</b>
<b>Elton E. Staples Scholar</b>	<b>August 2011 - May 2015</b>
<b>Presidential Scholar Semifinalist</b>	<b>May 2011</b>

## LEADERSHIP AND OUTREACH

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**WVUD Radio** **September 2016 - present**  
Hosted a morning radio show, "Rise and Science".

**Colburn Club Outreach** **September 2016 - present**  
Planned and led science-based activities for junior high students.

**EmPOWER Mental Health Task Force** **October 2016 - present**  
Worked with peers to create a program focused on addressing mental health among graduate students.

**Math Tutoring** **September 2017 - present**  
Taught mathematical concepts and assisted junior high students with math work weekly.

**UD Chemical and Biomolecular Engineering Safety Committee** **September 2016 - June 2018**  
Acted as the liaison between the safety directors and the graduate students/faculty to promote safety across the chemical engineering community.

# Jiayi Fu

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Newark, DE 19711

jiayi@udel.edu  
347-827-6460

## EDUCATION

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**University of Delaware** Newark, DE  
Ph.D. Candidate in Chemical and Biomolecular Engineering Expected 2020  
Cumulative GPA: 3.95/4.00

**The Cooper Union for the Advancement of Science and Art** New York, NY  
Bachelor of Engineering in Chemical Engineering May 2015  
Cumulative GPA: 3.83/4.00, *Summa Cum Laude*

## RESEARCH EXPERIENCE

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**University of Delaware** Newark, DE  
*Graduate Research Assistant* 2015-Present

Thesis advisor: Dr. Dionisios G. Vlachos

Thesis Title: Catalytic Hydrodeoxygenation of Biomass to Valuable Chemicals with Metal Oxides

- Developed an efficient one-step catalytic process for the hydrodeoxygenation of tartaric acid to succinic acid using MoO<sub>x</sub>/BC and HBr in acetic acid
- Performed reaction pathway studies and elucidated the catalytic roles of MoO<sub>x</sub>/BC and HBr
- Established structure-catalytic performance correlations for MoO<sub>x</sub>/BC catalyst by conducting catalyst pretreatment and characterization studies (XRD, XPS, XAS and TPR)
- Introduced doped oxides with noble metals (Pt/TiO<sub>2</sub>) at high dispersion as a new class of stable and selective catalysts for tandem reactions of hydrodeoxygenation
- Developed a methodology to quantify various types of active sites for typical particle sizes by combining the use of probe molecules, kinetics, modeling and characterization

**Columbia University** New York, NY  
*Undergraduate Research Assistant* Summer 2014

Research topic: Nanoparticle Organic Hybrid Materials (NOHMs) for CO<sub>2</sub> Capture

- Synthesized the silica-based NOHMs (NOHM-I-HPE) for CO<sub>2</sub> capture
- Designed a synthesis procedure for Fe<sub>3</sub>O<sub>4</sub>-based NOHMs

**University of Illinois at Urbana-Champaign** Urbana, IL  
*Undergraduate Research Assistant* Summer 2013

Research topic: Excitonic-Plasmonic Induced Transparency in Nanoparticles

- Modeled extinction spectra of various noble metal nanoparticles in DDSCAT
- Optimized and analyzed configurations of plasmonic nanoparticles for achieving complete optical transparency

## TEACHING EXPERIENCE & OUTREACH ACTIVITY

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**University of Delaware** Newark, DE  
*Undergraduate Researcher Mentor* Fall 2018

- Developed a research plan for the Research Experiences for Undergraduates program
- Mentored an undergraduate researcher synthesizing and testing doped metal oxide catalysts for biomass valorization



**Graduate Teaching Assistant for Engineering and the Environment Course**

Fall 2018

- Graded writing assignments, news reports and the final project

**Graduate Teaching Assistant for Green Engineering Course**

Spring 2017

- Hosted weekly office hours to assist students with assignments and consolidate course materials
- Created answer keys for problem sets

**Catalysis Center for Energy Innovation**

Newark, DE

**Diversity Outreach**

December 2016

- Designed and demonstrated an engaging scientific experiment to promote the STEM field to young girls (ages 4-18)

**SKILLS**

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**Laboratory Instruments:** XRD, XPS, XAS, HPLC, LCMS, GC, FTIR, NMR, TGA, Viscometer

**Computer Programs:** Origin, Microsoft Office, SPARTAN, AutoCAD, SolidWorks, COMSOL Multiphysics, PRO/II, MATLAB, Demeter

**PUBLICATIONS**

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**Fu, J.\***, Lym, J.\*, Zheng, W.\*, Alexopoulos, K., Mironenko, A., Vlachos, D. G., Selective Hydrodeoxygenation of Furfuryl Alcohol on Doped Metal Oxide Catalysts. (*In preparation*)

**Fu, J.**, Vasiliadou, E. S., Saha, B., Vlachos, D. G., Highly Efficient Molybdenum Oxide Catalyzed Hydrodeoxygenation of Tartaric Acid. (*In preparation*)

**Fu, J.**, Vasiliadou, E. S., Goulas, K. A., Saha, B., Vlachos, D. G., Selective Hydrodeoxygenation of Tartaric Acid to Succinic Acid. *Catal. Sci. Technol.*, 21(7), 4944–4954, 2017. **Cover art.**

Faucheaux, J. A., **Fu, J.**, & Jain, P. K., Unified Theoretical Framework for Realizing Diverse Regimes of Strong Coupling between Plasmons and Electronic Transitions. *J. Phys. Chem. C*, 118(5), 2710–2717, 2014.

**PRESENTATIONS**

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**Fu, J.**, Zheng, W., Lym, J., Alexopoulos, K., Mironenko, A. V., Vlachos, D. G. “Selective Hydrodeoxygenation of Furfuryl Alcohol on Doped Metal Oxide Catalysts” AIChE Annual Meeting, Pittsburgh, PA, 2018. (*Oral presentation*)

**Fu, J.**, Vasiliadou, E. S., Goulas, K. A., Saha, B., Vlachos, D. G. “Selective Hydrodeoxygenation of Tartaric Acid to Succinic Acid” ISCRE25, Florence, Italy, 2018. (*Poster presentation*)

**Fu, J.**, Vasiliadou, E. S., Saha, B., Vlachos, D. G. “Bio-Succinic Acid Production from Tartaric Acid” AIChE Annual Meeting, Minneapolis, MN, 2017. (*Oral presentation*)

**Fu, J.**, Vasiliadou, E. S., Saha, B. and Vlachos, D. G. “Heterogeneous Catalytic Route towards Succinic Acid from Biorenewable Tartaric Acid” Center for Catalytic Science and Technology Research Review, Newark, DE, 2016. (*Poster presentation*)

**HONORS & AWARDS**

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University Doctoral Fellowship

2018-2019

ISCRE25 Travel Award

2018

Cooper Union Full Tuition Scholarship

2011-2015

The Lewis Gleekman Memorial Prize

May 2015

Chu-Mattingly Cooper Fund Scholar

October 2014

**EDUCATION**

<b>University of Delaware</b> <i>Ph.D. in Chemical &amp; Biomolecular Engineering (2019 expected)</i>	August 2014-Present GPA: 4.0/4.0
<b>University of California, Berkeley</b> <i>Bachelor of Science with Honors in Chemical &amp; Biomolecular Engineering</i>	August 2007-May 2011 GPA: 3.71/4.0

**HONORS AND AWARDS**

<b>1<sup>st</sup> Place, AIChE Area 8A Excellence in Graduate Polymer Research Symposium AIChE 2018 Annual Meeting</b>	2018
<b>Fraser and Shirley Russell Teaching Fellowship, University of Delaware Department of Chemical &amp; Biomolecular Engineering</b>	2018
<b>1<sup>st</sup> Place, AIChE Materials Engineering and Sciences Division Graduate Student Poster Competition, AIChE 2017 Annual Meeting</b>	2017
<b>Honorable Mention, NSF Graduate Research Fellowship Program</b>	2015
<b>Paul H. Schipper Fellowship, University of Delaware Department of Chemical &amp; Biomolecular Engineering</b>	2015
<b>Qualifying Exam Commendation, University of Delaware Department of Chemical &amp; Biomolecular Engineering</b>	2015
<b>Graduate Coursework Commendation, University of Delaware Department of Chemical &amp; Biomolecular Engineering</b>	2015
<b>Robert L. Pigford Fellowship, University of Delaware Department of Chemical &amp; Biomolecular Engineering</b>	2014
<b>President's Quality Award, Applied Materials, Inc.</b>	2012

**PUBLICATIONS AND PATENTS**

1. T.B. Martin, **T.E. Gartner, III**, R.L. Jones, C.R. Snyder, A. Jayaraman, "Design and Implementation of pyPRISM: A Polymer Liquid-State Theory Framework," *Proc. of the 17th Python in Science Conf. (SCIPY 2018)*, **2018**, 129-136
2. T.B. Martin, **T.E. Gartner, III**, R.L. Jones, C.R. Snyder, A. Jayaraman, "pyPRISM: a computational tool for liquid-state theory calculations of macromolecular materials," *Macromolecules*, **2018**, *51* (8), 2906-2922
3. **T.E. Gartner, III**, A. Jayaraman, "Macromolecular 'size' and 'hardness' drives structure in solvent-swollen blends of linear, cyclic, and star polymers," *Soft Matter*, **2018**, *14*, 411-423
4. **T.E. Gartner, III**,\* M.A. Morris,\* C.K. Shelton,\* J.A. Dura, T.H. Epps, III, "Quantifying lithium salt and polymer density distributions in nanostructured ion-conducting block polymers," *Macromolecules*, **2018**, *51* (5), 1917-1926; \*Equal contributions
5. **T.E. Gartner, III**, T. Kubo, Y. Seo, M. Tansky, L.M. Hall, B.S. Sumerlin, T.H. Epps, III, "Domain spacing and composition profile behavior in salt-doped cyclic vs linear block polymer thin films: a joint experimental and simulation study," *Macromolecules*, **2017**, *50* (18), 7169-7176
6. M.A. Morris,\* **T.E. Gartner, III**,\* T.H. Epps, III, "Tuning block polymer structure, properties, and processability for the design of efficient nanostructured materials systems,"\*\* *Macromol. Chem. Phys.*, **2017**, *218* (5), 1600513; \*Equal contributions; \*\* Journal cover article
7. **T.E. Gartner, III**, T.H. Epps, III, A. Jayaraman, "Leveraging Gibbs ensemble molecular dynamics and hybrid Monte Carlo/molecular dynamics for efficient study of phase equilibria," *J. Chem. Theory Comput.*, **2016**, *12* (11), 5501-5510
8. H. Wu, H. Pan, M.A. Green, D. Dietderich, **T.E. Gartner, III**, H.C. Higley, M. Mentink, D.G. Tam, F.Y. Xu, F. Trillaud, X.K. Liu, L. Wang, and S.X. Zheng, "The resistance and strength of soft solder splices between conductors in MICE coils," *IEEE Trans. Applied Superconductivity*, **2011**, *21* (3), 1738-1741
9. V.V. Hardikar, Z. Wang, D.M. Gage, **T.E. Gartner, III**. Chemical mechanical polishing process and slurry containing silicon nanoparticles. United States Patent Application No. US 14/143,262. 2013, Dec 30.

*In Review or Preparation:*

10. **T.E. Gartner, III**, F.M. Haque, A. Gomi, S.M. Grayson, M.J.A. Hore, A. Jayaraman, "Scaling exponent and effective interactions in linear and cyclic polymer solutions," *Phys. Rev. Lett.*, **2018** (*in review*)
11. **T.E. Gartner, III**, A. Jayaraman, "Modeling and Simulations of Polymers: A Roadmap,"\*\* *Macromolecules*, **2018** (*reviews received, in revision*); \*\**Invited Perspective article*

## Thomas E. Gartner III

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12. M. Xiao,\* Z. Hu,\* **T.E. Gartner, III**,\* X. Yang, W. Li, A. Jayaraman, N.C. Gianneschi, M.D. Shawkey, A. Dhinojwala, "Surface segregation of binary particles in photonic colloidal assemblies," (*in preparation*); \*Equal contributions
13. H. Kuang, **T.E. Gartner, III**, A. Jayaraman, E. Kokkoli, "Controlling the Length and Diameter of DNA Nanotubes Formed by ssDNA-Amphiphiles," (*in preparation*)

### SELECTED PRESENTATIONS (13 total presentations at national conferences)

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1. **T.E. Gartner, III**, A. Jayaraman, Understanding the interplay between polymer architecture and solvent quality through coarse-grained molecular simulation and liquid state theory, AIChE Annual Meeting 2018
2. **T.E. Gartner, III**, A. Jayaraman, Controlling macromolecular structure and thermodynamics through solvent processing and polymer architecture: theory and simulation, GRC Polymer Physics 2018
3. **T.E. Gartner, III**, A. Jayaraman, Understanding Linear and Cyclic Polymer Chain Conformations and Thermodynamics in Solution, APS March Meeting 2018
4. **T.E. Gartner, III**, A. Jayaraman, Solvent effects on the structure and thermodynamics of polymer blends with varying architectures, AIChE Annual Meeting 2017
5. **T.E. Gartner, III**, H. Kuang, E. Kokkoli, A. Jayaraman, Influence of molecular design on the self-assembly of single-stranded DNA amphiphiles, AIChE Annual Meeting 2017
6. **T.E. Gartner, III**, T.H. Epps, III, A. Jayaraman, Development of simulation methods in the Gibbs ensemble to predict polymer-solvent phase equilibria, APS March Meeting 2016

### ACADEMIC AND PROFESSIONAL RESEARCH EXPERIENCE

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#### University of Delaware

Newark, DE

*Ph.D. Student, Department of Chemical & Biomolecular Engineering (August 2014-Present)*

- Develop and apply computational (molecular dynamics and Monte Carlo simulation) and theoretical (PRISM theory) techniques to study the solvent processing of polymer and bio-inspired colloidal materials
- Link macromolecular design characteristics and processing conditions to soft materials self-assembly
- Apply X-ray and neutron reflectometry to characterize lithium salt-doped block polymer materials

#### Applied Materials, Inc.

Sunnyvale, CA

*Chemical-Mechanical Planarization (CMP) Process Engineer (June 2011-July 2014)*

- Performed process development R&D for microelectronic device fabrication, including studies of wafer-pad friction and tribology during CMP and scratch and defect generation in Copper CMP

#### Lawrence Berkeley National Laboratory

Berkeley, CA

*Student Research Assistant, Superconducting Magnet Group (May 2010-May 2011)*

- Electrical characterization of superconductors in cryogenic and magnetic environments
- Tracked oxidation of superconducting materials during heat treatment
- Probed mechanical deformation in superconducting wire using optical and scanning-electron microscopy

### TEACHING AND OUTREACH EXPERIENCE

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#### University of Delaware Colburn Club Outreach Group

Newark, DE

*Outreach Coordinator (9/2015-9/2016); Member (3/2015-9/2015, 9/2016-Present)*

- Founding member of a UD chemical engineering student group devoted to science outreach
- Developed and executed original science and engineering demonstrations at a local middle school

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

Newark, DE

*Teaching Assistant (February 2016-December 2016)*

- Undergraduate Thermodynamics II (Spring 2016); Average TA evaluation score: 4.91/5.0
- Introduction to Polymer Science and Engineering (Fall 2016); Average TA evaluation score: 4.91/5.0

### SKILLS

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- Simulation & Theory Techniques: Coarse-grained molecular dynamics and Monte Carlo simulations, PRISM theory, umbrella sampling, weighted histogram analysis method, Gibbs ensemble
- Computers and Programming: Unix Shell, Python, GitHub, C++, TCL, MPI and parallelization, LAMMPS, Visual Molecular Dynamics, PACKMOL, moltemplate, Voro++, MATLAB, Aspen, SuperPro
- Characterization Methods: Neutron and X-ray scattering (small-angle and reflectometry), scanning electron microscopy, optical microscopy, atomic-force microscopy, spectral reflectometry, NMR
- Clean room procedures; laboratory, chemical, laser, vacuum, and cryogenic safety procedures

# Andrew S. Gaynor

Chemical and Biomolecular Engineering  
University of Delaware  
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150 Academy Street  
Newark, DE 19716

## Education

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**University of Delaware**, Newark, DE Fall 2014-Present  
Candidate for Doctor of Philosophy  
Chemical and Biomolecular Engineering

**Tulane University**, New Orleans, LA Fall 2010-Spring 2014  
Bachelor of Science Engineering in Chemical and Biomolecular Engineering, *Summa Cum Laude*  
Bachelor of Science in Cell and Molecular Biology and Jewish Studies, *Summa Cum Laude*  
GPA: 3.91/4.0

## Research Experience

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**University of Delaware**, Newark, DE Summer 2015-Present  
*Graduate Research Assistant*  
Advisor: Prof. Wilfred Chen

- Exploring the use of prodrug converting enzymes to treat cancer
- Developing novel techniques for modulating intracellular protein concentration via controlled protein degradation
- Constructing Boolean logic gates from protein components at the post-transcriptional level
- Designing autonomous, responsive protein circuits that respond to endogenous cancerous cues to treat diseased cells

**Tulane University**, New Orleans, LA Fall 2011-Spring 2014  
*Undergraduate Research Assistant*  
Advisor: Prof. Kim O'Connor

- Examined the effects of mesenchymal stem cell surface markers on their differentiation potential
- Developed methods for sorting heterologous mesenchymal stem cells populations based on differentiation potential
- **Senior Honors Thesis:** Differentiation and Proliferation Characterization of Senescent Mesenchymal Stem Cells

**Massachusetts Institute of Technology**, Cambridge, MA Summer 2013  
*Amgen Scholars Research Intern*  
Advisor: Prof. Angelika Amon

- Investigated the link between aneuploidy and growth rate in *S. cerevisiae*
- Analyzed microscopy images to determine time spent in each cell cycle phase

## Publications

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- **AS Gaynor** and W Chen. Induced Prodrug Activation by Conditional Protein Degradation, *J. Biotechnol.*, **260**, 62-66, 2017.

