



UNIVERSITY OF DELAWARE  
**ENGINEERING**

**DEPARTMENT OF CHEMICAL  
& BIOMOLECULAR ENGINEERING**

# **DOCTORAL CANDIDATES & POSTDOCTORATES**

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**Resume Booklet**  
(2019-2020)

UNIVERSITY OF DELAWARE



## DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING

### 2019-2020 Resumés

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Letter from Department Chair, Dr. Eric Furst

Alphabetical Listing of Resumés:

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Kimberly Dennis

Pierre Desir

Lucas Dunshee

O. Elvis Ebikade

Eden Ford

Andrew Gaynor

Nathaniel Hamaker

Amber Hilderbrand

Julie Hipp

Jeffrey Horner

Priyanka Ketkar

Joshua Lansford

Paige LeValley

Rachel Lieser

Arnav Malkani

Douglas Nmagu

Natalia Rodriguez Quiroz

Y. Summer Tein

Yifan Wang

Michiel Wessels

Katherine Wiley

Caitlin Wood

Ou Yang

Daniel Yur

January 2020

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 department 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 are driving new research initiatives across the wide range of chemical engineering science and practice—from biomolecular engineering to energy production and sustainable chemistry. A hallmark of the department is its strong interdisciplinary programs that connect faculty, students, industry, and national labs, including the UD-NIST Center for Neutron Science (CNS), Delaware Energy Institute (DEI), Center for Catalytic Science and Technology (CCST), the Catalysis Center for Energy Innovation (CCEI), Center for Biomanufacturing Science and Technology (CBST), and the newly-formed Center for Research in Soft matter and Polymers (CRiSP). To learn more about these initiatives, the Department, our faculty and their research, and each of the students presenting today, I invite you to visit our web site [www.che.udel.edu](http://www.che.udel.edu).

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

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

Sincerely,



Eric M. Furst  
Professor and Department Chair

# Jacob Anibal

anibalja@udel.edu | 517-525-5105 | linkedin.com/in/jacob-anibal

## EDUCATION

### University of Delaware

*Doctor of Philosophy, Chemical Engineering*

GPA: 3.957/4

Honors and Awards: Schipper Fellow

**Thesis:** Understanding the Electrochemical Reduction and Coupling of Biomass Derived Carbonyl Species

Newark, DE

Expected: Summer 2021

### Michigan State University

*Bachelor of Science*

Majors: *Chemical Engineering, Economics*

GPA: 3.9009/ 4.0

Honors and Awards: Larain Memorial Scholarship, Alumni Distinguished Freshman Scholarship, Dean's List (8 semesters)

East Lansing, MI

May 2016

## RESEARCH EXPERIENCE

### Xu Group, University of Delaware

*PhD Candidate*

Newark, DE

Jan 2016 - Present

#### Cross-coupling of Biomass Derived Aldehydes

*Expansion of Aldehyde Coupling to the Cross-coupling of Different Aldehydes*

- Performed risk assessment and developed a standard operating procedure for reactivity tests on Pb foil
- Collected cyclic voltammograms to determine reduction potentials of benzaldehyde and furfural on four metals
- Tested the cross-coupling activity and selectivity of benzaldehyde and furfural on Pt, Au, Cu and Pb
- Developed a new electrochemical plating procedure to allow for *in operando* probing of a lead surface using attenuated total reflection - surface enhanced infrared reflection absorption spectroscopy (ATR-SEIRAS)
- Utilized *operando* infrared spectroscopy to elucidate adsorbates on the Pb and Cu surfaces during reduction

#### Electroreductive Coupling of Benzaldehyde

*Investigation into the Variation of Benzaldehyde Coupling Ability between Catalysts*

- Developed a reactivity testing procedure to evaluate the electroreductive coupling activity of metal catalysts
- Evaluated the electroreductive coupling activity of benzaldehyde on Pt, Pd, Au, and Cu foils
- Identified a ketyl radical intermediate on the Au and Cu surfaces using attenuated total reflection - surface enhanced infrared reflection absorption spectroscopy (ATR-SEIRAS)
- Combined reactivity and spectroscopic data to rationalize coupling ability in terms of ketyl radical stability

#### Electrochemical Reduction of Nitrogen to Ammonia

*Collaboration to Evaluate Catalysts for Electrochemical Ammonia Synthesis*

- Constructed membrane electrode assemblies to test nitrogen reduction catalysts using a fuel cell electrolyzer
- Evaluated the nitrogen reduction activity of three nitride catalysts using a membrane electrode assembly
- Performed control tests to evaluate vanadium nitride stability under reaction conditions
- Collaborated with workers at Brookhaven national lab to identify active sites using *in situ* x-ray spectroscopy