- KC Russell, HA Tucker, BA Bunnell, M Andreeff, W Schober-Ditmore, **AS Gaynor**, KL Strickler, S Lin, MR Lacey and KC O'Connor. Cell-surface Expression of Neuron-glia Antigen 2 (NG2) and Melanoma Cell Adhesion Molecule (CD146) in Heterogeneous Cultures of Marrow-derived Mesenchymal Stem Cells, *Tissue Eng. Part A*, **19**, 2253-2266, 2013.

## Oral Presentations

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- **AS Gaynor** and W Chen. Tunable, Post-Translational Method for Controlling Prodrug Converting enzymes in Cancer Cells, *ACS National Meeting*, New Orleans, LA, 2018.
- **AS Gaynor** and W Chen. Controlled Protein Degradation for the Conditional Survival of Cancer Suicide Enzymes, *University of Delaware Department of Chemical and Biomolecular Engineering Winter Research Review*, Newark, DE, 2018.
- H Kim, **AS Gaynor**, and W Chen. Modulating Antibody/Antigen Affinity by Triggered Assembly and Disassembly of an Artificially Split Protein M, *AIChE Annual Meeting*, Minneapolis, MN, 2017.
- **AS Gaynor** and W Chen. Controlled Protein Degradation for the Conditional Survival of Cancer Suicide Enzymes, *ACS National Meeting*, San Francisco, CA, 2017.
- **AS Gaynor** and W Chen. Traceless Shielding-Mediated Rescue of Yeast Cytosine Deaminase for the Targeted Treatment of Cancer, *University of Delaware Department of Chemical and Biomolecular Engineering Summer Research Review*, Newark, DE, 2016.

## Laboratory Skills

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- **Molecular Cloning:** polymerase chain reaction, primer design, construct generation, site-directed mutagenesis, colony screening
- **Bacterial Culture:** protein expression and purification, plasmid DNA preparation
- **Mammalian Cell Culture and Analysis:** aseptic technique, HeLa and HEK cell lines, fluorescent microscopy, cell viability assays, western blot
- **Microscope Image Analysis:** Axiovision, ImageJ

## Awards

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- Fraser and Shirley Russell **Teaching Fellowship** for Heat and Mass Transfer (Spring 2018)
- Robert L. Pigford **Teaching Assistant Award** (Spring 2017)
- **N.S.F. Graduate Research Fellowship Program** Honorable Mention (2015 & 2016)
- **N.I.H. Chemical-Biology Interface** Training Fellowship (Spring 2015)

## Leadership and Communication Experience

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- **Chen Laboratory Manager** (Fall 2017-Fall 2018)
- **Teaching Assistant** for Metabolic Engineering (Fall 2016) and Introduction to Chemical Engineering (Spring 2016)
- **Colburn Outreach Club** performing outreach to local middle school to foster interest in science and engineering and providing supplemental algebra support (Fall 2015-Present)
- **Young Engineers' Camp** run by University of Delaware College of Engineering to allow local youth to explore engineering (Summer of 2015, 2016, & 2018)

# Amber M. Hilderbrand

Chemical and Biomolecular Engineering  
University of Delaware  
150 Academy Street, Colburn Laboratory Office #219, Newark, DE 19711

email: ahilder@udel.edu  
phone: (651) 328-9787

## EDUCATION:

**University of Delaware**, Newark, DE Fall 2013-Present  
Candidate for Doctor of Philosophy  
Chemical and Biomolecular Engineering Cumulative GPA: 3.41/4.00

**Iowa State University**, Ames, IA Fall 2009-Spring 2013  
Bachelor of Science in Chemical Engineering, *Cum Laude*  
Chemical and Biological Engineering Cumulative GPA: 3.65/4.00

## RESEARCH EXPERIENCE:

**University of Delaware**, Newark, DE August 2013-Present  
*Graduate Research Assistant*  
Advisor: Dr. April M. Kloxin

- Engineering a three-dimensional (3D), hydrogel-based culture system that incorporates collagen mimetic peptides (CMPs) to impart fibrillar structure over multiple length scales
- Investigating assembled properties of CMPs to promote fibrillar assembly in solution
- Evaluating mechanical properties of hydrogel-based materials with covalently incorporated CMPs using rheology

**Iowa State University**, Ames, IA August 2012-August 2013  
*Undergraduate Research Assistant*  
Advisor: Dr. Kaitlin Bratlie

- Induced polarization of Tumor Associated Macrophages using interleukin-4 and lipopolysaccharide and incubated with functionalized polystyrene particles to reverse polarization
- Performed various biochemical assays to determine extent of cell repolarization
  - Determined that particles did not change phenotype, but induced changes in expression of pro- or anti-inflammatory markers

## RESEARCH SKILLS:

**Peptide and protein characterization:** Reverse-phase HPLC, mass spectrometry (ESI, LC-MS), circular dichroism (CD), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), UV-Vis spectroscopy, dynamic light scattering (DLS), small angle neutron scattering (SANS)

**Polymer Synthesis:** Solid phase peptide synthesis, small molecule synthesis, conjugation reactions for modification of commercial polymers, click chemistry (thiol-ene), fragment condensation reactions

**Polymer Characterization:** Rheology, <sup>1</sup>H-NMR

**Cell culture and analysis:** Mammalian cell culture (tumor associated macrophages, 3T3 fibroblasts, human mesenchymal stem cells), cell viability assays, enzymatic assays (ELISA), immunocytochemistry

**Statistics:** Minitab software, design of experiments

## PUBLICATIONS & PROPOSALS

- **AM Hilderbrand**, C Guo, EM Ford, AM Kloxin, “Multifunctional collagen mimetic materials for controlled cell culture,” *In preparation*.

- **AM Hilderbrand**, P Taylor, F Stanzione, J Condon, MA LaRue, A Jayaraman, AM Kloxin, “Understanding the impact of non-natural amino acid incorporation on the assembly of multifunctional collagen mimetic peptides,” *In preparation*.
- **AM Hilderbrand\***, EM Ovadia\*, MS Rehmann, PM Kharkar, C Guo, AM Kloxin, “4D biomaterials for stem cell research,” *Curr. Opin. Solid State Mater. Sci.* **20**, 212-224, 2016. \*Equal contribution
- **AM Hilderbrand**, C Guo, AM Kloxin, “Nanoscale characterization of self-assembling peptides in solution and within hydrogel networks,” Center for Nanophase Materials Sciences Research Proposal, October 2015, Oak Ridge National Laboratory, Oak Ridge, TN.

#### PRESENTATIONS & AWARDS: (Presenter underlined)

- EM Ford, **AM Hilderbrand**, C Guo, AM Kloxin, “Incorporating hierarchical structure within hydrogel biomaterials using multifunctional collagen mimetic peptides toward directing stem cell fate,” Materials Research Society Fall Meeting 2018, November 2018, Boston, MA. *Oral Presentation*.
- AM Hilderbrand, F Stanzione, J Condon, MA LaRue, A Jayaraman, AM Kloxin, “Understanding the impact of non-natural amino acid incorporation on the assembly of multifunctional collagen mimetic peptides,” American Chemical Society Fall Meeting, August 2017, Washington, DC. *Oral Presentation*.
- AM Hilderbrand, C Guo, E Ford, AM Kloxin, “Designing multifunctional collagen mimetic peptides to incorporate hierarchical structure within robust hydrogel materials,” Society for Biomaterials Annual Meeting 2017, April 2017, Minneapolis, MN. *Oral Presentation*.
- M LaRue, **AM Hilderbrand**, AM Kloxin, “Mimicking the structure of the extracellular matrix using collagen mimetic peptides,” University of Delaware Undergraduate Research and Service Scholar Celebratory Symposium, August 2016, Newark, DE. *Poster*.
- AM Hilderbrand, C Guo, AM Kloxin, “Multifunctional biomaterials with structural complexity,” World Biomaterials Congress, May 2016, Montreal, QC. *Poster*.
- AM Hilderbrand, C Guo, AM Kloxin, “Hydrogels with structural complexity provided by multifunctional collagen mimetic peptides,” Neutron day, November 2015, Newark, DE. *Poster*.
- **Collins Fellowship** (2013-2014)

#### MENTORSHIP EXPERIENCE

- Mark LaRue, Undergraduate Research Assistant, University of Delaware Winter 2016-Spring 2018
  - Awards: UD Undergraduate Research Program Summer Fellow 2016 & 2017
- Orlando Walker Jr., K-12 Engineering High School Intern Summer 2017

#### LEADERSHIP & COMMUNICATION EXPERIENCE:

- **Founding member** of **Empathetic Peers Offering Wisdom Encouragement and Resources** (EmPOWER) Program in Department of Chemical & Biomolecular Engineering (2017-Present)
  - Lead Mentor from 2017-2018
- Fraser and Shirley Russell **Teaching Fellow** for Heat and Mass Transfer Operations (Spring 2017)
- **President** of graduate student organization, Colburn Club (2015-2016)
  - At-large representative (2013-2014), Second Year representative (2014-2015), Fourth Year representative (2016-2017)
- **DJ** for *Science Rocks!*, a weekly radio show on WVUD 91.3 FM The Basement (2014-2017)
- **Teaching Assistant** for Heat and Mass Transfer Operations (2016) and Introduction to Polymer Science (2014)

#### INDUSTRIAL EXPERIENCE:

**Honeywell Aerospace**, Plymouth, MN May 2011-August 2011  
*Engineering Intern*

- Studied process and worked with operators to reduce part scrap and revised Standard Operating Sheets
- Mapped temperatures of heating and cooling block to determine if gradient existed within block

## JULIE B. HIPPI

Graduate Research Assistant · Department of Chemical & Biomolecular Engineering  
University of Delaware, Newark, Delaware 19716 · (423) 991-3969 · [jhipp@udel.edu](mailto:jhipp@udel.edu)

### Education

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<b>University of Delaware, Newark, DE</b> Ph.D. candidate, Chemical & Biomolecular Engineering Advisor: Prof. Norman J. Wagner	2015 - present GPA: 3.8/4.0
<b>University of Tennessee, Knoxville, TN</b> B.S., Chemical & Biomolecular Engineering Graduated <i>Summa Cum Laude</i>	2011 - 2015 GPA: 3.97/4.0

### Research Experience

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**Visiting Graduate Research Assistant** 2018 - present  
NIST Center for Neutron Research, Advisor: Prof. Norman J. Wagner

**Graduate Research Assistant** 2016 - present  
University of Delaware, Advisor: Prof. Norman J. Wagner

- Characterized structural properties of industrially relevant conductive carbon blacks using a combination of neutron scattering (SANS and USANS) and light scattering (DLS) techniques
- Investigated the relationship between structural, rheological, and electrical properties of carbon black suspended in propylene carbonate using oscillatory rheology and impedance spectroscopy
- Studied the steady shear behavior of carbon black suspended in both polar and nonpolar media through a combination of simultaneous rheological and structural measurements (Rheo-SANS and Rheo-USANS) and simultaneous rheological and impedance spectroscopy measurements

#### **Undergraduate Research Assistant**

University of Tennessee - Knoxville, Principal Investigator: Prof. Cong T. Trinh 2012 - 2015

- Designed and built DNA plasmids to develop a chimeric biosensor platform for use in *E. coli*
- Characterized biosensor platform in *E. coli* using fluorescence microscopy
- Identified key bottlenecks in *Y. lipolytica* xylose utilization and resolved these bottlenecks by developing plasmids to upregulate genes in the xylose utilization pathway

### Publications

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- Ryu, S, **Hipp, J.B.**, Trinh, C.T. Activating and Elucidating Complex Sugar Metabolism in *Yarrowia lipolytica*. Applied and Environmental Microbiology. 2016; 82(4): 1334-1345.
- Richards, J.J., **Hipp, J.B.**, Riley, J.K., Butler, P.D., Wagner, N.J. Clustering and Percolation in Suspensions of Carbon Black. Langmuir. 2017; 33: 12260-12266.
- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. Structure-Property Relationships of Sheared Carbon Black Suspensions Determined by Simultaneous Rheological and Neutron Scattering Measurements. (2018, *submitted*)



## Selected Presentations

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- **Hipp, J.B.**, Richards, J.J., Riley, J.K., Butler, P.D., Wagner, N.J. “Percolation Behavior of Carbon Black Suspensions in Polar Aprotic Solvents” 88 th Annual Meeting of The Society of Rheology, Feb. 12-16, 2017. Tampa, FL. Oral presentation.
- **Hipp, J.B.**, Richards, J.J., Riley, J.K., Butler, P.D., Wagner, N.J. “The Microstructural Origin of the Rheo-Electric Behavior of Carbon Black Suspensions in Propylene Carbonate” 2017 Annual General Meeting of the International Fine Particle Research Institute, June 21, 2017. Philadelphia, PA. Poster.
- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. “Rheo-USANS as a Tool for Understanding Flow-Induced Structure in Carbon Black Suspensions” Neutron Day 2017, November 8, 2017. Newark, DE. Poster.
- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. “Investigation of the Shear-Induced Microstructure of Carbon Black Suspensions” 92<sup>nd</sup> Annual ACS Colloid & Surface Science Symposium, June 10-13, 2018. State College, PA. Oral presentation.
- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. “Investigation of the Shear-Induced Microstructure of Carbon Black Suspensions for Energy Storage Applications” 2018 American Conference on Neutron Scattering, June 24-28, 2018. College Park, MD. Oral presentation.
- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. “Shear-Induced Microstructural Evolution and Implications for the Rheo-Dielectric Behavior of Carbon Black Suspensions” 90 th Annual Meeting of the Society of Rheology, Oct. 14-18, 2018. Houston, TX. Oral presentation.

## Mentorship and Teaching Experience

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- NIST Center for Neutron Research 2018  
Mentor for the 2018 Summer School on the Fundamentals of Neutron Scattering
- University of Delaware, Department of Chemical & Biomolecular Engineering 2016 - 2017  
NSF-REU and UD K-12 Engineering Program mentor
- University of Delaware, Department of Chemical & Biomolecular Engineering 2016  
Teaching Assistant for Chemical Engineering Laboratory II
- University of Tennessee, Department of Mathematics 2012 - 2015  
Math tutor in the Math Tutorial Center
- University of Tennessee, Department of Chemical & Biomolecular Engineering 2014  
Mentor for the Eastman Chemical HITES Program

## Activities and Awards

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- NIST Center for Neutron Research User Group Committee student representative 2017 - present
- Graduate Coursework Commendations, University of Delaware 2016  
Department of Chemical & Biomolecular Engineering
- Tau Beta Pi Meeting Coordinator 2014 - 2015
- Academic Journal Club Cofounder 2013 - 2015
- TEDxUTK 2014 member of Core Planning Committee 2014
- BRIDGE Undergraduate Research Grant 2014

# Jeffrey S. Horner

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## EDUCATION

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- University of Delaware, Newark, DE**, Ph.D. (Expected: 02/2020) in Chemical and Biomolecular Engineering, Advisors: Dr. Antony N. Beris and Dr. Norman J. Wagner, H-Index – 2, Citations – 4, Downloads – 531 (Updated: 12/02/2018) 08/2015 – Present
- Cornell University, Ithaca, NY**, B.S. in Chemical and Biomolecular Engineering, Magna Cum Laude 08/2011 – 05/2015

## RESEARCH EXPERIENCE

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- Graduate Research Assistant**, University of Delaware 11/2015 – Present  
Beris and Wagner Research Groups – Safety Contact Representative  
Thesis: “An experimental and theoretical investigation of blood rheology”
- Measured human and animal blood rheology under steady and transient shear flow
  - Developed multidimensional, microstructure based models to fit and predict the experimental response of blood to different flows
  - Used model parameters and formulation to improve understanding of how individual physiology relates to the unique bulk flow behavior of blood
  - Currently constructing a microfluidic device to measure the bulk properties of blood
  - Currently working alongside Dr. Michael Mackay and David Phan on a side project to simulate extrusion for 3D printing applications using computational fluid dynamics
- Fluids Demo, Design, and Build Project Team Member**, Cornell University 06/2014 – 12/2014  
Zia Research Group
- Designed and fabricated five models that demonstrate fluid mechanics fundamentals to high school and undergraduate students

## TEACHING EXPERIENCE

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- Graduate Teaching Assistant**, University of Delaware 08/2017 – 12/2017  
CHEG 341: Fluid Mechanics 08/2016 – 12/2016
- Led office hours, wrote homework solutions, and assigned grades for a core undergraduate chemical engineering class
  - Facilitated and helped develop a blood flow simulation final project related to thesis
- Academic Excellence Workshop Facilitator**, Cornell University 08/2012 – 05/2015  
CS 1112: Introduction to Computing using MATLAB
- Directed a collaborative session as a supplemental class for freshman engineers
- Undergraduate Teaching Assistant**, Cornell University 01/2014 – 05/2015  
CHEME 4700: Process Control Strategies, CHEME 3230: Fluid Mechanics, and CHEME 3240: Heat & Mass Transfer
- Led office hours and graded for undergraduate chemical engineering classes

## LEADERSHIP ACTIVITIES

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- Cornell Alumni Admissions Ambassador Network (CAAAN) Member** 03/2017 – Present
- Currently interview prospective students and represent Cornell at college fairs
- Graduate Research Mentor**, University of Delaware 06/2018 – Present
- Mentored and conducted research directly related to thesis alongside four undergraduate students (Dominic Gallo, Evan Minnigh, Wallis Boyd, and Cameron Mertz) and a high school intern (Willow Bowen) 06/2017 – 08/2017  
01/2017 – 02/2017
- American Institute of Chemical Engineers (AIChE) Social Director**, Cornell University 02/2014 – 02/2015
- Coordinated social and professional events for undergraduate AIChE chapter
- Counselor In Training and Earth Education Director**, YMCA Stockwell Day Camp 06/2015 – 08/2015
- Mentored 15 year olds through direction of the counselor in training program 06/2013 – 08/2013
  - Directed the earth education program for campers ranging in age from 4 to 15 06/2012 – 08/2012
- Kappa Sigma Executive Committee Member and Social Director**, Cornell University 08/2012 – 05/2013
- Elected to lead the refounding of the Cornell chapter of Kappa Sigma Fraternity
  - Directed social, professional, and philanthropic events

## HONORS AND AWARDS

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- Student Travel Grant, Society of Rheology (SoR) 08/2018
- Robert L. Pigford Teaching Assistant Award, University of Delaware 04/2018
- Student Travel Award, Society for Industrial and Applied Mathematics (SIAM) 04/2018
- Professional Development Award, University of Delaware 09/2017
- Exceptional Qualifying Exam Pass, University of Delaware 08/2016
- Standard Operating Procedures: 2016 Safety Contest Award, University of Delaware 02/2016
- Tau Beta Pi (top 20% of engineering class), Cornell University 02/2015
- Dean's List – 6 semesters, Cornell University 08/2011 – 12/2014
- Cornell Club of Greater Philadelphia Rumsey Scholarship, Cornell University 08/2011 – 05/2014
- Eagle Scout, Boy Scouts of America 11/2013

## PUBLICATIONS

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1. **JS Horner**, MJ Armstrong, NJ Wagner, and AN Beris, "Investigation of blood rheology under steady and unidirectional large amplitude oscillatory shear," *Journal of Rheology*, **62**(2), 577-591 (2018).
2. M Armstrong, **J Horner**, M Clark, M Deegan, T Hill, C Keith, and L Mooradian, "Evaluating rheological models for human blood using steady state, transient, and oscillatory shear predictions," *Rheologica Acta*, **57**(11), 705-728 (2018).
3. **JS Horner**, AN Beris, DS Woulfe, and NJ Wagner, "Effects of ex vivo aging and storage temperature on blood viscosity," *Clinical Hemorheology and Microcirculation*, **70**(2), 155-172 (2018).
4. M Armstrong, T Helton, and **J Horner**, "Analysis of transient human blood rheology using sequence of physical processes (SPP)," *Rheologica Acta*, Submitted 2018.
5. **JS Horner**, MJ Armstrong, NJ Wagner, and AN Beris, "Constitutive modeling of blood structural viscoelasticity and thixotropy in response to step shear changes and oscillatory shear," In preparation.
6. **JS Horner**, NJ Wagner, and AN Beris, "A review on recent advances in modeling and simulation of blood flow," *Soft Matter* (Invited), In preparation.
7. DD Phan, **JS Horner**, AN Beris, and ME Mackay, "Computational fluid dynamics simulation of rheological effects during material extrusion in 3D printing," In preparation.
8. **JS Horner**, WR Bowen, NJ Wagner, DS Woulfe, and AN Beris "On the rheology of different animal species blood: a comparative study," In preparation.