#### Other Work

- Coordinated group meeting schedule and speakers
- Provided critical peer review for three journal articles
- Developed a convective transport model to estimate CO surface concentration under reduction conditions
- Designed spectroscopic flow and stir cells, cell holders, and other spectroscopic equipment

**Calabrese Barton Group, Michigan State University**  
*Undergraduate Researcher*

East Lansing, MI  
June 2014 - June 2016

#### **Non-precious Metal Catalyst Synthesis and Characterization**

*Synthesis and Characterization of Non-precious Metal Catalysts for Oxygen Reduction*

- Synthesized 10 non-precious metal catalysts for oxygen reduction using a high-pressure pyrolysis synthesis
- Evaluated oxygen reduction catalyst performance using a rotating disk electrode
- Characterized catalyst pore morphology using mercury porosimetry and nitrogen physisorption

#### **Effect of Pore Structure on Hard Template Oxygen Reduction Catalysts**

*Investigation of Pore Morphology Effects on Oxygen Reduction Activity*

- Collaborated with industry partner Pajarito Powder to evaluate morphology effects on catalyst activity
- Evaluated pore size and area with nitrogen physisorption using BJH and DFT based fitting methods
- Developed a geometric model to relate catalyst pore size to template particle diameter

**Lira Group, Michigan State University**  
*Undergraduate Researcher*

East Lansing, MI  
Sep 2012 - June 2014

#### **Correlation of Fuel Properties with Infrared Spectra**

*Project to Relate Fuel Properties and IR Spectra*

- Analyzed property-spectra correlations using partial least squares regression
- Developed R code to process infrared data and perform partial least squares regression analysis

#### **Measurement of Thermodynamic Equilibria**

- Measured equilibrium data for solid-liquid, vapor-liquid and vapor-liquid-liquid systems
- Evaluated statistical uncertainty to provide estimates of measurement error

### **TECHNICAL SKILLS**

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- Programming Languages: Matlab, R
- Software: Microsoft Office, Word Press, Igor, AutoCAD, ChemDraw
- Analytical Techniques: Gas Chromatography, Infrared Spectroscopy, Raman Spectroscopy, NMR, X-ray Photoelectron Spectroscopy

### **ACTIVITIES**

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**Graduate Student Government, University of Delaware**  
*Senator*

Newark, DE  
Sep 2017 - Sep 2018

**AICHE, Michigan State Student Chapter**  
*Treasurer*

East Lansing, MI  
May 2015 - May 2016

**AICHE, Michigan State Student Chapter**  
*Chem-E Car Captain*

East Lansing, MI  
May 2013 - May 2015

**Honors Times Two Program, Michigan State University**  
*Mentor*

East Lansing, MI  
Sep 2012 - Sep 2014

# Atharv Bhosekar

5411, Christiana Meadows, Bear, DE 19701 | [atharv.bhosekar@gmail.com](mailto:atharv.bhosekar@gmail.com) | (412)-886-8864

## EDUCATION

**Rutgers University**, New Brunswick, NJ  
Visiting scholar, University of Delaware  
Ph.D. in Chemical Engineering

*Expected Graduation: August 2020*

GPA: 4.0/4.0

**Carnegie Mellon University (CMU)**, Pittsburgh, PA  
Master of Science in Chemical Engineering

*December 2015*

GPA: 4.0/4.0

**Institute of Chemical Technology (ICT)**, Mumbai, India  
Bachelor of Chemical Engineering

*May 2014*

GPA: 7.91/10.0

## SKILLS

|                              |  |
|------------------------------|--|
| <b>Programming Languages</b> | Python, C++, Fortran, Matlab, Java, GOlang, Scilab |
| <b>Software</b>              | GAMS, AMPL, gPROMS, MS-Office                      |
| <b>Languages</b>             | English, Hindi, Marathi                            |

## THESIS

**Machine learning-based optimization frameworks for enterprise-wide optimization**

*September 2016-present*

*Advisor: Dr. Marianthi Ierapetritou*

- Developed a framework for inventory optimization using a simulation of multienterprise supply chain network that identifies discontinuities in the simulation response to achieve more robust and cost-effective solutions
  - The framework identifies discontinuities in the simulation response with the help of support vector machines and sparse grid sampling
  - Demonstrated more robust and cost-effective solutions compared to existing commercial solvers when applied to three different supply chain networks
- Developed a novel framework that minimizes the investment costs and addresses the product demand uncertainty by using support vector machine-based feasibility analysis to obtain optimal modular designs for an air separation unit
- Ongoing work focuses on integration of supply chain design and production planning for modular designs

## RESEARCH AND PROFESSIONAL EXPERIENCE

**Research Associate, CMU**

*January 2015-July 2016*

**Data-driven global optimization**

*Advisor: Dr. Nikolaos Sahinidis*

- Created a Fortran implementation of a novel data-driven global optimization algorithm to optimize over computationally demanding simulations and included to a library containing 28 other data-driven optimization solvers
- Demonstrated a superior performance in finding global optimum compared to six other solvers under comparison

**Assessment of meta-flowsheeting software**

- Analyzed the potential of a software to be commercialized as a deployment platform for models generated in gPROMS in collaboration with the researchers at CMU and presented it to Process Systems Enterprise (PSE)

**Intern, Yokogawa Middle East & Africa B.S.C. (c), Bahrain**

*May 2013-July 2013*

**Development of operator training simulator**

- Built a simulation model as part of the development of the operator training simulator (OTS) for an oil and gas company
- Gained first-hand experience of simulating and tuning the control parameters of dynamic processes

**Research Intern, Indian Institute of Technology-Bombay (IIT-B), Mumbai, India**

*May 2012-July 2012*

**Numerical methods for partial differential equations**

- Built a teaching-aid that enabled the user to choose from various numerical methods for differential and integral equations to obtain a graphical representation of the convergence results

## RELEVANT GRADUATE COURSEWORK

|                             |                        |                                      |
|-----------------------------|------------------------|--------------------------------------|
| Dynamic Programming         | Discrete Optimization  | Nonconvex Optimization               |
| Algorithmic Learning Theory | Stochastic Programming | Advanced Process Systems Engineering |

## PUBLICATIONS

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**Bhosekar, A.,** & Ierapetritou, M. Modular design optimization using machine learning-based flexibility analysis. *(submitted)*, 2019

**Bhosekar, A.,** & Ierapetritou, M. A discontinuous derivative-free optimization framework for multi-enterprise supply chain. *Optimization Letters*, 108, 250–267, 2019

Dias L., **Bhosekar, A.,** & Ierapetritou, M. Data-driven feasibility analysis for modular design under demand variability *Foundations of Computer Aided Process Design (FOCAPD) conference proceedings*, 2019

Dias L., **Bhosekar, A.,** & Ierapetritou, M. Adaptive sampling approaches for surrogate-based optimization, *Foundations of Computer Aided Process Design (FOCAPD) conference proceedings*, 2019

**Bhosekar, A.,** & Ierapetritou, M. Space mapping based derivative-free optimization framework for supply chain optimization, *Process Systems Engineering (PSE) conference proceedings*, 2018

**Bhosekar, A.,** & Ierapetritou, M. Advances in surrogate based modeling, feasibility analysis, and optimization: A review. *Computers and Chemical Engineering*, 108, 250–267, 2018

## CONFERENCES

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Dias L., **Bhosekar, A.,** & Ierapetritou, M. Data-driven feasibility analysis for modular design under demand variability *American Institute of Chemical Engineers (AIChE) Annual Meeting*, Orlando, FL, November, 2019

**Bhosekar A.,** & Ierapetritou, M., ‘Surrogate-based derivative-free optimization of a multi-enterprise supply chain simulation’, *American Institute of Chemical Engineers (AIChE) Annual Meeting*, Pittsburgh, PA, November, 2018

**Bhosekar A.,** Dias L., Wang Z., & Ierapetritou, M., ‘Surrogate-based optimization framework in process systems engineering’, *American Institute of Chemical Engineers (AIChE) Annual Meeting*, Pittsburgh, PA, November, 2018

**Bhosekar A.,** L. M. Rios, Sahinidis N. V., ‘computational experience with the BAM global optimization algorithm for derivative-free optimization’, *Institute for the Operations Research and the Management Sciences (INFORMS) Annual Meeting*, Philadelphia, PA, November, 2015

**Bhosekar A.,** Rios L. M., Sahinidis N. V., ‘Branch-and-Model: A model-based derivative-free global optimization algorithm’, *American Institute of Chemical Engineers (AIChE) Annual Meeting*, Salt Lake City, UT, November, 2015

## TEACHING EXPERIENCE

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|   |                    |
|---|--------------------|
| Chemical Engineering Kinetics (Teaching Assistant), Rutgers University              | <i>Spring 2017</i> |
| Analytical Methods in Chemical Engineering (Teaching Assistant), Rutgers University | <i>Fall 2017</i>   |

## AWARDS

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|   |                   |
|---|-------------------|
| PSE 2018 Young Researcher Award                               | <i>May 2018</i>   |
| TA-GA Professional development fund award, Rutgers University | <i>March 2018</i> |

- Solution-oriented researcher with a strong background in biomaterials and 7 years of project management experience with 14 peer-reviewed publications, 8 conference presentations
- Experienced self-starter with expertise in interdisciplinary collaborations in the fields of foreign body response, tumor metastasis and pharmacokinetic research studies.
- Knowledgeable leader and mentor having trained 17 undergraduate researchers across 4 nationally funded programs recognized through teaching and research excellence awards.