## SELECTED PRESENTATIONS

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### Oral (\* Denotes presenting author)

- **JS Horner\***, AN Beris, and NJ Wagner, "Viscoelasticity, thixotropy, and wall effects in human blood rheology," *2018 American Institute of Chemical Engineers Annual Meeting*, Pittsburgh, PA, 10/31/2018.
- **JS Horner**, DD Phan, K Coasey, AN Beris, and ME Mackay\*, "Simulation of rheological effects in processing during material extrusion," *Society of Rheology: 90<sup>th</sup> Annual Meeting*, Houston, TX, 10/15/2018
- **JS Horner\***, AN Beris, NJ Wagner, and DS Woulfe, "Incorporating rheology and concentration gradients in blood flow simulations," *Society for Industrial and Applied Mathematics Conference on the Life Sciences*, Minneapolis, MN, 08/07/2018.
- **JS Horner\***, AN Beris, and NJ Wagner, "Modeling thixotropy, viscoelasticity, and slip layer formation in human blood rheology," *92<sup>nd</sup> American Chemical Society Colloid & Surface Science Symposium*, State College, PA, 06/12/2018.
- **JS Horner\***, AN Beris, and NJ Wagner, "Combining rheology and simulations to model bulk blood flow," *American Physical Society March Meeting 2018*, Los Angeles, CA, 03/06/2018.

### Poster (\* Denotes presenting author)

- **JS Horner\***, AN Beris, and NJ Wagner, "Modeling of blood rheology to improve flow simulations," *2018 Colloidal, Macromolecular and Polyelectrolyte Solutions Gordon Research Conference*, Ventura, CA, 02/07/2018.
- **JS Horner\***, AN Beris, NJ Wagner, and DS Woulfe, "Effects of physiology on blood rheology," *2017 Biomedical Engineering Society Annual Meeting*, Phoenix, AZ, 10/12/2017.

## SPECIALIZED SKILLS

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**Laboratory Skills:** Machine shop (drill press, metal lathe, and milling machine) and rheometry (Anton-Paar: Rolling-ball viscometer and TA Instruments: ARES-G2 and DHR-3)

**Computer Skills:** AFT Fathom, Android Studio, ANSYS Fluent, ANSYS Polyflow, Aspen Plus, AutoCAD, MATLAB, Microsoft Office, Microsoft Visio, Minitab, Origin, SolidWorks, TRIOS, and Wolfram Mathematica

# Victoria M. Hunt

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336-302-9938 • vmhunt@udel.edu

## Education

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<b>University of Delaware</b> , Newark, DE Ph.D. Candidate, Department of Chemical and Biomolecular Engineering	Sept. 2015 - present Cum. GPA: 3.82/4.00
<b>North Carolina State University</b> , Raleigh, NC Bachelor of Science in Chemical Engineering, minor in Biomanufacturing University Valedictorian, <i>Summa Cum Laude</i>	May 2015 Cum. GPA: 4.00/4.00

## Research Experience

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<b>Doctoral Researcher, University of Delaware</b> Advisors: Kelvin H. Lee & Wilfred Chen	Jun. 2016 - present
<ul style="list-style-type: none"><li>• Development of RNA-sensing gene regulation program for temporal control in mammalian cells</li><li>• Implementation of novel approaches for controlling intracellular protein concentration via directed protein degradation</li><li>• Establish autonomous gene regulation circuits in Chinese hamster ovary (CHO) cells to direct cellular behavior and specific phenotype</li></ul>	

<b>Undergraduate Researcher</b> Khan Lab Group at NC State University	Aug. 2014 - May 2015
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- Fabricated electrospun nanofibers for differential scanning calorimetry (DSC)
- Generated UV/Vis spectrophotometry data for drug absorbance studies for sustained drug delivery applications
- Evaluated consistency and stability of nanofibers with scanning electron microscopy (SEM)

<b>Undergraduate Researcher</b> Biomanufacturing Training & Education Center (BTEC) at NC State University	Jan. 2014 - Dec. 2014
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- Generated recombinant plasmid through recombination of entry clone and destination vector using *E.Coli* strain
- Transfected CHO cell cultures for transient and stable protein expression
- Executed experiments for protein purification followed by analytic assays to detect protein of interest

## Industrial Experience

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<b>Senior Design, NCSU Chemical Engineering</b> Research Triangle Institute, International	Aug. 2014 - May 2015
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- Investigated current literature on thin-film polymer device properties and needleless injectable system
- Developed comprehensive plan of action and schedule of experiments and deliverables for academic year
- Executed experiments to determine the optimal combination of molecular weight, free volume, and porosity to yield desired diffusion rate of active pharmaceutical ingredient (API)

<b>Technical Development, Virology Intern</b> Novartis Vaccines & Diagnostics	May 2014 - Aug. 2014
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- Executed current influenza generation protocols and optimized methods for alternate influenza types
- Passaged generated viruses and characterized viruses using established analytical assays including hemagglutination assay and focus forming assays
- Assessed growth characteristics and stability of candidate vaccine strains for the cell culture process

- Culminated summer experience with Summer Internship Poster Presentation: *Synthetic Seed Generation using Influenza B strains*, Holly Springs, NC (2014)

### Power Sector Intern

May 2013 – Jul. 2013

#### Chicago Bridge & Iron

- Updated and restructured employee job descriptions for a company project based in Saudi Arabia
- Compiled and analyzed quantitative data of manpower rightsizing for over forty power plants
- Demonstrated teamwork skills by interacting with all members of the engineering team to improve efficacy of company projects

### Honors and Awards

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Robert L. Pigford Graduate Fellowship, <i>University of Delaware</i>	2015 - 2016
NIH Chemistry-Biology Interface Training Fellowship <i>-Interdisciplinary training program involving research rotations in biochemistry and molecular biology</i>	2015 - present
University Valedictorian, <i>North Carolina State University</i>	2015
Tau Beta Pi Engineering Honor Society, <i>Member</i>	2013 - 2015
BTEC Scholar- KBI Biopharma	2013 - 2015
Chancellor's Leadership Scholar	2011 - 2015

### Research Skills

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**Molecular Cloning:** polymerase chain reaction, primer design, plasmid construction

**Bacterial Culture:** protein expression and purification, plasmid DNA preparation

**Mammalian Cell Culture:** aseptic technique, HeLa and CHO cell lines, fluorescent microscopy

**Analytical Techniques:** spectroscopy, SDS-PAGE, Western, Bradford, qRT-PCR

### Presentations

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1. **Hunt VM**, Lee KH, Chen W. (Oct. 2018). "Development of a novel RNA-sensing spatiotemporal gene regulation program for eukaryotic systems." AiChE Annual Meeting, Pittsburgh, PA, USA. Oral.
2. **Hunt VM**, Siu K, Lee KH, Chen W. (Dec. 2017). "Development of a novel temporally-controlled gene regulation program in mammalian cells." Advanced Mammalian Biomanufacturing Innovation Center (AMBIC) Semi-Annual Meeting, Clemson, SC, USA. Poster.

### Leadership and Communication Experience

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#### University of Delaware, Newark, DE

President, Graduate Student Body Sept. 2017 – Sept. 2018

*Dept. of Chemical and Biomolecular Engineering*

Industry Liaison, Graduate Student Body Sept. 2016 - present

*Dept. of Chemical and Biomolecular Engineering*

#### North Carolina State University, Raleigh, NC

College of Engineering Ambassador Aug. 2014 – May 2015

Treasurer, Alpha Omega Epsilon, Professional Engineering Sorority Aug. 2012 – Dec. 2013

Undergraduate Tutorial Center Tutor Aug. 2012 – Dec. 2013

**Matthew A. Jouny**     *Curriculum Vitae*

University of Delaware | Center for Catalytic Science and Technology

jounym@udel.edu | (610) 984-4719

**Education**

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**University of Delaware** 2015-Present  
 Ph.D. Chemical Engineering  
 Cumulative GPA: 3.86

**Lafayette College** 2011- 2015  
 Bachelor of Science, Chemical Engineering with Honors  
 Bachelor of Arts, Mathematics  
 Cumulative GPA: 3.86

**Research Experience**

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**Graduate Research Assistant**, University of Delaware January 2016-Present  
 Advisor: Dr. Feng Jiao

- **Thesis Topic:** “Electrochemical conversion of CO<sub>2</sub> to valuable chemicals”
- Performed a techno-economic analysis identifying optimal CO<sub>2</sub> electrolysis products and defined key performance benchmarks needed for commercialization
- Demonstrated the electroreduction of CO to C<sub>2+</sub> products with the highest reaction rate and selectivity reported in the literature, and utilized isotopic labelling to gain mechanistic insight into acetate production
- Synthesized a highly porous copper electrocatalyst for CO<sub>2</sub> reduction and developed a transport model using Matlab to study the electrolyte effect on performance by calculating pH profiles
- Developed a novel advanced oxygen recovery system using a thermo-electrochemical hybrid process and designed and fabricated a prototype integrated system in collaboration with NASA Glenn Research Center

**Honors Thesis**, Lafayette Chemical Engineering Honors Program August 2014 – May 2015  
 Advisor: Dr. Michael Senra

- Researched the gelation and thermodynamic properties of ternary systems of long chain n-alkanes in a short chain solvent via rheology to better understand the formation of wax blockages in subsea oil pipelines.

**EXCEL Scholar**, Lafayette College EXCEL Scholars Program May 2013 - May 2014  
 Advisor: Dr. Joshua Levinson

- Researched the design and implementation of a microfluidic surface tensiometer, fabricated using the soft-lithography technique, for the compositional analysis of water.

**Work Experience**

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**Graduate Teaching Assistant**, “Applied Mathematics for Engineers” Spring 2017  
 University of Delaware

- Prepared and gave lectures educating students on solving ordinary differential equations using Matlab
- Created solution keys for homework assignments, graded homework, and prepared exam problems

**Engineering Intern** May 2014 - July 2014  
 Equipto Inc, Tatamy, PA

- Implemented a new facility-wide Safety Data Sheet (SDS) maintenance program and updated SDS books.
- Developed a pallet estimator program in Excel to optimize space utilization and lower shipping costs.
- Analyzed CNC machine steel utilization data and made recommendations on a software upgrade.
- Assisted manufacturing manager in writing SOPs and contacting vendors.

**Teaching Assistant**, Introduction to Engineering: Nanotechnology Fall 2013  
 Lafayette College

- Prepared lab materials and demonstrated all aspects of the soft-lithography process.

**Peer Tutor**, Material and Energy Balances Fall 2013  
 Lafayette College

## Publications & Patents

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**M. Jouny**,\* J. Lv,\* T. Cheng,\* B. Ko, J. Zhu, W. Goddard, & F. Jiao, Formation of carbon-nitrogen bonds in carbon monoxide electrolysis. (under review)

**M. Jouny**, W. Luc, & F. Jiao, High-rate electroreduction of carbon monoxide to multi-carbon products, *Nature Catalysis* 1, 748-755 (2018). [**Selected as Cover Story**]

F. Jiao, **M. Jouny**, & J. Lv. Electrochemical generation of valuable chemicals from carbon dioxide and carbon monoxide. *U.S. Patent Application No. 62/757,785*. 2018

J. Lv,\* **M. Jouny**,\* W. Luc, W. Zhu, J.J. Zhu, & F. Jiao, Highly porous copper electrocatalyst for carbon dioxide reduction. *Advanced Materials* 30, 1803111 (2018)

W. Luc, **M. Jouny**, J. Rosen, & F. Jiao, Carbon dioxide splitting using an electro-thermochemical hybrid looping strategy. *Energy & Environmental Science* 11, 2928-2934 (2018).

**M. Jouny**, W. Luc, & F. Jiao, General techno-economic analysis of CO<sub>2</sub> electrolysis systems, *Industrial & Engineering Chemistry Research* 57, 2165-2177 (2018).

\*equal contribution

## Presentations

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**M. Jouny** & F. Jiao, “Selective Conversion of CO<sub>2</sub> to Multi-Carbon Chemicals through Two-Step Electrolysis”, Institute for Energy Conversion, University of Delaware, Invited Seminar, October 2018.

F. Jiao & **M. Jouny**, “Electrochemical Carbon Dioxide Reduction to Valuable Chemicals” 256<sup>th</sup> American Chemical Society National Meeting. August 2018. (talk)

**M. Jouny**, W. Luc, & F. Jiao, “Electrochemical conversion of CO<sub>2</sub> to alcohols”, 252<sup>nd</sup> American Chemical Society National Meeting. August 2017. (talk)

**M. Jouny**, W. Luc, & F. Jiao, “A Scalable Stack Electrolyzer for the Electrochemical Reduction of CO<sub>2</sub> to CO”, Catalysis Club of Philadelphia, November 2016. (poster)

## Activities and Honors

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Qualifying Exam Commendation	2016
Summa Cum Laude Honors	2015
NCAA Division I Varsity Swimming	2011-2015
Pi Mu Epsilon Mathematics Honor Society	2014
Tau Beta Pi Engineering Honor Society	2014
Patriot League Academic Honor Roll	2012-2015

## Skills and Techniques

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**Experimental:** Electrolyzer development and testing, microfluidics, CV/RDE studies, NMR, gas chromatography

**Materials preparation:** Chemical vapor deposition, soft-lithography, spin coating

**Materials Characterization:** XRD, XPS, SEM-EDS, *operando* XAS, WDXRF

**Software:** AspenPlus, Matlab, Adobe Illustrator, AutoCad, Minitab, Mathematica, OriginLab, MestReNova, Demeter, CasaXPS

# KAO, CHEN-YUAN

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15 Innovation Way, Rm 243 Newark, DE 19711 | 302-831-6168 | cykao@udel.edu

## Education

- 2018**      **Ph.D. Chemical and Biomolecular Engineering** (*GPA: 3.58/4.00*)  
University of Delaware – Newark, DE, USA
- 2012**      **Bachelor of Science: Chemical Engineering** (*GPA: 3.91/4.00*)  
National Taiwan University – Taipei, Taiwan

## Research Experience

- Jan/2014**      **Graduate Research Assistant**  
– **Current**      **University of Delaware** – Newark, DE      *Advisor: Eleftherios T. Papoutsakis, Ph.D.*
- Investigate the biological functionality of megakaryocytic microparticles (MkMPs), and developed a gene delivery system to target hematopoietic stem/progenitor cells (HSPCs)**
- **Optimized** plasmid DNA loading to MkMPs with more than **55%** of efficiency, and achieved **81%** of delivery to hematopoietic stem cells and nucleus to enable protein expression.
  - Demonstrated the **enhancement of megakaryocytic differentiation** through optimized miRNA/siRNA delivery to HSPCs.
  - **Identify the interaction between MkMPs and HSPCs**, including the recognition, endocytosis, and membrane fusion process, *in vitro*.
  - **Investigate shear-induced megakaryocyte maturation** (caspase 9 activation, p53 acetylation) and platelet/MkMPs production (functionalities)
  - **Enhanced *in vitro* platelet/MkMPs production up to 5 fold**, with the designed laboratory-scale shaking bioreactor.
- Sep/2010**      **Undergraduate Research Assistant**  
– **Jun/2012**      **National Taiwan University** – Taipei, Taiwan      *Advisor: Steven Sheng-Shih Wang, Ph.D.*
- Examine the mechanism of cataract formation under UV-C light.
  - Purified human gamma-D crystallin from *E.coli*
  - Investigate the inhibitory effect of resveratrol on human gamma-D crystallin aggregation
  - Examine the effect co-polypeptides on the unfolding of insulin.