## Work Experience

### Research Collaborator and Project Manager

*As a Postdoctoral Scholar at University of Delaware, Newark, USA*

March 2019 – Present

- Synthesized and purified **collagen mimetic peptide** (CMP) conjugates using HPLC, MALDI, GPC and CD characterization to efficiently transfect immune cells that heal wounds faster.
- Designed plasmid DNA based bioconjugates to catalyse re-epithelialization of **chronic wounds** in **diabetic patients** by stimulating collagen turnover at the wound site.
- Trained researchers on small animal **surgery techniques** using GLP concepts.

### Research Scientist and Project Manager

*As a Ph.D. Scholar at Iowa State University, Ames, USA*

June 2015 – December 2018

- Derived a **rational design** for synthesizing responsive alginate hydrogels that can reduce scarring response to traumatic or chronic injuries which to-date has resulted in 2 awards and significantly contributed to projects funded for \$200,000+.
- Characterized **wound healing** treatments on porcine subjects for scarring related markers with the Biomaterials group at **Corporate Research Materials Lab at 3M**.
- Spearheaded and managed research projects on pancreatic, breast cancer cell proliferation
- Optimized **pharmacokinetics** of doxorubicin-liposome delivery to epithelial cancer cells in metastatic tumor environments.

### Microbiologist and Microscopy Specialist

*As a Research Intern at the Indian Agricultural Research Institute, Delhi, India*

August 2014 – December 2014

- Demonstrated decrease of **~40% in the vigor index** of biofilm-inoculated wheat and tomato plants in a Zinc oxide nanoparticle infused, mineral-rich environment.

### Microbiologist and Medical Device Specialist

*As a Research Intern at LiPhy Grenoble, France*

February 2014 – July 2014

- **Decreased biofilm formation by ~25%** on stiffer, flexible substrates to understand propagation of hospital acquired infections and proliferation of **antibiotic resistant MRSA** strains.
- Completed **cleanroom training** at Chalmers University, Sweden to fabricate **biosensor** chips.

### Microscopy Specialist

*As a Research Intern at IIT Delhi, India*

January 2012 – July 2012

- **Increased detection limit** for salmonella biosensors **by 100 times** using total internal reflection fluorescence microscopy and bioconjugated nanoparticles, for cost-effective treatment.

### Process Engineering Specialist

*As a Process Engineering Intern at Tata Chemicals, Babrala, India*

June 2010 – August 2010

- Analysed the production of Ammonia and Urea at the **processing** plant and provided suggestions for **increased efficiency and process control** to the Plant Supervisor.



## Selected Peer-Reviewed Publications (6 out of 14 articles)

1. **Anuraag Boddupalli**, Dana Akilbekova and Kaitlin Bratlie (2019) Effect of PLR modifications on the *in vivo* organization and secretion of collagen in SKH1-E mice. *Materials Science and Engineering C* 106: 11043 ([doi: 10.1016/j.msec.2019.110143](https://doi.org/10.1016/j.msec.2019.110143))
2. **Anuraag Boddupalli** and Kaitlin Bratlie (2019) Second harmonic generation microscopy imaging of collagen organization in tunable, environmentally responsive alginate hydrogels. *Biomaterials* 7(3):1188-1199 ([doi: 10.1039/C8BM01535J](https://doi.org/10.1039/C8BM01535J))
3. Kendall Neuberger, **Anuraag Boddupalli** and Kaitlin Bratlie (2018) Effects of arginine-based surface modifications of liposomes for drug delivery in Caco-2 colon carcinoma cells. *Biochemical Engineering Journal* 139:8-14 ([doi: 10.1016/j.bej.2018.08.003](https://doi.org/10.1016/j.bej.2018.08.003))
4. **Anuraag Boddupalli** and Kaitlin Bratlie (2018) Collagen organization deposited by fibroblasts encapsulated in pH responsive methacrylated alginate hydrogels. *Journal of Biomedical Materials Research Part A* 106(11):2934-2943 ([doi: 10.1002/jbm.a.36482](https://doi.org/10.1002/jbm.a.36482))
5. Juan Wang\*, Joseph Koelbl\*, **Anuraag Boddupalli\***, Zhiqi Yao, Kaitlin Bratlie, and Ian Schneider (2018) Transfer of assembled collagen fibrils to flexible substrates for mechanically tunable contact guidance cues. *Integrative Biology* 10(11):705-718 ([doi: 10.1039/c8ib00127h](https://doi.org/10.1039/c8ib00127h))
6. **Anuraag Boddupalli\***, Lida Zhu\*, Kaitlin Bratlie (2016) Methods for implant acceptance and wound healing: Material Selection and Implant Location modulate macrophage and fibroblast phenotypes. *Advanced Healthcare Materials* 5(20):2575-2594 ([doi: 10.1002/adhm.201600532](https://doi.org/10.1002/adhm.201600532))

For the complete list of publications: [Google Scholar Link](#)

\*equal contributions

## Education

|   |                |
|---|----------------|
| <b>Ph. D. in Chemical and Biological Engineering</b>                      | [2015 to 2018] |
| At Iowa State University, Ames, United States of America                  |                |
| <b>Erasmus Mundus Master of Science in Nanoscience and Nanotechnology</b> | [2012 to 2014] |
| At KU Leuven, Belgium and Universite Joseph Fourier, France               |                |
| <b>Bachelor of Engineering in Chemical Engineering</b>                    | [2008 to 2012] |
| At Manipal Institute of Technology, Manipal, India                        |                |

## Skills

| Key Bench Skills     | Instrumentation          | Software               |
|----------------------|--------------------------|------------------------|
| Molecular Techniques | Confocal Microscopy      | Microsoft Office Suite |
| ELISA Assays         | NanoDrop™                | JMP 13, 14             |
| Liposome Synthesis   | Agilent HPLC, GPC        | MATLAB, Origin         |
| IHC/ICC/IF staining  | SpectraMax™ Plate Reader | RStudio, Magick        |
| Small Animal Surgery | Jasco 1500-CD            | FILJI and ImageJ       |
| Cell Transfection    | MALDI-TOF                | Adobe Photoshop Suite  |

## Awards and Scholarships

- **Research Excellence Award** 2018 from Dept of Chemical Engineering, Iowa State University
- **Teaching Excellence Award** 2018 from Dept of Chemical Engineering, Iowa State University
- **People's Choice Award for Three Minute Thesis (3MT) presentation** at Iowa State University in 2017
- **Erasmus Mundus Scholarship** including Erasmus Mobility Scholarship from 2012-2014 of Masters' Studies at Universite Joseph Fourier, Grenoble on behalf of Erasmus Mundus

## Affiliations

- American Institute of Chemical Engineers (2015 to present)
- Sankalp, a non-profit initiative for public service projects in India (2015 to 2018)

# Kamil Charubin

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

## Education

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***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

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***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

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**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/US2017/48176. 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.

# Kimberly A. Dennis

704-280-3092

kadennis@udel.edu

linkedin.com/in/kimberlydennis/

## Summary of Qualifications

- Applications driven rheologist with instrument and method development experience resulting in novel techniques for high-pressure and paint drying conditions
- Extensive teamwork experience with academic and industrial collaborators resulting in journal publications and professional conference presentations
- Excellent leadership and management skills developed through helping create and lead a new peer mentorship organization

## Education

Ph.D., Chemical Engineering, May 2020  
MChE., Chemical Engineering, May 2018  
University of Delaware (UD), Newark, DE

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

## Research Experience

### Department of Chemical and Biomolecular Engineering, UD

**Advisor: Eric M. Furst, Co-Advisor: Norman J. Wagner**

Graduate Research Assistant

08/2015-present

- Developed and validated novel pressure cell for high-pressure light scattering measurements resulting in new insights into the rheology of fracturing fluids
- Measured light scattering of aqueous paints to assess high-frequency rheology and structure development
- Mentored and trained 2018 Summer Scholar undergraduate student in rheometry and passive microrheology resulting in deeper understanding of polymer solutions

### Department of Chemical and Biomolecular Engineering, NCSU

**Advisors: Peter S. Fedkiw and Saad A. Khan**

Research Assistant

05/2013-07/2015

- Investigated biopolymers as silicon anode binders for novel polymer composites by fabricating structures and analyzing electrochemical performance
- Electrospun polyacrylonitrile, graphene oxide, and tin (IV) chloride to create new structures to improve lithium-ion battery performance

### 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 and aided in mixing device development resulting in facile way to re-calcify whole blood

## Publications

- **K.A. Dennis**, Y. Gao, A. Phatak, P. Sullivan, E.M. Furst, "Design, operation, and validation of a microrheology instrument for high-pressure linear viscoelasticity measurements," *Journal of Rheology*, 2019 (in revision).
- Y. Luo, Y.-F. Lee, **K.A. Dennis**, C. Velez, S.C. Brown, E.M. Furst, N.J. Wagner, "One-step, in-situ jamming point measurements by immobilization cell rheometry," *Rheologica Acta*, 2019 (under review).
- **K.A. Dennis**, "High-pressure linear viscoelasticity measurements," Master's thesis, University of Delaware, 2018.