## Selected Publications

- **C.Y. Kao**, E.T. Papoutsakis, “Extracellular vesicles: a mechanistic view of exosomes, microparticles, their parts and their targets to enable their biomanufacturing and clinical applications” **Current Opinion in Biotechnology** (2019, revision)
- **C.Y. Kao**, E.T. Papoutsakis, “Engineering Human Megakaryocytic Microparticles for Targeted Delivery of Nucleic Acids to Hematopoietic Stem & Progenitor Cells” **Science Advances** 3(11): eaau6762 (2018)
- S. Luff\*, **C.Y. Kao\***, E.T. Papoutsakis, “Role of p53 and Transcription-Independent p53-Induced Apoptosis in Shear-Stimulated Megakaryocytic Maturation, Particle Generation, and Platelet Biogenesis” **PLoS ONE** 13(9): e0203991 (2018, \*co-first-authors)



- J. Jiang, **C.Y. Kao**, E.T. Papoutsakis, *How do megakaryocytic microparticles target and deliver cargo to alter the fate of hematopoietic stem cells?* **Journal of Controlled Release**, 247:1-18 (2017)
- W.L. Chou, L.T.W. Lin, Y.Y. Shih, C.T. Li, **C.Y. Kao**, W.B. Tsai, S.S.S. Wang, *Aggregation behavior of casein is correlated with the type of glycation-inducing agent*, **Journal of the Taiwan Institute of Chemical Engineers**, 45(2): 393-403 (2014)
- **C.Y. Kao**, J.K. Lai, T.H. Lin, Y.J. Lin, J.S. Jan, S.S.S. Wang, *Examining the inhibitory actions of copolypeptides against amyloid fibrillogenesis of bovine insulin*, **Biochemical Engineering Journal** 78:181-188 (2013)
- J.W.R. Wu, **C.Y. Kao**, L.T.W. Lin, W.S. Wen, J.T. Lai, S.S.S. Wang, *Human  $\gamma$ D-crystallin aggregation induced by ultraviolet C irradiation is suppressed by resveratrol*, **Biochemical Engineering Journal**, 78:189-197 (2013)

### Oral Presentation

- **C.Y. Kao**, E.T. Papoutsakis, "Engineering Megakaryocyte-derived Microparticles for Gene Delivery" AICHE Annual Meeting (2016)

### Poster Presentation

- **C.Y. Kao**, E.T. Papoutsakis, "MiRNAs from Megakaryocytic Microparticles Mediating Megakaryocytic Differentiation of Hematopoietic Stem & Progenitor Cells in the Absence of Thrombopoietin"
- **C.Y. Kao**, C. Escobar, E.T. Papoutsakis "Megakaryocytic Microparticles-Mediated Nucleic Acid Delivery for Gene Therapy" Cell Culture Engineering XVI (2018)
- **C.Y. Kao**, C. Escobar, E.T. Papoutsakis "Megakaryocytic Microparticles for Gene- and Cell- Therapies" 59<sup>th</sup> ASH Annual Meeting (2017)
- **C.Y. Kao**, E.T. Papoutsakis, "Exploring the Space of CHO Extracellular Vesicles and their Potential Applications" AMBIC IAB Meeting (2017)
- **C.Y. Kao**, E.T. Papoutsakis, "Nucleic Acid Delivery to Hematopoietic Stem Cells using Megakaryocytic Microparticles" 9<sup>th</sup> Extracellular RNA Communication Consortium (2017)
- **C.Y. Kao**, E.T. Papoutsakis, "Therapeutic Application of Megakaryocytic Microparticles in Gene Delivery" Boston Taiwanese Biotech. Association Symposium (2017)
- **C.Y. Kao**, J.Jiang, E.T. Papoutsakis "Extracellular vesicles and their applications in human therapy and cell culture" AMBIC Launch Meeting (2016)

### Award

- **Outstanding Poster Award**, Cell Culture Engineering XVI (2018)
- **University of Delaware Professional Development Award**, (Nov 2016, Dec 2017)

### Skills

- Mammalian Cell Culture, Flow Cytometry, Confocal Microscopy, Super-Resolution Microscopy, Molecular and Biology Techniques, Transcriptional Analysis (qPCR), Western Blotting, Experimental Design

# OHNMAR KHANAL

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CHEMICAL & BIOMOLECULAR ENG. DEPT. | UNIVERSITY OF DELAWARE  
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(917) 238-8727 | [okhanal@udel.edu](mailto:okhanal@udel.edu) | [WWW.LINKEDIN.COM/IN/OHNMARKHANAL/](http://WWW.LINKEDIN.COM/IN/OHNMARKHANAL/)

## EDUCATION

**Bachelor of Science**, Chemical-Biological Engineering, MASSACHUSETTS INSTITUTE OF TECHNOLOGY,  
Cambridge, MA (2012)

## ACADEMIC EMPLOYMENT

UNIVERSITY OF DELAWARE, Newark, DE 2015 – present

**Ph.D. Candidate - Chemical and Biomolecular Engineering** (September 2015 - Present)

**Advisor: Dr. Abraham M. Lenhoff**

- Correlated measured adsorption of model proteins and therapeutics mAbs onto depth filters (DF) to bulk measured properties. Explored the role of DF components in the removal of differently charged proteins.
- Probed the mechanisms by which nucleic acids are retained on depth filter media.
- Enriched and separated mAb charge variants using a novel multi-column charge displacement chromatography with partial recycling approach.

*Recognitions:*

University Graduate Scholars Award (2018)

University Summer Doctoral Award (2018)

Third Place Academic Best Poster, Preparative and Process Chromatography Symposium (2018)

Best talk in "Downstream Processes: Advances in Non-Chromatographic Separations I", ACS BIOT (2017)

Exceptional performance in the Ph.D. qualifying examination (2016)

## ACADEMIC EXPERIENCE

MIT, Cambridge, MA 2009 - 2012

*Robert Langer Lab* (February 2011 - May 2012)

**Undergraduate Researcher**

Helped synthesize and screen of a library of functionalized, cationic, biodegradable poly (beta-amino esters) for their utility in siRNA delivery followed by complexation with siRNA and transfection of Dual-Hela cells.

*Allan Myerson Lab* (September 2011 - February 2012)

**Undergraduate Researcher**

Assisted in the study of heterogeneous nucleation of pharma compounds on biocompatible thin films to control crystal forms. Determined compounds', temperature and solvent dependent, solubility and crystal induction times.

## PROFESSIONAL EXPERIENCE

MODERNA THERAPEUTICS, INC., Cambridge, MA 2014 – 2015

**Process Development Engineer- Production** (December 2014 – August 2015)

Collaborated to identify bottlenecks and help improve the mRNA therapeutic production process.

INVIVO THERAPEUTICS CORPORATIONS, Cambridge, MA 2013 - 2014

**Chemical Engineer** (August 2013 - July 2014)

Researched biomaterials, drug and protein combination products for medical device applications, consisting of hydrogel and polymer particles. Managed external collaboration for analytical/physical characterization.

**Assistant Chemical Engineer** (May 2013 - August 2013)

### SKILLS

*Software:* Proficient in Matlab, Aspen Plus, Minitab, Empower, Prism, Image J and knowledge of Python

*Microscopy and spectroscopy:* SEM, confocal and light microscopy. UV, visible and mass spectroscopy

*Characterization:* Gas adsorption, HPLC/Akta systems, light scattering, and thermal analysis (DSC, TGA)

*Molecular biology:* Mammalian and bacterial cell culture and transfection

*Languages:* Fluent in Burmese and proficient in Nepali

### SERVICE AND TEACHING

**Co-representative, Graduate Women in Engineering at University of Delaware** (April 2016 – August 2018)

Encourage, and promote initiatives for women in STEM. Responsible for planning and executing several events including talks by distinguished speakers, career panels, get to your faculty events and coffee/social breaks.

**Teaching Assistant for CHEG 345 Junior Lab at University of Delaware** (February 2017 - May 2017)

Planned, tested and troubleshoot a vapor-liquid equilibrium experiment for ~ 95 students. Conducted lab tours, assisted the students in conducting the experiment and provided guidance and feedback on lab reports.

### PUBLICATIONS

Khanal, Ohnmar, et al. "Contributions of Depth Filter Components to Protein Adsorption in Protein Bioprocessing." *Biotechnology and bioengineering* (2018).

Khanal, Ohnmar, et al. "DNA retention on depth filters." *Journal of Membrane Science* 570 (2019): 464-471.

Khanal, Ohnmar, et al. "Multi-column Displacement Chromatography for Separation of Charge Variants of Monoclonal Antibodies." *Journal of Chromatography A* (2018).

### CONFERENCE PRESENTATIONS

The 29<sup>th</sup> International PREP Symposium, 2016 "Characterizing diatomaceous earth and its capacity as an adsorbent for proteins" (Poster)

The 253rd ACS (BIOT), 2017 "Deconstructing depth filters and providing mechanistic insights into their function" (Oral)

The 30<sup>th</sup> International PREP Symposium, 2017 "Deconstructing depth filters and providing mechanistic insights into their function" (Oral)

The 255th ACS (BIOT), 2018 "Mechanisms of DNA retention on depth filters" (Oral)

The 31<sup>th</sup> International PREP Symposium, 2018 "Size Effects on DNA retention on depth filter into their function" (Poster)

The 31<sup>th</sup> International PREP Symposium, 2018 "Multi-column charge displacement chromatography for separation of charged variants of monoclonal antibodies" (Poster)

### PROFESSIONAL COURSES & WORKSHOPS

Proteomics. Cold Spring Harbor Laboratory. Cold Spring Harbor, NY, August 7-21 2018.

Biophysical Characterization Workshop. University of Delaware. Newark, DE, June 6-8 2017.

# Hojin Kim

Ph.D Candidate

Department of Chemical & Biomolecular Engineering

University of Delaware

Allan P. Colburn Laboratory, 150 Academy Street, Newark, DE 19716 USA

E-mail: [hjkim@udel.edu](mailto:hjkim@udel.edu), tel +1 302-509-9474

## Education

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**UNIVERSITY OF DELAWARE**, Ph.D., Department of Chemical and Biomolecular Engineering, 2015-  
Advisor: Eric M. Furst

**HANYANG UNIVERSITY**, B.S., Department of Chemical Engineering, 2015

Thesis : "Molecular thermodynamic analysis for phase transitions of linear and cross-linked poly(N-isopropylacrylamide) in water/2-propanol"

Advisor : Prof. Young Chan Bae

GPA : 4.25/4.5 (3.86/4.0)

## Professional Experience

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- Undergraduate Research Assistant, Department of Chemical Engineering, Hanyang University, July/2012 - March/2014
- Graduate Teaching Assistant, Department of Chemical Engineering, University of Delaware, Chemical Engineering Thermodynamics (CHEG325), Spring, 2017
- Graduate Teaching Assistant, Department of Chemical Engineering, University of Delaware, Chemical Engineering Thermodynamics/Equilibria in Material Systems (CHEG825/MSEG803, Fall, 2017)
- Visiting Scholar (Project leader: Dr. George Fytas), Max Planck Institute for Polymer Research, Mainz, Germany, 2018
- Research Assistant, Department of Chemical Engineering, University of Delaware, September/2015-Present

## Honors & Fellowships

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1. Outstanding Student (2012) - the best academic performance in Hanyang University
2. National Natural Sciences and Engineering Scholarship (South Korea)
3. Scholarship for Top Student in Hanyang University
4. Travel Grant, Winter School 2019 - Nanomaterials for Energy Storage and Conversion, January 2019, Tel Aviv University, Tel Aviv, Israel.

## Publications

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1. S. Y. Oh, **H. J. Kim** and Y. C. Bae "Molecular thermodynamic analysis for phase transitions of linear and cross-linked poly(N-isopropylacrylamide) in water/2-propanol", *Polymer*, 2013, **54**, 6776-6784
2. **H. Kim**, Y. Cang, E. Kang, B. Graczykowski, M. Secchi, M. Montagna, R. D. Priestley, E. M. Furst, and G. Fytas, "Direct Observation of Polymer Surface Mobility via Nanoparticle Vibration" *Nat. Comm.*, 2018, **9** ([Publicity](#))
3. E. Kang, **H. Kim**, L. A. G. Gray, D. Christie, U. Jonas, B. Graczykowski, E. M. Furst, R. D. Priestley, and G. Fytas, "Ultrathin Shell Layers Dramatically Influence Polymer Nanoparticle Surface Mobility", *Macromolecules*, 2018, **51** (21), pp 8522-8529
4. **H. Kim** J. L. Bauer, P. A. Vasquez, and E. M. Furst, "Structural coarsening of magnetic ellipsoidal particle suspensions driven in toggled fields", *submitted*
5. **H. Kim** and E. M. Furst, "Synthesis of Superparamagnetic Anisotropic Metal-Polymer Multi-Layered Nanoparticles", *in preparation*

## Professional Presentations

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### Oral Presentation

1. **H. Kim**, E. M. Furst, "Building phononic crystals via directed self-assembly of anisotropic particles", Mid-Atlantic Soft Matter Workshop at University of Delaware, February 3, 2017, Delaware, USA
2. **H. Kim**, E. M. Furst, Y. Cang, G. Fytas, "Directed Self-Assembly of Dicolloids into Phononically Active Crystals", 91<sup>st</sup> ACS Colloid & Surface Science Symposium, July 9-12, 2017, New York, USA.
3. **H. Kim**, E. M. Furst, Y. Cang, E. Kang, B. Graczykowski, G. Fytas, M. Secchi, M. Montagna, and R. D. Priestley, "Direct Observation of Polymer Surface Mobility via Nanoparticle Vibration", APS March Meeting, March 5-9, 2018, Los Angeles, CA, USA
4. **H. Kim**, G. Fytas and E. M. Furst, "Phononic Properties of Self-Assembled Nanodicolloid Crystal", 92<sup>nd</sup> ACS Colloid and Surface Science Symposium, June 10-13, 2018, State College, PA, USA
5. **H. Kim**, E. M. Furst, "Direct Observation of Surface Mobile Layer *via* Nanoparticle Vibration", Mid-Atlantic Soft Matter Workshop, August 3, 2018, Georgetown University, Washington DC, USA

### Poster Presentation

1. **H. Kim**, E. M. Furst, Y. Cang, G. Fytas, "Crystallization of Nano-Dicolloids by Directed Self-Assembly", Gordon Research Seminar & Gordon Research Conference, February 3-9, 2017, Ventura, CA, USA.

# Joshua L. Lansford

Department of Chemical and Biomolecular Engineering  
University of Delaware, Newark, DE 19716-3110

(703) 400-3046  
lansford.jl@gmail.com

## Education

### **University of Delaware, College of Engineering**

Major: PhD Candidate in Chemical Engineering, GPA: 3.76  
Advisor: Dr. Dionisios G. Vlachos

**Newark, DE**  
2015 – 2020 (Expected)

### **University of Virginia, School of Engineering and Applied Science**

Major: Chemical Engineering with High Distinction and a minor in Engineering Business, GPA: 3.79

**Charlottesville, VA**  
2009 – 2013

## Interests and Skills

**Research Areas:** Electrocatalysis, fuel cells, and batteries

- Machine learning and uncertainty quantification of stochastic and deterministic models
- Applications in characterization and micro-kinetic modeling using transition state theories, statistical mechanics include heterogeneous catalysis, spectroscopy, surface science, and quantum chemistry

**Programming Languages:** Unix, SAS, SQL, Python, Aspen, MATLAB, Tableau, Java, JavaScript, VBA, HTML, Mathcad

- Contributor to open source atomic simulation python software [ASE](#)
- Developer of the University's Proxify bookmark into a [Chrome Extension](#) for downloading scientific journals

## Honors and Awards

- 2018 – Phillip and Ruth Evans Fellowship, University of Delaware Professional Education Development Award, ISCRE25 Graduate Student Travel Grant, CRE Division AIChE Graduate Student Travel Grant
- 2017 – National Science Foundation Graduate Research Fellowship, Honorable Mention
- 2013 – Louis T. Rader Chemical Engineering Prize, First place national winner of the Up to Us National Debt Campaign, awarded by President Clinton
- 2012 – Second place at the AIChE student poster competition
- 2011 – Donald and Jean Heim Scholarship
- 2010 – Dr. John Kenneth Haviland Scholarship
- 2009 – ExxonMobil Teagle Scholarship

## Research Experience

### **University of Delaware – Advisor: Dr. Dionisios G. Vlachos**

**Newark, DE**

Topic: Discrete and Probabilistic Surrogate Model Development with Uncertainty Quantification for Catalyst Characterization and Kinetic Modeling via Fundamental Theory and Machine Learning

2015 – 2020 (Expected)

- Developed theory to explain vibrational scaling of chemisorbates on transition metal surfaces from quantum principles
- Built models from theory and computation for identifying adsorption species and sites in experiments
- Quantifying impact of uncertainty in a multi-scale oxygen reduction (ORR) kinetic model

### **University of Connecticut**

**Storrs, CT**

National Science Foundation Research Fellowship

2012

- Developed Predictive Fluid Catalytic Cracking Model that split effects of the support matrix and active zeolite catalyst to better determine gasoil conversion and product yields

### **University of Virginia Organic Synthesis Lab**

**Charlottesville, VA**

- Determined optimal reaction conditions for stereospecific mechanisms
- Ran ion-exchange chromatography separations

2010

## Teaching & Advising

### **University of Delaware**

**Newark, DE**

REU Mentor – feature selection for rapid catalyst screening

Summer, 2017

Teaching Assistant – process design

Spring, 2017

- Initiated, designed, and taught a new in-person team-building class for honors students

## Journal Publications

J. L. Lansford, A. V. Mironenko, and D. G. Vlachos, Scaling relationships and theory for vibrational frequencies of adsorbates on transition metal surfaces. Nat. Commun. 8, No. 1842 (2017).

J. Feng, J. L. Lansford, A. Mironenko, D. B. Pourkargar, D. G. Vlachos, M. A. Katsoulakis, Non-parametric correlative uncertainty quantification and sensitivity analysis: Application to a Langmuir bimolecular adsorption model. AIP Adv. 8, 035021 (2018).

M. Núñez, J. L. Lansford, and D.G. Vlachos, Optimization of transition metal catalyst facet structure: Application to the oxygen reduction reaction. *Nat. Chem.* - Accepted

J. L. Lansford, D. G. Vlachos, Generating synthetic IR spectra to reconstruct local catalyst microstructure from DFT, theory, and machine learning. (In Preparation)

J. L. Lansford, J. Feng, M. A. Katsoulakis, and D. G. Vlachos, The uncertainty quantification index for correlated uncertainty: Predicting the ideal catalyst for the oxygen reduction reaction. (In Preparation)

J. Feng, J. L. Lansford, M. A. Katsoulakis, and D. G. Vlachos, Probabilistic graph theory models combining physical models, expert opinion, and data. *Proc. Nat. Acad.* (In Preparation)

### **Invited Talks, Presentations and Posters**

#### **AIChE Meeting Presentation**

Catalyst Characterization from Complex Infrared Spectroscopy: A Machine Learning Approach

**Pittsburgh, PA**

Oct. 2018

#### **Gordon Research Conference**

Entropic Effects on Microkinetic Modeling

**New London, NH**

June 2018

#### **International Symposia of Chemical Reaction Engineering (ISCRE25) – Invited Talk**

Catalyst Structure Prediction via DFT, Theory, and Machine Learning

**Florence, Italy**

May 2018

#### **Catalysis Club of Philadelphia Poster Competition**

Scaling Relations for Adsorbate Vibrations on Transition Metal Surfaces

**Philadelphia, PA**

Nov. 2017

#### **AIChE Meeting Presentation**

Adsorbate Vibrations on Transition Metal Surfaces: Applications and Theory

**Minneapolis, MN**

Oct. 2017

#### **AIChE Student Poster Competition**

Separation of Catalyst Kinetics for Maximizing Gasoline Output, Yield, and Selectivity

**Pittsburgh, PA**

Oct. 2012

- Won second place in the Fuels, Petrochemicals, and Energy Division

### **Industry Work Experience**

#### **Capital One Bank**

Senior Data Analyst: National Expansion

**McLean, VA**

2014 – 2015

- Developed geocoding system to map customer ATM transactions at foreign-owned ATMs: Makes use of Google's geocoding API, SAS fuzzy matching, Unix, Teradata, and Tableau
- Identified effectiveness of digital advertising and presented findings to the Managing Vice President of National Expansion
- Created Tableau based one-size-fits-all performance tool that provides daily updates to 10 Capital One Cafes and serves as the monthly business report for the managing vice president
- Converted organization's data library to Tableau infrastructure and scaled to all markets of interest.

#### **Capital One Bank**

Data Analyst: Bank Operations

**Richmond, VA**

2013 – 2014

- Led self-proposed initiative to automate case tracking system for five business teams. Headed two IT teams and coordinated with business teams in addition to developing and mapping out the automated system – saves 25-50 business hours per day
- Leveraged analysis and software development skills to automate identification of 17 high risk transactions
- Responded to audit of Capital One IRA team by generating dynamic alerts to all 900 branches
- Managed Capital One data work with a third-party company to fulfill social security asset requests

#### **CLEARresult Consulting**

Core Engineering Energy Efficiency Consultant

**Fairfax, VA**

2010 – 2011

- Incorporated new efficiency regulations and standards into training documents
- Presented contract proposal findings to Vice President of Engineering

### **University Service & Leadership**

#### **University of Delaware**

Manage and update the Vlachos research group [website](#)

**Newark, DE**

2016 – Present

#### **University of Virginia**

University Dormitory Resident Advisor

**Charlottesville, VA**

2010 – 2013

- Advised over 60 first year students to help them transition to college through academic, service, and multicultural programs

President of UVA OXE Chemical Engineering Honor Society

2012 – 2013

- Organized tutoring, research panels, and other service and leadership opportunities

Co-President of UVA Wahoo Wizards Educational Outreach Group

2012 – 2013

- Develop and piloted new experiments in Charlottesville elementary schools to teach science to low-income students

# Paige J. LeValley

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## Education

### **Ph.D. Candidate in Chemical Engineering**

**Fall 2015 - Present**

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

### **M.S. in Chemical Engineering**

**Summer 2015**

*University of Wyoming*, Laramie, WY  
Department of Chemical Engineering

### **B.S. in Chemical Engineering**

**Summer 2013**

*University of Wyoming*, Laramie, WY  
Department of Chemical Engineering

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## Research Experience

### **Graduate Research Assistant**

**Fall 2015 - Present**

*University of Delaware, Department of Chemical and Biomolecular Engineering*  
Advisor: Dr. April M. Kloxin

Establishing a multimodal responsive hydrogel microparticle system for controlled and tailorable delivery of protein therapeutics towards development of a personalized medicine platform.

### **Graduate Research Assistant**

**Fall 2013 – Summer 2015**

*University of Wyoming, Department of Chemical Engineering*  
Advisor: Dr. John Oakey

Created topology complex photodegradable surfaces for rare cell capture and miniaturized biosensors using *in situ* photopolymerization of poly(ethylene glycol) (PEG) hydrogels within microfluidic devices.

### **Undergraduate Research Assistant**

**Summer 2012 – Summer 2013**

*University of Colorado Boulder and University of Wyoming, Department of Chemical Engineering*  
Advisor: Dr. Kristi Anseth and Dr. John Oakey

Established an approach for the integration of photodegradable PEG hydrogels into microfluidic platforms to create capture surfaces for the specific capture and release of rare mammalian cells from whole blood toward enhanced diagnostic platforms.

### **Undergraduate Research Assistant**

**Summer 2011 – Spring 2012**

*University of Wyoming, Department of Chemical Engineering*  
Advisor: Dr. John Oakey

Generated a protocol for the formation of microfluidic devices using Silastic 7-4860 Biomedical Grade LSR (Dow Corning) and characterized the material properties of devices made with this material.

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## Honors and Awards

**University of Delaware Chemical and Biomolecular Engineering Teaching Fellow, 2018-2019**

**Phillip and Ruth Evans Chemical Engineering Fellowship, 2017**

**Wyoming NSF EpSCoR Wyoming Women in Science and Engineering Travel Grant, Spring 2014 and Fall 2014**

**Outstanding Student Presentation, Second Place at the 51<sup>st</sup> Annual Rocky Mountain Bioengineering Research Symposium, Spring 2014**

**Minority and Women Graduate Assistantship Award, 2013 - 2014**

**Wyoming Engineering Society Chemical Engineer of the Year Award, Spring 2013**

**Tau Beta Pi Honor Society, University of Wyoming, Inducted Fall 2012**



## **Publications**

- **LeValley, P.**, Tibbitt, M., Noren, B., Kharkar, P., Kloxin, A., Anseth, K., Toner, M., Oakey, J., *Coll Surf B: Biointer*, 2018, 483-92. DOI: 10.1016/j.colsurfb.2018.11.049.
  - Wu, H., **LeValley, P.**, Luo, T., Kloxin, A., Kiick, K., *Bioconjugate Chemistry*, **29**, 2018, 3595-3605. DOI: 10.1021/acs.bioconjchem.8b00546.
  - Smithmyer, M., Deng, C., Cassel, S., **LeValley, P.**, Sumerlin, B., Kloxin, A., *ACS Macro Lett*, **7**, 2018. DOI: 10.1021/acsmacrolett.8b00462.
  - **LeValley, P.**, Noren, B., Kharkar, P., Kloxin, A., Gatlin, J., Oakey, J., *ACS Biomater Sci Eng*, **4**, 2018, 3078-87. DOI: 10.1021/acsbiomaterials.8b00350.
  - **LeValley, P.\***, Ovadia, E. \*, Bresette, C., Sawicki, L., Maverakis, E., Bai, S., Kloxin, A., *Chem Comm*, **54**, 2018, 6923-26. DOI: 10.1039/C8CC03218A. \*equal contribution
  - Kharkar, P., Scott, R., Olney, L., **LeValley, P.**, Maverakis, E., Kiick, K., Kloxin, A., *Adv Healthc Mater*, **6**, 2017, 1700713. DOI: 10.1002/adhm.201700713.
- 

## **Manuscripts in Progress**

- **LeValley, P.**, Kloxin, A., *ACS Macro Lett*, Manuscript in Revision.
  - **LeValley, P.**, Neelarapu, R., Dasgupta, S., Kloxin, C., Kloxin, A., *Chem of Mater*, Manuscript in Prep.
- 

## **Selected Conference Presentations**

- **LeValley, P.**, Kloxin, A., Poster Presentation at: Gordon Research Conference on Drug Carriers in Medicine and Biology; 2018 August 12 – 17: West Dover, VT.
  - **LeValley, P., et al.**, Oral Presentation at: 254<sup>th</sup> ACS National Meeting; 2017 August 20 – 24: Washington, DC.
  - **Fischer, P.**, Xia, B., and Oakey, J., Oral Presentation at: 2014 AIChE Annual Meeting; 2014 November 16-21: Atlanta, GA.
  - **Fischer, P., et al.**, Poster Presentation at: The 18th Annual Conference on Miniaturized Systems for Chemistry and Life Sciences; 2014 October 26-30: San Antonio, TX..
  - **Fischer, P., et al.**, Oral Presentation at: 51st Annual Rocky Mountain Bioengineering Research Symposium; 2014 Apr 4; Denver, CO.
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## **Teaching and Communication Experience**

### **Mentoring of Undergraduate Researcher**

*University of Delaware*

*Summer 2017 - Present*

### **Radio Show Host**

*University of Delaware, Rise and Science (91.3 WVUD)*

*Spring 2017 – Present*

- A radio show focused on making science advances accessible to the local community

### **Teaching Assistant for Chemical Engineering Department**

*University of Delaware*

*Fall 2017 and Spring 2018*

### **Colburn Club Outreach Chair**

*University of Delaware*

*Fall 2016 – Fall 2018*

## **Research Skills**

### **Material Synthesis and Characterization**

End-group modification of commercial polymers, solid-phase peptide synthesis, organic small molecule synthesis, click chemistry, <sup>1</sup>H NMR, <sup>2</sup>D NMR, mass spectrometry (ESI), HPLC, UV-Vis spectrometry, rheology, profilometry, tensile stress/strain testing

### **Microfluidic Techniques**

Formation of PDMS devices using PDMS, oxygen plasma bonding, photolithography, and droplet formation

### **Cell Culture**

Mammalian cell culture, cell viability assays, enzymatic assays (ELISA)

# YU LUO

University of Delaware, 150 Academy St., Newark, DE 19716

<https://l16cn.github.io>

## EDUCATION

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- Columbia University, Graduate School of Arts and Sciences** 02/2017  
Doctor of Philosophy, Chemical Engineering
- Columbia University, Fu Foundation School of Engineering and Applied Science** 05/2012  
Master of Science, Chemical Engineering  
**Full GPA**
- National University of Singapore, Faculty of Engineering** 06/2011  
Bachelor of Engineering, Chemical Engineering  
**First Class Honors**

## EXPERIENCE

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- University of Delaware, Chemical and Biomolecular Engineering** 06/2017–Present  
*Postdoctoral Researcher* Newark, DE
- **Advisors:** Prof. Babatunde A. Ogunnaike and Prof. Kelvin H. Lee
  - **Project(s):** Multiscale modeling of antibody and glycosylation for improved upstream process design
  - Collaborated closely with a major pharmaceutical company to design manufacturing process of antibody
  - Employed systems techniques to identify a multiscale dynamical model of cell culture and glycosylation
  - Developed a model to quantify effect of process conditions on cell growth and glycosylation dynamics
  - Implemented an algorithmic decision-making tool (user interface) for upstream process development
  - Optimized MATLAB codes to run 60 times faster than the previous version
- Columbia University, Chemical Engineering** 09/2011–05/2017  
*Doctoral Student (2011–2016) and Postdoctoral Researcher (2017)* New York, NY
- **Advisors:** Prof. Venkat Venkatasubramanian and Prof. Garud Iyengar
  - **Dissertation:** Multi-agent control in sociotechnical systems
  - Led multiple interdisciplinary research teams of graduate and undergraduate students
  - Guest-lectured graduate-level courses including “Managing Systemic Risk in Complex Systems”
  - Modeled collective dynamics of interacting and intelligent agents using control theory
  - Designed soft feedback mechanisms to make intelligent crowds “smarter”
  - Discovered deep connections through game theory between income inequality and thermodynamics
  - Conducted behavioral research experiments on social influence with human subjects
  - Developed a data-driven early warning system to predict mine accidents based on regulatory data
  - Applied process hazard analysis (signed digraph) to identifying vulnerabilities in financial networks
  - Worked with Prudential Financial on a financial statement based risk measure for insurers and banks
- PNC Bank** 08/2015–12/2015  
*Quantitative Analyst Intern* New York, NY
- **Manager:** Dr. Brian Burk
  - Supervised two graduate students and collaborated with finance professionals at PNC Bank
  - Built an operational risk model based on the loss distribution approach

# JONATHAN LYM

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## EDUCATION

---

**University of Delaware, College of Engineering**, Newark, DE Aug 2015 - Present

Ph.D. Candidate, Chemical and Biomolecular Engineering

Thesis Advisor: Prof. Dionisios G. Vlachos

Thesis Title: "Catalytic Conversion of Carbon Dioxide to Value-Added Products"

**University of Pennsylvania, School of Engineering**, Philadelphia, PA Aug 2011 - May 2015

B.S.E., Chemical and Biomolecular Engineering, *Magna Cum Laude*

Concentration: Energy and Sustainability

## RESEARCH EXPERIENCE

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**Ph.D. Candidate** Jan 2016 – Present

*Vlachos Research Group, University of Delaware*

- Developed pMuTT (<https://github.com/VlachosGroup/pMuTT>), a Python library to streamline conversion of *ab-initio* data to thermochemical data
- Created machine-learning models, such as cluster-expansions and neural networks, to predict coverage effects over metal and metal oxide systems with multiple adsorbates
- Investigated reaction mechanisms using VASP for metal and metal oxide catalysts
- Constructed mean-field microkinetic models using Chemkin to analyze reaction pathways for metal and metal oxide catalysts
- Developed and led workshops on VASP, ASE, and pMuTT for graduate students
- Organized development of internal group website, which tripled membership in four months

**Undergraduate Research Assistant** May 2014 – May 2015

*Gorte and Vohs Research Group, University of Pennsylvania*

- Synthesized supported precious metal catalysts by liquid impregnation methods
- Monitored reaction paths of furfural on supported metal catalysts using DRIFTS

## PUBLICATIONS

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- **Lym, J.**; Wittreich, G.; Vlachos, D. G., pMuTT: A Python library to streamline conversion of *ab-initio* data to thermodynamic properties (in preparation)
- Fu, J.; **Lym, J.**; Zheng, W.; Alexopoulos, K.; Mironenko, A. V.; Vlachos, D. G., Enhancement of metal oxide activity for biomass hydrogenation using single atom catalysts (in preparation)
- **Lym, J.**; Gu, G.; Jung, Y.; Vlachos, D. G., Lattice Convolutional Neural Network for Modelling Adsorbate Coverage Effects (in preparation)
- Ebikade, E.; **Lym, J.**; Wittreich, G.; Saha, B.; Vlachos, D. G. *Ind. Eng. Chem. Res.* **2018**, acs.iecr.8b04671.
- Goulas, K. A.; Lee, J. D.; Zheng, W.; **Lym, J.**; Yao, S.; Oh, D. S.; Wang, C.; Gorte, R. J.; Chen, J. G.; Murray, C. B.; Dionisios, D. G. *Catal. Sci. Technol.* **2018**, 6100–6108.

## PRESENTATIONS

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- **Lym, J.**; Gu, G.; Vlachos, D. G.; Jung, Y. “Investigating Coverage Effects of O, NO/Pt(111) via Machine Learning”, AIChE Annual Meeting, Pittsburgh, PA, 2018. (Oral presentation)
- **Lym, J.**; Fu, J.; Zheng, W.; Alexopoulos, K.; Mironenko, A. V.; Vlachos, D. G., “Enhancing the Specific Activity of Metal Oxides Using Transition-Metal Dopants”, AIChE Annual Meeting, Pittsburgh, PA, 2018. (Oral presentation)
- **Lym, J.**; Gu, G.; Vlachos, D. G.; “Understanding the Active Site for CO<sub>2</sub> Conversion to Methanol”, Gordon Research Seminar: Accelerating Catalytic Solutions to Global Grand Challenges, New London, NH, 2018. (Poster presentation)
- **Lym, J.**; Gu, G., Vlachos, D. G., “Understanding the Active Site for CO<sub>2</sub> Conversion to Methanol”, Machine Learning in Science and Engineering, Pittsburgh, PA, 2018. (Poster presentation)
- **Lym, J.**, Gu, G., Vlachos, D. G., “Understanding the Active Site for CO<sub>2</sub> Conversion to Methanol”, Catalysis Club of Philadelphia Poster Session, Wilmington, DE, 2017. (Poster presentation)
- **Lym, J.**, Gu, G., Vlachos, D. G., “Understanding the Active Site for CO<sub>2</sub> Hydrogenation to Methanol over Metal-Oxide Catalysts”, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, Minneapolis, MN, 2017. (Oral presentation)

## SOFTWARE SKILLS

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**Modelling:** VASP, Tensorflow, Chemkin, Aspen Plus

**Programming:** Python, MATLAB, Bash, C, C++, R, Golang

**Productivity:** Microsoft Office (Word, Excel, PowerPoint, Visio), Origin, LaTeX, Adobe Creative Suite

## HONORS AND AWARDS

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- Catalysis Club of Philadelphia Student Poster Competition Winner Nov 2017
- Rachleff Scholars, Research Program Nov 2012 – May 2015
- Deans List Aug 2011- May 2012, Aug 2013 – May 2015

## TEACHING EXPERIENCE

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### Graduate Teaching Assistant

*University of Delaware*

- Green Engineering (CHEG 625) taught by Dr. Robert Giraud Feb 2018 – May 2018
- Applied Chemical Kinetics (CHEG 835) taught by Prof. Michael Klein Aug 2017 – Dec 2017

### Undergraduate Teaching Assistant

*University of Pennsylvania*

- Introduction to Chemical Engineering (CBE 160) taught by Dr. Sean Holleran Jan 2014 -May 2014

# ALEXANDER A. MITKAS

123 Arielle Dr., Newark, DE, U.S.A.

[Mitkas@udel.edu](mailto:Mitkas@udel.edu) / Citizenship: US and Greek

Cell #: 617-233-2009

## EDUCATION

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2015-Present	<b>University of Delaware</b> , Newark, DE, U.S.A. <ul style="list-style-type: none"><li>• Ph.D. in Chemical-Biomolecular Engineering <b>Current GPA: 4.0/4.0</b></li><li>• Member of the Chemistry-Biology Interface Program</li></ul>
2011-2015	<b>Massachusetts Institute of Technology</b> , Boston, MA, U.S.A. <ul style="list-style-type: none"><li>• B.S.E. in Chemical-Biological Engineering (10B) <b>GPA: 4.7/5.0</b></li></ul>
2009-2011	<b>International Baccalaureate, Anatolia College</b> , Thessaloniki, Greece <ul style="list-style-type: none"><li>• Dean's List, International Baccalaureate, AC</li><li>• IB Merit Scholarship</li><li>• Anatolia College of Thessaloniki Merit Scholarship</li></ul>

## RELEVANT SKILLS

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<b>Languages</b>	Greek (Native), English (Native), German (Advanced, C1 Certificate June 2009), French (Intermediate), Classical Greek (Advanced: read, write, and translate).
<b>Courses Completed</b>	Graduate Level: Chemical Kinetics, Chemical Thermodynamics, Linear Algebra, Protein and Cellular Engineering, Metabolic Engineering, Statistics.
<b>Additional</b>	Proficient: MATLAB (8 courses involving MATLAB and 4years of self-teaching), Extensive experience: Biological laboratories.