- 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.

## Presentations (selected)

- **K.A. Dennis**, S.C. Brown, N.J. Wagner, E.M. Furst, "Particle dynamics and structure development during paint drying," The Society of Rheology 91<sup>st</sup> Annual Meeting, 2019, Raleigh, NC.
- **K.A. Dennis** and E.M. Furst, "Microrheology," UD Rheology Boot Camp, 2019, Newark, DE.
- **K.A. Dennis**, Y. Gao, A. Phatak, E.M. Furst, "High-pressure linear viscoelasticity measurements of polymer solutions and gels," ACS: 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.

## Leadership Experience

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|---|-----------------|
| Gordon Research Seminar (GRS) Chair   | 03/2018-02/2020 |
| <ul style="list-style-type: none"> <li>▪ Worked closely with co-chair to develop framework, select participants, and fundraise for the 2020 Colloidal, Macromolecular and Polyelectrolyte Solutions GRS</li> </ul>  |                 |
| EmPOWER Program   | 09/2016-present |
| Lead Mentor   | 09/2018-08/2019 |
| Mentor  | 09/2017-present |
| <ul style="list-style-type: none"> <li>▪ Founding member of <b>Empathetic Peers Offering Wisdom, Encouragement, and Resources</b></li> <li>▪ Worked with team to create low-barrier peer-support group for graduate students</li> <li>▪ Received Mental Health First Aid Certification (01/2019 – 01/2022)</li> <li>▪ Organized departmental seminars on mindfulness and public speaking</li> <li>▪ Mentored 3 first year chemical engineering graduate students each year</li> </ul> |                 |

## Work Experience

### University Tutorial Center, NCSU

- |   |                 |
|---|-----------------|
| Tutor Mentor  | 08/2012-11/2014 |
| <ul style="list-style-type: none"> <li>▪ Supervised tutors by observing sessions and co-leading group trainings for 1-8 hour(s)/week</li> </ul> |                 |
| Tutor   | 08/2011-11/2014 |
| <ul style="list-style-type: none"> <li>▪ Tutored students in chemistry by meeting for 2-4 hours/week</li> </ul>                                 |                 |

## Volunteer Experience

- |   |                  |
|---|------------------|
| Fusion Running Club   | 11/2018-present  |
| <ul style="list-style-type: none"> <li>▪ Participated and volunteered in local running races</li> </ul>                 |                  |
| New Castle County Science Fair Judge  | 03/2018, 03/2019 |
| <ul style="list-style-type: none"> <li>▪ Judged high school chemistry posters and middle school best of show</li> </ul> |                  |

## Honors, Awards, and Affiliations

- First Place in 2018 UD Environmental Health and Safety Poster Competition
- Society of Rheology Travel Grant recipient for 89th Annual Meeting in Denver, CO
- Dean's List: Fall 2010-Fall 2014
- Member of The Society of Rheology
- Member of NCSU University Scholars Program, Omega Chi Epsilon, and Tau Beta Pi

# PIERRE DESIR

310 East Park Place, Newark, DE 19711

(347) 948-2684 | [pdesir@udel.edu](mailto:pdesir@udel.edu)

## CAREER OBJECTIVE

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Chemical Engineering PhD candidate looking for a R&D position in process engineering and process development where I can apply my experience in chemical reaction engineering and reactor design to solve challenges in pharmaceutical applications or in global energy.

## 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 bio-derived platform chemical, 5-hydroxymethyl furfural (HMF)
- Optimized the HMF yield from fructose with an increase in productivity by a factor of x10 – 1000 in an in-house built flow microreactor with millisecond-scale mixing at 4 s reaction time
- Developed scale-up and scale-out strategies for single-phase liquid microreactors with second-scale reaction times for distributed manufacturing in farm-scale biomass processing to HMF
- Mentored and managed a Chemical Engineering undergraduate freshman student in building and characterizing high-throughput slurry flow (solid-liquid-liquid) milli-scale reactors for biomass conversion

**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 chemiluminescence reactions

**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)
- Held training courses on Matlab coding of phase equilibrium and Aspen simulations of separation processes

## SKILLS

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- Design, optimization, scale-up, and techno-economic analysis of capillary microreactors
- Kinetic and reactor modeling in Matlab
- Confocal microscopy imaging for microfluidic flow characterization
- Product quantification by High Pressure Liquid Chromatography (HPLC)
- 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 2019 North American Symposium on Chemical Reaction Engineering Graduate Poster Competition, Houston, TX, March 2019
- 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** (2019), *“Two-Phase, Liquid-Liquid Microreactor Design for the Reactive Extraction of HMF”*, *2019 North American Catalysis Society Meeting*, Chicago, IL, June 2019 (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
- **Pierre Desir**, Basudeb Saha, Dionisios G. Vlachos, *“Ultrafast Flow Chemistry for the Acid-Catalyzed Conversion of Fructose”*. *Energy Environ. Sci*, **2019**, 12, pp 2463–2475
- **Pierre Desir**, Tai-Ying Chen, Mauro Bracconi, Basudeb Saha, Matteo Maestri, Dionisios G. Vlachos, *“Experiments and Computations of Microfluidic Liquid-Liquid Flow Patterns”*. *React. Chem. Eng.*, **2019**, DOI: 10.1039/C9RE00332K
- **Pierre Desir**, Tai-Ying Chen, Basudeb Saha, Dionisios G. Vlachos, *“Liquid-Liquid Microfluidic Flows for Ultrashort HMF Extraction”*. (In Preparation), **2019**

# Lucas Dunshee

150 Academy St. (Rm 253)  
Newark, DE 19716

+1 515-401-8901  
ldunshee@udel.edu

## EDUCATION

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### University of Delaware

Ph.D. Candidate in Chemical Engineering  
Advisors: Dr. Millicent Sullivan and Dr. Kristi Kiick  
Cumulative GPA: 3.57

Newark, DE  
2015-Present

### Iowa State University

B.S in Chemical Engineering  
Cumulative GPA: 3.38  
Cumulative Core Course Work GPA: 3.65

Ames, IA  
May 2015

## PROFESSIONAL EMPLOYMENT

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### Graduate Research Assistant

University of Delaware  
Department of Chemical and Biomolecular Engineering

*January 2016 To Present*

Project: Dually thermoresponsive peptide nanovesicles for drug delivery applications: sequence design and heuristics

- Designed, synthesized, purified and characterized the thermal properties of elastin-like peptides, collagen-like peptides and their resulting elastin-*b*-collagen like peptide conjugates and the nanovesicles into which they assembled
- Implemented new synthetic procedures for solid-phase peptide synthesis and copper catalyzed azide-alkyne cycloaddition and optimized high performance liquid chromatography programs for the improvement of peptide conjugate yields from 5mg to 15mg per synthetic batch
- Collaborated with many individuals and facilities on projects, proposals, and equipment including the Delaware Biotechnology Institute Bioimaging Facility, the Centers of Biomedical Research Excellence, The Biomedical Engineering Department, and The Molecular Physiology Research Laboratory of the University of Delaware
- Managed and maintained laboratory equipment within the research group and the department including a circular dichroism spectrometer, fluorescent microscopy unit, two solid-phase peptide synthesizers, high performance liquid chromatography unit, preparatory ultracentrifugation unit, table-top centrifuges, and a freeze-drying apparatus
- Mentored four students in research activities and protocols including two high-school students, an undergraduate student, and a first-year graduate student
- Laboratory safety officer for two years.

### Undergraduate Research Assistant

Iowa State University  
Department of Chemical and Biological Engineering

*June 2013 To May 2015*

Project: Development of high-throughput methods for the synthesis of polyanhydride nanoparticles with applications therapeutic protein drug release

- Performed research under the direction of Dr. Balaji Narasimhan and the mentorship of Dr. Jonathan Goodman with the specific aim of establishing an automated high-throughput method for polymer and nanoparticle synthesis

### Undergraduate Research Assistant

Argonne National Lab – Chemical and Fuel Cycle Division  
Student Research Program (SRP) Participant

*June 2014 To August 2014*

Project: Molten salt droplet generation and analysis for nuclear waste pyroprocessing



- Tested and analyzed a novel molten salt droplet generator under the direction of Dr. Candido Pereira and the mentorship of Dr. Cari Launiere with the specific aim of improving the integrity of molten droplet morphology post droplet generation

### Process Engineering Intern

Cambrex Corporation

August 2013 To December 2013

- Drafted and revised procedures for equipment for various processes and cleanouts
- Collected loss on drying data in order to identify trends and reduce lab drying time

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## TEACHING EXPERIENCE

### Graduate Teaching Assistant

University of Delaware

Fall 2018 and Fall 2019

Department of Chemical and Biological Engineering

Course: Chemical Engineering Laboratory II – Distillation

- Evaluated student's presentations based on necessary lab procedures, equipment knowledge and safety precautions
- Led students during their 5-hour long multi-day experiments – monitored experimental parameter selection and safe operation of distillation column