## ACADEMIC DISTINCTIONS

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2018-2019	•Recipient of University of Delaware's Graduate Scholars Award
2016-2017	•Received honorable mention for the NSF-GRFP scholarship
2015-2016	•Finalist for the George W. Laird fellowship
2015-2016	•Recipient of the Robert L. Pigford merit scholarship
2012-2014	•Ploussios Scholarship Fund

## LAB AND RESEARCH EXPERIENCES

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Spring 2016- Present	<b>Lab member of the Wilfred Chen group</b> <ul style="list-style-type: none"><li>• Developing a dynamic, high binding affinity, modular scaffold toolkit for the control of intracellular metabolic flux</li></ul>
Winter 2016	<b>CBI rotation in the Papoutsakis Lab</b> <ul style="list-style-type: none"><li>• Developed a new anaerobic co-culture system utilizing <i>C. acetobutanicum</i> and <i>C. ljungdahlii</i> for increased biofuel production</li><li>• Co-inventor of filed patent titled: SYNTHETIC AND SYNTROPHIC CO-CULTURE OF ACETOGENS AND SOLVENTOGENS TO MAXIMIZE SOLVENT PRODUCTION VIA MIXOTROPHY. Patent reference number is UD 17-11</li></ul>
Spring 2013- Summer 2014	<b>UROP at Koch institute in the Wittrup Laboratory, Cambridge USA:</b> <ul style="list-style-type: none"><li>• Worked with human embryonic kidney cells in a BL2 environment.</li><li>• Engineered stable cell lines for production of novel molecule (Fc/II2)</li><li>• Engineered, produced, and purified novel proteins Fc/II21, Fc/II15, and Fc/G-CSF.</li><li>• Tested above proteins combined with TA99 antibody in mice with B16F10 melanoma tumors.</li></ul>
Spring semester 2012	<b>UROP at Whitehead Institute in the Fink Laboratory, Cambridge USA:</b> <ul style="list-style-type: none"><li>• Helped develop screening process for simultaneous testing of multiple high isopropanol producing yeast mutants.</li><li>• Allowed faster detection of high isopropanol producing yeast mutants.</li></ul>

## **PRESENTATIONS, PROCEEDINGS, AND PAPERS**

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November 2018 *Developing a high affinity, dynamic scaffold toolkit for intracellular spatial organization of proteins.* Oral presentation presented at the annual meeting of the American Institute of Chemical Engineers (AIChE), Pittsburgh, PA.

## **LEADERSHIP**

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2015-Present Board member of the NGO Afixis

- Education centered NGO based in Greece
- Programs under the umbrella of Afixis include: Model Greek Parliament, World Academic Expo (WAVE), Protagoras (trial simulations)
- Responsibilities include helping identify educational goals for the programs, and determining how to best achieve those goals

Fall 2014 Selected by course instructors to be a teaching assistant (TA) for introductory biology lab course (Subject number at MIT is 7.02)

- Graded students' daily assignments.
- Assisted and supervised students during lab time.

Summer 2014 Selected as one of the 25 participants in the Amgen Scholars program at MIT

- Received stipend for working at the Wittrup Lab.
- Presented a poster on the results at the end of the program.

Fall 2013, Summer 2014 Elected President/House Manager at the No6 Club (Delta Psi) Independent Living Group (ILG)

- Responsible for managing a house with 40 residents. Duties range from maintaining the house in good condition to representing the No6 Club in MIT.

2012-2015 Elected Recruitment Chair at the No6 Club (Delta Psi) ILG

- Organized all the events for the No6 Club during MIT Rush week.

Fall 2012 Elected Social Chair at the No6 Club (Delta Psi) ILG

- Organized social events for the Club for the semester.

2011-2012 Elected member of the MIT Hellenic Student Association executive board

- Attended meetings. Helped organize Greek culture related events.

2010-2011 Selected to represent Anatolia College in the Deree XXX9 Invitational Debate Tournament, Athens, Greece (Finalists).

## **EXTRACURRICULAR-OUTREACH ACTIVITIES**

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2017-Present Algebra tutoring for middle school students (sixth grade)

2016-Present Reviewer for World Academic Expo (WAVE) applications

- WAVE is a conference where undergraduate students from all over Greece have a chance to present their research
- Helped design the application itself as well as the requirements for a successful application
- Helped review applications

2016-Present Member of the Colburn outreach club (performed science demonstrations for middle school students)

2011-2012 Member of the MIT freshman heavyweight crew team (Fall semester 2011)

# Jared Nash

1209 Gilpin Avenue Wilmington, DE, 19806 • 508-846-1652 • [jnash@udel.edu](mailto:jnash@udel.edu)

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## EDUCATION

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**University of Delaware**, Newark, DE

PhD Candidate in Chemical Engineering (2014-present); *Projected Completion: Spring 2019*

Coursework GPA: 4.00/4.00

Thesis Advisors: Dr. Yushan Yan, Dr. Bingjun Xu

**Tufts University**, Medford, MA

Bachelor of Science in Chemical Engineering, Graduation: May 2014

GPA: 3.86/4.00, Dean's List: Fall 2010 – Spring 2014, Tau Beta Pi – Member 2013

Senior Honors Thesis with High Honors: *Novel Quantum Dot-Ionogel Light Emitting Devices and a Determination of the Mechanism for Electroluminescence*. Advisor: Dr. Matthew Panzer

## RESEARCH EXPERIENCE

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**University of Delaware** – *Graduate Research Assistant*

January 2015 – Present

- Synthesized, characterized, and tested Cr<sub>2</sub>N, VN, and VMN metal nitrides for ammonia production in proton exchange membrane electrolyzers
- Tested Pt, Ir, Pd, and Ru for ammonia production in both a hydroxide exchange membrane and proton exchange membrane electrolyzers
- Synthesized and performed physical and electrochemical characterizations on nickel and nickel molybdenum catalysts for the hydrogen oxidation reaction
- Analyzed pH effect on commercial PtRu bimetallic catalyst for the hydrogen oxidation reaction using a rotating disk electrode setup

**Tufts University** – *Senior Honors Thesis with High Honors*

September 2013 – May 2014

- Analyzed photoluminescence and electroluminescence spectra to characterize the quantum dot LEDs
- Integrated different ionic liquids into the quantum dot ionic liquid LEDs
- Examined the effect different gases have on the electroluminescence of quantum dot LEDs

**Tufts University** - *Summer Scholar Researcher in GENE Lab*

June 2012 – August 2012

- Created and tested a novel solid-state LED with quantum dots and ionic liquid gel
- Spin coated different thicknesses of quantum dots to test the effect of thickness on device performance
- Used an atom force microscope to determine quantum dot film thicknesses

## WORK EXPERIENCE

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**Ocean Spray Cranberries** - *Engineering Intern*

May 2013 – January 2014

- Developed a budget management and project tracking workbook to improve efficiencies in the daily procedures of the project managers
- Updated foreign material and metal detection systems into a Visio file

**The Whitehead Institute** - *Programming Intern*

May 2010 – June 2010

- Developed an Excel Database of genes to improve the efficiency of researcher finding relevant genes
- Developed a database used to find gene sections in a group

## TEACHING EXPERIENCE

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**Chemical and Biomolecular Engineering** - *Teaching Assistant*

• **CHEG431: Chemical Process Analysis**

September 2015 – December 2015

- TA in charge of grading/editing homework and organizing/leading review sessions before exams
- Received a student evaluation average of 4.66 out of 5 over 4 categories from 51 students

• **CHEG606: Introduction to Catalysis**

February 2016 – May 2016

- TA in charge of grading/editing homework
- Received a student evaluation average of 4.92 out of 5 over 4 categories from 22 students

# Jared Nash

1209 Gilpin Avenue Wilmington, DE, 19806 • 508-846-1652 • [jnash@udel.edu](mailto:jnash@udel.edu)

## SELECTED PRESENTATIONS

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1. J. Nash, J. Zheng, B. Xu, Y. Yan, “pH Dependence of HOR/HER Activity for PtRu/C”, Catalysis Club of Philadelphia Poster Session, Wilmington, DE, 2015. (Poster presentation)
2. J. Nash, J. Zheng, B. Xu, Y. Yan, “Effect of pH on the activity of hydrogen oxidation reaction/hydrogen evolution reaction over PtRu bimetallic catalysts”, American Chemical Society Fall Meeting, Philadelphia, PA, 2016, (Oral presentation)
3. J. Nash, J. Zheng, B. Xu, Y. Yan, “Ni and NiMo for Hydroxide Exchange Membrane Fuel Cells”, UD Winter Research Review, Newark, DE, 2017. (Poster presentation)
4. J. Nash, J. Zheng, B. Xu, Y. Yan, “Effect of pH on the activity of hydrogen oxidation reaction/hydrogen evolution reaction over PtRu bimetallic catalysts”, ECS Fall Meeting, National Harbor, MD, 2017. (Oral presentation)
5. J. Nash, X. Yang, J. Anibal, B. Xu, Y. Yan, “Electrochemical Synthesis of Ammonia using Proton and Hydroxide Exchange Membrane Cells”, ECS Fall Meeting, National Harbor, MD, 2017. (Oral presentation)
6. J. Nash, X. Yang, J. Anibal, B. Xu, Y. Yan, “Electrochemical Synthesis of Ammonia Using Metal Nitride Catalysts”, AIChE Annual Meeting, Pittsburgh, PA, 2018. (Oral presentation)

## PUBLICATIONS

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1. J. Nash, X. Yang, J. Anibal, J. Wang, Y. Yan, B. Xu, “Electrochemical Nitrogen Reduction Reaction on Noble Metal Catalysts in Proton and Hydroxide Exchange Membrane Electrolyzers.” *J. Electrochem. Soc.*, 164 (2017) F1712-F1716.
2. J. Zheng, J. Nash, B. Xu, Y. Yan, “Perspective—Towards Establishing Apparent Hydrogen Binding Energy as the Descriptor for Hydrogen Oxidation/Evolution Reactions.” *J. Electrochem. Soc.*, 165 (2018) H27-H29.
3. X. Yang, J. Nash, J. Anibal, M. Dunwell, S. Kattel, E. Stavitski, J. G. Chen, Y. Yan, B. Xu, , “Mechanistic Insights into Electrochemical Nitrogen Reduction Reaction on Vanadium Nitride Nanoparticles” *Journal of the American Chemical Society*, 2018, 140, 41, 13387-13391
4. S. A. Giles, J. C. Wilson, J. Nash, B. Xu, D. G. Vlachos and Y. Yan (2018). "Recent advances in understanding the pH dependence of the hydrogen oxidation and evolution reactions." *Journal of Catalysis*, Just Accepted
5. J. Nash, J. Zheng, Y. Wang, B. Xu, Y. Yan, “Mechanistic Study of the Hydrogen Oxidation/Evolution Reaction over Bimetallic PtRu Catalysts.” *Under Review*.
6. J. Nash, X. Yang, J. Anibal, M. Dunwell, S. Yao, K. Attenkofer, J. G. Chen, Y. Yan, B. Xu, “Electrochemical Nitrogen Reduction Reaction in Proton Exchange Membrane Electrolyzers using a Chromium Nitride Catalyst.” *In preparation*.

## TECHNICAL SKILLS

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**Electrochemistry:** Membrane electrode assembly (MEA) fabrication and testing for fuel cell and electrolyzer applications, cyclic voltammetry, linear sweep voltammetry, CO stripping, Cu stripping

**Synthesis and Characterization:** Scanning electron microscopy (SEM), X-ray diffraction (XRD), thermal gravimetric analysis (TGA), incipient wetness impregnation, hydrothermal synthesis, urea-glass synthesis, ammonolysis synthesis of nitrides, X-ray Absorption Spectroscopy (XAS)

**Software:** Igor, Microsoft Office (Excel, Powerpoint, Word), Matlab, Aspen, Java

## LEADERSHIP AND PROFESSIONAL MEMBERSHIPS

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- Yushan Yan Lab Manager (January 2016 – Present)
  - Writing standard operating procedures and improving lab safety
  - Training new lab members safety procedures and protocols
  - Maintaining lab equipment
  - Updating and maintaining the chemical inventory
  - Purchasing chemicals
- American Institute of Chemical Engineers – Member
- The Electrochemical Society – Member



# Jannatun Nayem

JANNAT@UDEL.EDU | (347) 574 7323 | [LINKEDIN.COM/IN/JANNATNAYEM](https://www.linkedin.com/in/jannatnayem)

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## **Career Goals:**

Upon completion of my degree, I seek to utilize my academic, professional, and interdisciplinary research experiences to help find answers to some of the challenges in the bio-pharmaceutical industries.

## **Education & Qualifications:**

UNIVERSITY OF DELAWARE (UD) (2014 - 2019)

### **Ph.D. Candidate, Chemical and Biomolecular Engineering**

National Science Foundation Graduate Research Fellow (2015- Present)

Guest Researcher at the Center for Neutron Science at NIST (2017- Present)

**Thesis Topic:** I focus on utilizing neutron scattering techniques, simulation, and colloidal theories to study solution microstructures, dynamics, and interactions of therapeutic monoclonal antibody (mAb) formulations relevant for biopharmaceutical companies.

**Thesis Advisors:** Dr. Norman J. Wagner and Dr. Yun Liu

CITY COLLEGE OF NEW YORK (CCNY) (2010-2014)

### **Bachelor of Science in Chemical Engineering**

Minor in Mathematics and Psychology

Summa Cum Laude (2014)

## **Co-ops & Internships:**

**Research Co-op at Genentech Inc.,** Department of Late Stage Pharmaceutical Development, South San Francisco, CA (June 2016-Dec 2016)

- Synthesized therapeutic mAb particles that are representative of the stress conditions observed at pharmaceutically relevant conditions
- Characterized and investigated stability of the protein aggregates in IV bag solution via complimentary and corroborative biophysical techniques relevant for immunogenicity.

**Summer Research Internship at ExxonMobil,** Process Technology Department, Annandale, NJ. (June 2014-August 2014)

- Studied the impact of resid cutpoint on coke morphology
- Created both theoretical and experimental morphology maps to establish relationship between resid feed properties and the coke morphology

**Summer Undergraduate Research Internship at Lawrence Berkeley National Laboratory,** Berkeley, CA. (June 2013– August 2013)

- Synthesized nanoporous and crystalline Zeolitic Imidazolate Frameworks (ZIFs)
- Investigated surface growth of ZIFs using optical microscopy, electron microscopy, X-ray scattering, and atomic force microscopy

**Summer Undergraduate Research Internship at City University of New York, NY.** (June – August 2011)

- Investigated electrostatic self-assembly approach to generate an ordered electrode with nano- and micron sized MnO<sub>2</sub> and Ni particles on functionalized surfaces essentially to enhance the storage capability of capacitors and battery

### **Undergraduate Research Experiences:**

- Created micro-textured solid surfaces to prevent water droplet adhesion relevant for application in hydrate formation in crude oil (Honors Research), 2013-2014, Dr. Charles Maldarelli (PI)
- Synthesized core-shell nanoparticles and established relationship between the core and shell dimension and for application in capacitors (Honors Research), 2011-2012, Dr. Alexander Couzis (PI)
- Investigated photodynamic therapy in cancer treatment (Honors Research), 2009-2010, Dr. Diana Samaroo (PI)

### **Activities:**

Vice President-Omega Chi Epsilon Honor Society, CCNY Chapter (2013-2014)

Educational outreach program for underrepresented high school students, CCNY (2013-2014)

AIChE ChemE car team organizer and pioneer member, CCNY (2013-2014)

Teaching Assistant of Undergraduate Senior Lab, UD (2015)

Student Chair, Gordon Research Seminar on colloidal, macromolecular, and polyelectrolyte solution (2016)

### **Publications:**

1. Nayem, J., Zhang, M., Tomlinson, A., Zarraga, I.E., Wagner, N. J., & Liu, Y. "Studying Morphology and Thermal Stability of Individual and Mixed Components of Polysorbate 20 and 80 and their Implications in Micellar Degradation via Small Angle Neutron Scattering." *Journal of Pharmaceutical Science* (2018) (In prep for submission)
2. Nayem, J., Koshari, S.H., Zhang, M., Tomlinson, A., Zarraga, I.E., Wagner, N. J., & Liu, Y. "Neutron in Biopharma." *Journal of Pharmaceutical Science* (2018) (In prep for submission)
3. Nayem, J., Koshari, S.H., Zhang, M., Tomlinson, A., Zarraga, I.E., Wagner, N. J., & Liu, Y. "Understanding the Mechanistic Pathways of Polysorbate 20 Degradations and their Storage Stability via Small Angle Neutron Scattering." *Journal of Pharmaceutical Science* (2018) (In prep for submission)
4. Nayem, J., Villanueva J.R.V., Curtis, J.E., Wagner, N. J., & Liu, Y. "Investigating Domain Flexibility of NISTmAb via Neutron Spin Echo and Molecular Dynamic Simulations." *PNAS* (2019) (In prep)
5. Nayem, J., Wagner, N. J., & Liu, Y. "Studying Temperature Dependent Internal Dynamics of NISTmAb using Neutron Spin Echo." *Biophysical Journal* (2019) (In prep)

### **Selected Talks:**

- Jannatun Nayem, P. Falus, L. Porcar, I. Zarraga, Y. Liu, N. Wagner, Investigating Internal Motions of Monoclonal Antibody via Neutron Spin Echo, American Conference on Neutron Scattering, CA, July 2016 (Contributed Talk)
- Jannatun Nayem, S. Koshari, Z. Zhang, I. Zarraga, Y. Liu, N. Wagner, "Investigating Morphology and Thermal Stability of Biopharmaceutical Surfactants and their Implications in Micellar Degradation, ACS Colloid & Surface Science Symposium, NY, July 2016 (Contributed Talk)
- Nayem, J., Villanueva J.R.V., Curtis, J.E., Wagner, N. J., & Liu, Y. "Investigating Structure and Dynamics of Monoclonal Antibodies using Neutron Scattering." ILL & ESS User Meeting and Conference, France, October 2018 (Invited talk)

# Eleanor Hammer Oates

B.S., B.A., Ph.D. (expected 2020)

ehoates@me.com | 650-245-4501

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## Education

- Ph.D. **University of Delaware** Chemical Engineering Expected June 2020  
Department of Chemical and Biomolecular Engineering  
GPA – 3.32
- B.S. **Stanford University** Chemical Engineering June 2015  
Department of Chemical Engineering  
GPA – 3.65
- B.A. **Stanford University** Economics June 2015  
Department of Economics  
GPA – 3.73

## Research Experience and Industry Experience

**Graduate Research with Maciek Antoniewicz, Ph.D.** Jan. 2016-Present  
**Metabolic cross-feeding interactions between adipocytes and hepatocytes in an engineered mammalian co-culture system**, University of Delaware  
Newark, DE

- Developed a novel approach for co-culture  $^{13}\text{C}$ -metabolic flux analysis (co-MFA) to analyze in detail how global regulators of mammalian metabolism (e.g. insulin and isoproterenol) impact adipocyte-hepatocyte metabolite cross-feeding
- Found complete metabolic profiles of both proliferating and differentiating 3T3-L1 fat cells
- Found how metabolic fluxes through the oxidative and non-oxidative pathways of 3T3-L1 fat cells are affected by normoxic versus hypoxic culturing conditions
- Completed a holistic metabolic profile of FAO liver cells undergoing gluconeogenesis

**Undergraduate Research with Elizabeth Sattely, Ph.D.** Apr. 2012-Oct. 2013  
**Applications and Discovery of Plant Chemistry**, Stanford University  
Stanford CA

- Researched and validated multiple quantitative and qualitative liquid and solid media assays to be used as standard laboratory instruments.
- Authored standard operating procedures on the following subjects:
  - Qualitative measurement of lignin degradation through solid media staining
  - Determination of acid and non-acid soluble lignin content in biomass
  - Qualitative measurement of produced acid-precipitable polymeric lignin (APPL)
- Collaborated with graduate students to engineer lignin model compound production pathways via synthetic chemical routes and heterologous gene expression.
- Presented personal research and critiqued graduate projects in weekly group meetings and symposiums.

**Research Intern, Anaerobe Systems** Summer 2009  
Morgan Hill CA

- Designed, constructed, and programmed a fermenter to be used by the company for researching anaerobic bacteria as biofuel producers.
- Developed machining skills, becoming proficient in power lathing, milling, and welding.

**Veterinary Assistant, San Francisco Zoo Veterinary Hospital** Summer 2008  
San Francisco CA

- Programed the hospital's VetScan i-STAT 1 handheld analyzer, which analyzes animal blood chemistry and composition.
- Created a database that documented and monitored the chemical status and quantity of the hospital's prescription medication supplies.

### **Posters and Presentations**

- "Applying  $^{13}\text{C}$ -Metabolic Flux Analysis to Investigate Metabolic Shifts in 3T3-L1 Fat Cells Under Normoxic and Hypoxic Conditions," Poster Presentation, 10<sup>th</sup> Annual Frontiers in Chemistry and Biology Interface Symposium, University of Delaware, DE, May 6<sup>th</sup>, 2017.
- "4<sup>th</sup> of July Special - Research on the metabolism and function of fat cells," Radio Interview, Rise and Science, July 4<sup>th</sup>, 2017.
- "Metabolic Shifts in 3T3-L1 Fat Cells Under Normoxic and Hypoxic Conditions," Oral Presentation at Summer Research Review, University of Delaware, May 31<sup>st</sup>, 2017.
- "Towards Qualitative and Quantitative Microbial Lignin Degrading Assays," Poster Presentation, Stanford University Chemical Engineering Summer Research Symposium 2013, Stanford, CA, September 26<sup>th</sup>, 2013.
- "Towards a Simple Plate Assay to Screen for Efficient Lignin Degrading Bacteria," Poster Presentation, Stanford University Chemical Engineering Summer Research Symposium 2012, Stanford, CA, September 24<sup>th</sup>, 2012.

### **Awards, Honors, and Funding**

- Robert L. Pigford Fellowship • *University of Delaware (UD)* 2015
- Vice Provost Fellowship • *Stanford University* 2013
- Vice Provost Fellowship • *Stanford University* 2012
- Lunsford Award for Oral Presentation of Research Nominee • *Stanford University* 2012

### **Leadership and Service Experience**

- VP of Colburn Club (ChemE Graduate Student Government) • *UD* 2017-Present
- Second Year Colburn Representative • *UD* 2016-2017
- Science Outreach Volunteer • *UD* 2015-Present
- First Year Colburn Representative • *UD* 2015-2016
- President of the Stanford Shakespeare Company • *Stanford University* 2013-2014
- Rho Gamma of Inter-Sorority Council • *Stanford University* 2013
- VP of Education for Alpha Epsilon Phi • *Stanford University* 2011- 2012
- Self-Generated Fundraising for San Francisco Zoo • *San Francisco Zoo* 2007-2008

## Education

- 2015– **University of Delaware**, *Ph.D Candidate*, Chemical Engineering.  
Graduate Thesis Advisor: Prof. Michael E. Mackay
- 2011–2015 **University of California, Santa Barbara**, *Bachelor of Science*, Chemical Engineering.  
Undergraduate Thesis Advisor: Prof. Bradley F. Chmelka

## Publications

- **D. D. Phan**, Z. R. Swain, M. E. Mackay, "Rheological and heat transfer effects in fused filament fabrication." *J. Rheol.* **62(5)**, 1097-1107 (2018).
- J. P. Jahnke, S. Hussain, M. N. Idso, M. J. N. Junk, J. M. Fisher, **D. D. Phan**, S. Han, B. F. Chmelka, "Functionally active proteorhodopsin membrane proteins incorporated in mesostructured silica films." *J. Am. Chem. Soc.* **140**, 3892-3906 (2018).
- Y. Zhang, T. S. Kleine, K. J. Carothers, **D. D. Phan**, R. S. Glass, M. E. Mackay, K. Char, J. Pyun, "Functionalized chalcogenide hybrid inorganic/organic polymers (CHIPs) via inverse vulcanization of elemental sulfur and vinylanilines." *Polym. Chem.* **9(17)**, 2290-2294 (2018).
- L. E. Anderson, T.S. Kleine, Y. Zhang, **D. D. Phan**, S. Namnabat, E. A. LaVilla, K. M. Konopka, L. R. Diaz, M. S. Manchester, J. Schwiegerling, R. S. Glass, M. E. Mackay, K. Char, R. A. Norwood, J. Pyun, "Chalcogenide hybrid inorganic/organic polymers: Ultrahigh refractive index polymers for infrared imaging." *ACS Macro Letters.* **6(5)**, 500-504 (2017).
- M. E. Mackay, Z. R. Swain, C. R. Banbury, **D. D. Phan**, D. A. Edwards, "The performance of the hot end in a plasticating 3D printer." *J. Rheol.* **61(2)**, 1-8 (2017).

## Presentations

- Oct. 2018 **Society of Rheology 90th Annual Meeting, Houston, TX**, *Rheological and heat transfer effects in fused filament fabrication additive manufacturing*, Conference Oral Presentation.
- Aug. 2018 **Solid Freeform Fabrication Symposium, Austin, TX**, *Rheological and heat transfer effects in fused filament fabrication additive manufacturing*, Conference Oral Presentation.

## Teaching and Mentorship

- Spring 2017 **Substitute Lecturer**, *University of Delaware - MSEG 302*, Materials Science for Engineers.  
Delivered lecture to ~200 students regarding connection between atomic/molecular bonding and macroscopic material properties; guided in-class problem solving discussions
- Teaching Assistant**, *University of Delaware - CHEG 112*, Introduction to Chemical Engineering.  
Designed solutions and grading rubrics for homework sets, reviewed and reinforced course concepts during office hours
- Fall 2016 **Guest Lecturer**, *University of Delaware - CHEG 600*, Introduction to Polymer Science.  
Designed lesson plan, delivered lecture to ~30 students regarding fundamentals of differential scanning calorimetry and its use in probing thermodynamic transitions and crystallinity of polymeric materials
- Teaching Assistant**, *University of Delaware - CHEG 231*, Chemical Engineering Thermodynamics.  
Designed solutions and grading rubrics for homework sets and projects, reviewed and reinforced course concepts during office hours, conducted course examination review sessions for ~125 students
- Fall 2015– **Graduate Student Research Mentor**, *University of Delaware*.  
Mentored undergraduate students in research environments: **Zachary Swain** (UD, Fall 2015-present), **Colby Banbury** (UD, Fall 2015-Fall 2016), **Kevin Schmalbach** (Rowan University, NSF-REU Program, Summer 2016, now Ph.D student at University of Minnesota, Department of Chemical Engineering and Materials Science)

# JULIA ROHLHILL

née Petruzzo  
juliapet@udel.edu  
(631) 264-4935

## EDUCATION

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**University of Delaware**, Ph.D. Chemical Engineering, Summer 2019 (Expected)  
Advisor: Eleftherios T. Papoutsakis  
GPA: 3.5/4.0

**University at Buffalo, The State University of New York**  
Bachelor of Science, Chemical Engineering, June 2014  
Minor in Biotechnology, Minor in Mathematics  
GPA: 3.8/4.0

## RESEARCH

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**Graduate Research Assistant**, University of Delaware, Newark, DE 2014 - present  
Thesis project: Engineering *E. coli* for growth and product production using non-native substrate methanol

- Protein and promoter engineering via site-saturation mutagenesis, fluorescence activity assays using flow cytometry, and high-throughput sequencing
- Chemostat evolution of *E. coli* base strains for improved methanol utilization
- *E. coli* genome refactoring for methanol consumption through synthetic formaldehyde regulation

### Undergraduate Research:

Department of Energy, Science Undergraduate Laboratory Internship Summer 2013  
Brookhaven National Laboratory, Upton, NY  
*"Investigating the Role of Potassium in Phloem Transport Using Zea mays sut1 Mutants"*

Institute for Cellular Engineering, NSF Research Experience for Undergraduates Summer 2012  
University of Massachusetts Amherst, Amherst, MA  
*"Controlling Plant Cell Aggregation"*

Center for Biorenewable Chemicals, NSF Research Experience for Undergraduates Summer 2011  
Iowa State University, Ames, IA  
*"Determining Gene Function in the Methane-Producing Archaea Methanosarcina acetivorans"*

## SKILLS

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Flow cytometry, fluorescence-activated cell sorting (FACS), 1 and 4 L bench-scale bioreactor operation, HPLC, standard molecular biology techniques, MATLAB

## TEACHING

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Teaching Assistant, Senior Fermentation Lab Fall 2016  

- Demonstrated *E. coli* growth and green fluorescent protein production in 4 L bioreactors, purification using anion exchange chromatography, and product visualization via microplate fluorometer and SDS-PAGE protein gels

Teaching Assistant for Introductory Engineering courses 2011-2014

## PUBLICATIONS AND PRESENTATIONS

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**Rohlhill J**, Sandoval NR, Papoutsakis ET. "Sort-Seq Approach to Engineering a Formaldehyde-Inducible Promoter for Dynamically Regulated *Escherichia coli* Growth on Methanol", *ACS Synthetic Biology*, 2017, 6 (8), pp 1584-1595

### Oral Presentations:

**Rohlhil JR**, Bennett RK, Papoutsakis ET, "Implementing formaldehyde-based regulation in *E. coli* for synthetic methylotrophy" AIChE 2018 Annual Meeting, October 2018

**Rohlhil JR**, Sandoval NR, Papoutsakis ET, "Sort-Seq Approach to Engineering an *E. coli* Formaldehyde-Inducible Promoter" AIChE 2017 Annual Meeting, October 2017

**Rohlhil J**, Urello M, Sullivan M, "Achieving tailorable gene delivery using collagen-mimetic peptides" CBI Rotation Oral Presentation, May 2015

**Rohlhil J**, Carlson E, Papoutsakis ET, "Improving alcohol titers in *Clostridium acetobutylicum*," CBI Rotation Oral Presentation, February 2015

### Poster Presentations:

**Rohlhil J**, Sandoval NR, Papoutsakis ET, "Sort-seq approach to engineering a formaldehyde-inducible promoter and methanol dehydrogenase in *E. coli*" Biochemical and Molecular Engineering XX Conference, July 2017

**Rohlhil J**, Sandoval NR, Papoutsakis ET, "Sort-seq approach for engineering an *E. coli* formaldehyde-inducible promoter" UD Microbial Symposium, February 2017

**Rohlhil J**, Kalburge SS, Boyd EF, "Transcriptome Sequencing Analysis of the Human Pathogen *Vibrio parahaemolyticus*" CBI Rotation Poster Presentation, April 2015

## **HONORS AND AWARDS**

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- Poster award (2<sup>nd</sup> place), Biochemical and Molecular Engineering XX Conference, Newport Beach, CA, *July 2017*
- Poster award, UD Microbial Symposium, *February 2017*
- Joyce Hilty and Robert L. Richards, Jr. Fellowship (*2017-present*)
- Philip & Ruth Evans Fellowship (*2016-2017*)
- Chosen for the Chemistry-Biology Interface Program (*2014-2016*)
- Robert L. Pigford Fellowship (*2014-2015*)
- Member of Tau Beta Pi, the Engineering Honor Society
- Presidential Scholarship, an all-inclusive 4-year scholarship to the University at Buffalo

## **ACTIVITIES**

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Delaware Biotechnology Institute (DBI) Tour Guide	<i>2015 - present</i>
Lab Safety Officer	<i>2017 - present</i>
Delaware Biotechnology Institute (DBI) Representative in Colburn Club	<i>2015-2016</i>
University at Buffalo (UB) chapter of AIChE	<i>Secretary 2012-2013   President 2013-2014</i>

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**SUMMARY**

Proven ability to link the technical and financial aspects of projects, by providing quantitative based insights, application driven research, and leadership skills.

**EXPERIENCE****Department of Chemical & Biomolecular Engineering** - University of Delaware. Newark, DE.

August 2017

*Postdoctoral Researcher*

- Responsible for coordinating a team of 6 scientists and carrying out experiments to evaluate the performance of new hydroxide exchange polymers to be used in hydroxide exchange membrane fuel cells and electrolyzers
- Compiling information, writing quarterly reports and making presentations to the U.S. Department of Energy on the grant supporting this research
- Optimized methodologies for hydroxide exchange membrane fabrication, which improved their mechanical properties by a factor of 5. Established protocol for ePTFE reinforcement integration. Also, developed a new methodology to cut their activation time from 5 days to half a day.
- Explored new applications and technology landscape where the polymer will have an important competitive advantage and business potential
- Technology transfer lead and COO of W7Energy LLC, a company, formed to commercialize the hydroxide exchange membrane developed in the DOE IONICS program. Responsible for customer interaction and integrating their feedback into the products.
- Performed financial analysis and projections, made a business plan and investors pitch deck, leading to private investment of \$1M and possible \$3M DOE grant. These will be used to transition into mass production of the hydroxide exchange polymer and membranes.
- Lead one grant writing and helped on two others.
- Mentored two graduate, five undergraduate students, following their progress and helping them to analyze their data

**Center for Micro Engineered Materials** – The University of New Mexico. Albuquerque, NM.

January 2012–May 2017

*Research Assistant*

- Employed multivariable analysis statistical techniques to identify the most relevant variables on complex datasets
- The findings of the most relevant features of these cutting-edge materials will enable mass production of fuel cell devices, which will open doors for high-performance portable power
- Published 11 peer-reviewed articles in peer-reviewed scientific journals. 293 citations and h-index 7

**Batterade, LLC.** – Albuquerque, NM

March 2013-January 2015

*Chief Executive Officer*

- Commercialized fuel cell technology to provide an affordable and green cellphone charging solution for Sub-Saharan Africa
- Tripled the power output of the fuel cell by conducting various tests on different material constituents and modeled which ones enhanced performance
- Raised and managed over \$75,000 in seed capital
- Lead the establishment of a partnership with Los Alamos National Laboratory for technology integration and validation
- Led development of Batterade's branding
- Won multiple grants and awards:
  - Goizueta Business School. Emory University: \$5,000 Social Enterprise Unrestricted Grant
  - Semifinalist Rice University 2014 Business Plan Competition: \$1,250
  - New Mexico Small Business Assistance Program: \$60,000 work with Los Alamos National Laboratory
  - The University of New Mexico Technology Business Plan Competition: \$10,000 Second Place Technology Ventures Track
  - Startup New Mexico. Second place: Elevator Pitch Competition, Startup NM's Pitch Fiesta

**Computational Fluid Dynamics Research Corporation (CFDRC)** – Huntsville, AL

July-August 2013

*Research and Development Intern*, Research and Development Department

- Achieved a 10-fold increase in the power output of the cathode by examining the variables within the electrode's structure and made calculated adjustments
- Led integration of materials developed in the University of New Mexico (platinum metal group free catalysts for Oxygen Reduction) into fuel cells developed in CFDRC
- Optimized eight parameters of gas diffusional layers for air-breathing electrodes to be used in biofuelcells
- Explored partnerships for a joint venture between CFDRC and Batterade LLC

**Center for Emerging Energy Technologies** – The University of New Mexico. Albuquerque, NM.

August 2010 –May 2011

*Undergraduate Research Assistant*

- Developed and evaluated new materials to be used in ethanol fuel cells
- Published one peer-reviewed paper on NiLa catalyst for direct hydrazine alkaline anion-exchange membrane fuel cells
- Was offered admittance to The University of New Mexico's Ph.D. program on a merit-based scholarship



## EDUCATION

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- Ph.D. Chemical Engineering - Minor: Statistics. The University of New Mexico. May 2017. GPA: 3.89
- MBA - Concentration: Finance. The University of New Mexico. May 2017. GPA: 3.96
- M.S. Nanoscience & Microsystems. The University of New Mexico. July 2013. GPA 3.88
- B.S. Chemical Engineering. Universidad Nacional de Colombia. August 2011. GPA: 4.0

## LEADERSHIP & SERVICE

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Have been selected to occupy multiple leadership roles in several organizations, achieving significant outcomes in each one of them:

- The Electrochemical Society – The University of New Mexico: Vice-president
- Toastmasters - The University of New Mexico Health Sciences Center: Vice-president of Membership
- Rotary International – Rotary Club of Albuquerque Del Norte: Coordinator of Public Image
- Rotaract – The University of New Mexico: President, Chair of Social Events and Membership
- AIESEC – Javeriana University: Team Building Chair

## PERSONAL

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*Skills:* Highly Proficient: R. Statistical Computing, Excel, Adobe Illustrator, Origin Lab. Familiar with: SAS, C++, and MATLAB.

*Languages:* Spanish and English, highly proficient

*Interests:* Windsurfing, scuba diving, and traveling

*Affiliations:* Rotary International, Association of Latino Professionals for America, The Electrochemical Society.

## Publications

- **Rojas-Carbonell, S.**, Artyushkova, K., Serov, A., Santoro, C., Matanovic, I., & Atanassov, P. (2018). Effect of pH on the Activity of Platinum Group Metal-Free Catalysts in Oxygen Reduction Reaction. *ACS Catalysis*, 8, 3041-3053.
- Santoro, C., **Rojas-Carbonell, S.**, Awais, R., Gokhale, R., Kodali, M., Serov, A., Artyushkova, K. & Atanassov, P. (2018). Influence of platinum group metal-free catalyst synthesis on microbial fuel cell performance. *Journal of Power Sources*, 375, 11-20.
- Chen, Y., Artyushkova, K., **Rojas-Carbonell, S.**, Serov, A., Matanovic, I., Santoro, C., Asset, T., Atanassov, P., (2018) Inhibition of surface chemical moieties by tris(hydroxymethyl)aminomethane: a key to understanding oxygen reduction on iron-nitrogen-carbon catalysts. *ACS Applied Energy Materials*
- **Rojas-Carbonell, S.**, Babanova, S., Serov, A., Artyushkova, K., Workman, M., Santoro, C., Mirabal, A., Calabrese Barton, S., & Atanassov, P., (2017). Integration of Platinum Group Metal-Free Catalysts with Bilirubin Oxidase into a Hybrid Material for Oxygen Reduction Reaction: Interplay of Chemistry and Morphology. *ChemSusChem*. doi: 10.1002/cssc.201601822
- **Rojas-Carbonell, S.**, Santoro, C., Serov, A., & Atanassov, P. (2017). Transition metal-nitrogen-carbon catalysts for oxygen reduction reaction in neutral electrolyte. *Electrochemistry Communications*. 75, 38-42.
- Artyushkova, K., Serov, A., **Rojas-Carbonell, S.**, & Atanassov, P. (2015). Chemistry of multitudinous active sites for oxygen reduction reaction in transition metal–nitrogen–carbon electrocatalysts. *The Journal of Physical Chemistry C*, 119(46), 25917-25928
- **Rojas-Carbonell, S.**, Babanova, S., Serov, A., Ulyanova, Y., Singhal, S., & Atanassov, P. (2016). Hybrid electrocatalysts for oxygen reduction reaction: Integrating enzymatic and non-platinum group metal catalysis. *Electrochimica Acta*, 190, 504-510.
- Merino-Jimenez, I., Santoro, C., **Rojas-Carbonell, S.**, Greenman, J., Ieropoulos, I., & Atanassov, P. (2016). Carbon-based air-breathing cathodes for microbial fuel cells. *Catalysts*, 6(9), 127.
- Santoro, C., Serov, A., Gokhale, R., **Rojas-Carbonell, S.**, Stariha, L., Gordon, J., Artyushkova, K. & Atanassov, P. (2017). A family of Fe-NC oxygen reduction electrocatalysts for microbial fuel cell (MFC) application: Relationships between surface chemistry and performances. *Applied Catalysis B: Environmental*, 205, 24-33.
- Villarrubia, C. W. N., Soavi, F., Santoro, C., Arbizzani, C., Serov, A., **Rojas-Carbonell, S.**, Gupta, G. & Atanassov, P. (2016). Self-feeding paper based biofuel cell/self-powered hybrid  $\mu$ -supercapacitor integrated system. *Biosensors and Bioelectronics*, 86, 459-465.
- Martinez, U., **Rojas-Carbonell, S.**, Halevi, B., Artyushkova, K., Kiefer, B., Sakamoto, T., Asazawa, K., Tanaka, H., Datye, A. & Atanassov, P. (2014). Ni-La Electrocatalysts for Direct Hydrazine Alkaline Anion-Exchange Membrane Fuel Cells. *Journal of The Electrochemical Society*, 161(13), H3106-H3112.

## Oral Presentations

Seven oral presentations in international conferences, along with six poster presentations

# Katherine L. Wiley

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## EDUCATION

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### Ph.D. Candidate in Chemical Engineering, *NSF IGERT Fellow*

*expected Summer 2019*

University of Delaware, Newark, DE

Department of Chemical and Biomolecular Engineering

### B.S. in Chemical Engineering, *Magna Cum Laude*

*Spring 2014*

Bucknell University, Lewisburg, PA

Department of Chemical Engineering

University of Queensland, Brisbane, Australia (International study)

*Spring 2013*

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## RESEARCH EXPERIENCE

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### Doctoral Research - NSF IGERT Fellow

*Fall 2014-present*

University of Delaware, Department of Chemical and Biomolecular Engineering

Thesis: Design of mechanically dynamic hydrogels to understand cell response to matrix remodeling

Advisor: Dr. April M. Kloxin

- Developed 3D synthetic hydrogel extracellular matrix (ECM) mimics that are capable of changing mechanical properties in response to applied stimuli during cell culture to understand the influence of dynamic environments on disease progression
- Synthesized and characterized tissue mimetic hydrogel materials for 3D cell encapsulation
- Evaluated cell compatibility of materials, characterized cell response to 3D cell culture in static and dynamic conditions

### Undergraduate Research

*Spring 2011-Spring 2014*

Bucknell University, Department of Chemical Engineering

Advisor: Dr. Erin L. Jablonski

- Designed and fabricated milli-scale devices for controlled emulsion formation and separation for efficient liquid-liquid extraction of model dye
- Developed a mathematical model (MATLAB) of mass transfer in milli-scale liquid-liquid extraction system

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## PROFESSIONAL EXPERIENCE

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### Research Science Intern (International)

*Fall 2016*

Fraunhofer, Leipzig, Germany

Institute for Cell Therapy and Immunology (IZI) and Institute for Ceramic Technologies and Systems (IKTS)

Advisor: Dr. Julianne Pasold

- Developed and evaluated immunobiological test procedures for bioceramic materials for dentistry and endoprosthetics
- Compared osteoblast proliferation on various material surfaces

### Process Engineering Intern

*Summer 2012*

Corning Incorporated, Corning, NY

Corning Environmental Technologies, Division Engineering

- Designed, executed, analyzed, and presented experiments at the interface of R&D and production
- Six Sigma yellow belt certified

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## PUBLICATIONS

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KL Wiley\*, EM Ovdia\*, C Calo, R Huber, AM Kloxin, "Rate-based approach for controlling the mechanical properties of 'thiol-ene' hydrogels formed with visible light," *In preparation*. [**\*Co-first author**]

LJ Macdougall\*, KL Wiley\*, AM Kloxin, AP Dove, "Design of synthetic extracellular matrices for probing breast cancer cell growth using robust cytocompatible nucleophilic thiol-yne addition chemistry," *Biomaterials*, **178**, 435-447, 2018. [**\*Co-first author**]

LA Sawicki, LH Choe, KL Wiley, KH Lee, AM Kloxin, "Isolation and identification of proteins secreted by cells cultured within synthetic hydrogel-based matrices," *ACS Biomaterials Science & Engineering*, **4**, 836-845, 2018.

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## AWARDS & HONORS

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<b>NSF IGERT Fellow</b>	<i>Spring 2015-present</i>
<b>Tau Beta Pi Honor Society</b> , Bucknell University	<i>Inducted Fall 2013</i>
<b>Alpha Lambda Delta Honor Society</b> , Bucknell University	<i>Inducted Spring 2011</i>

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## TEACHING & COMMUNICATION EXPERIENCE

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<b>Graduate Teaching Fellow</b> for Fluid Mechanics <b>University of Delaware</b> , Department of Chemical and Biomolecular Engineering	<i>Fall 2018-present</i>
<ul style="list-style-type: none"><li>Prepared and delivered lectures (~25% of semester lectures), prepared homework and exam questions</li><li>Developed new design focused term project</li></ul>	
<b>Radio Show Host and Director</b> <b>Rise and Science (93.1 WVUD)</b> , Newark, DE	<i>Spring 2016-present</i>
<ul style="list-style-type: none"><li>Interview local and visiting scientists about their work and its importance to society</li><li>Report on the latest science news and demystify science we see in everyday life</li></ul>	
<b>Teaching Assistant</b> for Vector and Tensor Analysis, Eng. Probability and Statistics (grad courses) <b>University of Delaware</b> , Department of Chemical and Biomolecular Engineering	<i>Spring 2016</i>

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## LEADERSHIP EXPERIENCE

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<b>Mentor and Founding Member, CBE EmPOWER</b> , University of Delaware	<i>Spring 2017-present</i>
<ul style="list-style-type: none"><li>EmPOWER (Empathetic Peers Offering Wisdom, Encouragement, and Resources)</li><li>Mentored first year Chemical and Biomolecular Engineering (CBE) PhD students as they transitioned to grad school</li></ul>	
<b>Representative, Colburn Club</b> , University of Delaware	<i>Fall 2014-Fall 2018</i>
<ul style="list-style-type: none"><li>Positions held: 4<sup>th</sup> Year Rep. (2017-18), Vice President (2016-17), 2<sup>nd</sup> Year Rep. (2015-16), At-large Rep. (2014-15)</li><li>Organized department graduate student recruitment and various social, academic, and professional development events</li></ul>	
<b>Founding Member, Colburn Outreach Committee</b> , University of Delaware	<i>Spring 2015-Fall 2017</i>
<ul style="list-style-type: none"><li>Partnered with local middle school classes to introduce STEM to students with hands on demos</li><li>Led demos introducing concepts of polymerization and thrust</li></ul>	
<b>Secretary, AIChE Student Chapter</b> , Bucknell University	<i>Fall 2013-Spring 2014</i>
<ul style="list-style-type: none"><li>Assisted in preparation for student travel to conferences and events</li><li>Served as liaison between undergraduate students and faculty</li></ul>	

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## SELECTED PRESENTATIONS & SEMINARS (presenters underlined)

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### *Oral presentations:*

KL Wiley, "Design of dynamic hydrogels to understand cell response to matrix remodeling," University of Delaware Winter Research Review, January 2018, Newark, DE.

KL Wiley, "Life as a PhD student in chemical engineering," Department of Chemical Engineering, Bucknell University, April 2017, Lewisburg, PA. *Invited*.

### *Poster presentations:*

KL Wiley, EM Ovadia, C Calo, R Huber, AM Kloxin, "Tunable visible light polymerization of poly (ethylene glycol) hydrogels for post-polymerization modulation of material properties," MRS Fall Meeting, November 2018, Boston, MA.

EM Ovadia, KL Wiley, AM Kloxin, "Visible light photoinitiation of poly(ethylene) glycol hydrogels," ACS Annual Meeting, August 2017, Washington, DC.

KL Wiley, EL Jablonski, "Efficient liquid liquid extraction by emulsion formation and separation in robust milli-fluidic devices," AIChE Annual Meeting, November 2013, San Francisco, CA.

## CAITLIN WOOD

2 The Horseshoe, Newark, DE, 19711  
caitlinw@udel.edu; (609) 613-2991

### EDUCATION

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**University of Delaware**, Newark, DE September 2015—Present  
Ph.D., Chemical and Biomolecular Engineering

**Princeton University**, Princeton, NJ September 2011—June 2015  
B.S.E., Chemical and Biological Engineering  
Certificates: Engineering Biology, Music Performance

### EXPERIENCE

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Graduate Research Assistant, University of Delaware 2015—Present  
Advisors: Christopher J. Roberts, Ph.D. and Eric M. Furst, Ph.D.

Doctoral research thesis focused on elucidating mechanisms of bulk interface-mediated protein aggregation with applications in improving therapeutic safety and efficacy

- Achieved novel mechanistic insight into model monoclonal antibody aggregation by examining competing aggregation pathways and kinetics of particle formation mediated by air-water interfaces
- Designed, built, and used an improved microtensiometer for directly monitoring protein adsorption and rearrangement at air-water and oil-water interfaces

Undergraduate Researcher, Princeton University 2013—2015  
Advisor: A. James Link, Ph.D.

Senior thesis: engineering a small molecule-dependent intein into a thrombin binding knottin peptide

- Independently developed project proposal during sophomore year
- Successfully engineered DNA constructs for peptide expression in *E. coli*
- Probed peptide expression using *E. coli* cell system

Junior year thesis: discovery and expression of a novel lasso peptide

- Isolated novel DNA sequence for a putative positively-charged lasso peptide

Summer Research Intern, The Hong Kong University of Science and Technology 2014  
Advisor: King-Lun Yeung, Ph.D.

Development of a smart, multilevel antimicrobial coating

- Examined efficacy of different material formulations through laboratory tests and clinical trials
- Visited Queen Elizabeth Hospital semiweekly for clinical trials. Involved interactions with doctors, patients, and cleaning staff

Summer Research Intern, University of Alberta 2013  
Advisor: John M. Shaw, Ph.D.

Studied phase oil inversion during heavy oil and bitumen production with solvent addition

- Measured densities of Athabasca Bitumen + Toluene and Athabasca Bitumen + *n*-heptane mixtures at room temperature and atmospheric pressure

Summer Intern, Boreal Genomics 2012

- Performed complete chain of tasks in sample cartridge manufacturing including quality checks, glass sterilization, and cartridge assembly in clean room. Cartridges used to process DNA samples and required to be free of macroscopic and microscopic contamination.
- Awarded honorarium for exemplary performance halfway through internship

## PUBLICATIONS

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- **Wood, C.**, McEvoy, S., Razinkov, V., Qi, W., Furst, E., and Roberts, C. Competing Aggregation Pathways and Kinetics of Particle Formation for Therapeutic Proteins Mediated by Air-Water Interfaces (in preparation)
- DiPaolo, B., Ashcroft, C., Konica, G., Castner, T., **Wood, C.**, Cordovez, B., and Hart, R. Backgrounded Membrane Imaging: A High Refractive Index Contrast, Low Volume Microscopic Particle Analysis Technique. (submitted)
- Stewart, R., **Wood, C.**, Murowchuk, S., and Shaw, J. (2014) Phase Order Inversion During Heavy Oil and Bitumen Production with Solvent Addition. *Energy & Fuels*, 28 (7) 4835- 4848

## CONFERENCE PRESENTATIONS

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- **Wood, C. V.**, McEvoy, S., Razinkov, V. I., Qi, W., Furst, E. M., and Roberts, C. J. Competing Aggregation Pathways and Kinetics of Particle Formation for Therapeutic Proteins Mediated by Air-Water Interfaces. *Biotherapeutics and Vaccines Development Gordon Research Conference*. January 2019.
- **Wood, C. V.**, Razinkov, V. I., Qi, W., Furst, E. M., and Roberts, C. J. Combined Effects of Temperature and Compression/Dilation of Air-Water Interfaces on Therapeutic Protein Aggregation. *92<sup>nd</sup> ACS Colloid and Surface Science Symposium*. June 2018.
- **Wood, C. V.**, Razinkov, V. I., Qi, W., Furst, E. M., and Roberts, C. J. Combined Effects of Temperature and Compression/Dilation of Air-Water Interfaces on Therapeutic Protein Aggregation. *Colloidal, Macromolecular, and Polyelectrolyte Solutions Gordon Research Conference*, February 2018.
- Stewart, R., Murowchuk, S., **Wood, C.**, Shaw, J. Phase Inversion with Solvent Addition during Bitumen Production. *PetroPhase XV*, June 2014.

## SKILLS

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Analytical: HPLC, MALDI, Static and Dynamic LS, turbidity, particle counting, microscopy  
Molecular Biology: Cell culture, PCR, DNA and Protein Gels, Western Blot  
Software: LabVIEW, Java, MATLAB, Aspen Plus, PyMOL  
Languages: French (elementary proficiency)

## AWARDS AND ACHIEVEMENTS

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2018: Robert L. Pigford Teaching Assistant Award, University of Delaware  
2015: Robert L. Pigford Fellow, University of Delaware  
2012: Winner, Princeton University Concerto Competition  
2010: Semifinalist, Stradivarius International Violin Competition  
Assistant Concertmaster, Orchestra of the Closing Ceremonies of the 2010 Winter Olympics

## LEADERSHIP AND MENTORSHIP

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- Mentored two undergraduate students during research internships:
  - Surface-mediated aggregation of MAb + surfactant mixtures (Summer 2018)
  - Apparent unfolding temperatures of MAbs in different formulations (Winter 2018)
- Graduate teaching assistant, CHEG345 Chemical Engineering Laboratory (2017)
- American Institute of Chemical Engineers: Princeton University Chapter president (2014), Treasurer (2013), Class of 2015 rep. (2012)
- Princeton University Orchestra: Co-Concertmaster (2013-2015), Tour Planning Committee (2013-2015)
- Engineering School Freshmen Orientation: Student Interactor (2012-2015)

# DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING