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## PUBLICATIONS

1. **Dunshee, L.C.**, Sullivan, M.O., and Kiick, K.L., "Manipulation of the Dually Thermoresponsive Behavior of Peptide-Based Vesicles through Modification of Collagen-like Peptide Domains", *Bioengineering and Translational Medicine* e10145 (2019). DOI: 10.1002/btm2.10145
2. Goodman, J.T., Mullis, A.S., **Dunshee, L.C.**, Mitra, A., Narasimhan, B., "Automated High-Throughput Synthesis of Protein-Loaded Polyanhydride Nanoparticle Libraries", *ACS Combinatorial Science* **20** (5), 298-307 (2018). DOI: 10.1021/acscombsci.8b00008
3. Luo, T., David, M.A., **Dunshee, L.C.**, Scott, R.A., Urello, M.A., Price, C., Kiick, K.L., "Thermoresponsive Elastin-*b*-Collagen-Like Peptide Bioconjugate Nanovesicles for Targeted Drug Delivery to Collagen-Containing Matrices", *Biomacromolecules* **18** (5), 2539-2551. (2017). DOI: 10.1021/acs.biomac.7b00686

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## ORAL PRESENTATION

1. MRS Fall Meeting, Boston, MA, November 27, 2018  
"Self-Assembly of Elastin-*b*-Collagen-Like Conjugates Mediated by Triple Helical Parameters"

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## HONORS/ACHIEVEMENTS

### Laird Fellowship Candidate 2016

One of ten finalists, among many contestants for the 2016 Laird fellowship at the University of Delaware. Candidates are chosen based on qualities such as character, maturity, ingenuity, and perseverance and must be recommended by faculty members and department chairpersons.

### Collins Fellowship 2016

Fellowship endowed for select students who are in good standing with the department.

### Eagle Scout - 2010

Achieved the highest rank in the Boy Scouts of America program - the rank of Eagle Scout. This rank was attained through hard work, dedication, leadership and consistent participation in the activities of Troop 98 in Urbandale, Iowa. One of the requirements for the rank of Eagle Scout is to perform a service project for the community. The service project involved the planning, construction and installation of trail signs that include GPS coordinates which have helped emergency personnel find the location of people who need assistance. After nearly a decade the trail signs continue to serve the community.

Lucas Dunshee – For complete list of equipment and research skills visit [lucasdunshee.org](http://lucasdunshee.org)

## Osamudiamhen Elvis Ebikade

221 Academy Street, Newark, DE 19711 | Phone: +1 302-244 -1770 | E-Mail: [eebikade@udel.edu](mailto:eebikade@udel.edu)

Linkedin: [www.linkedin.com/in/ebikade](http://www.linkedin.com/in/ebikade)

## Catalysis and Process Engineering for Biorefinery Development

### EDUCATION

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#### University of Delaware, Newark, DE, USA

Ph.D. Candidate, Chemical and Biomolecular Engineering. Advisor: Prof. Dionisios Vlachos 8/2016 – present

#### University of Lagos, Lagos, Nigeria

B.S., Chemical Engineering: CGPA: 3.92/4.0 2010 – 2014

### RESEARCH EXPERIENCE

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#### Graduate Research Assistant

12/2016 – present

*Catalysis Centre for Energy and Innovation; Department of Chemical and Biomolecular Engineering, University of Delaware*

- Championed food waste (FW) research, combining process engineering with techno economics for novel solutions.
- Developed collaborations with researchers in food science, data science, process system analysis towards developing technology for upgrading waste biomass into biobased products. **U.S. Patent No.: 62/887,009**
- Developed an integrated biorefinery technology, repurposing potato peel waste (PPW) into three biobased value-added products, obtaining revenues of **~\$9000 per ton of PPW. U.S. Patent No.: 62/862,840**
- Designed experiments and developed a kinetic model to probe fundamental reaction mechanisms to improve reaction rates and glucose yields from FW. **\*\*Featured on Journal cover, Ind. Eng. Chem. Res. Dec 2018\*\***
- Co-authored the proposal for CENFOODS seed grant (Lead PI: Professor Changqing Wu, Co-PI: Professor Dionisios Vlachos) **raising \$40,000 in grant support.**
- Given > 25 oral and poster presentations at national and local conferences and symposia on my research work.

### ENTREPRENEURIAL EXPERIENCE

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#### Co-Founder, Lignolix Inc.

2019

- Developed technology for **ambient pressure** depolymerization of pulp and paper industry waste into phenolic monomers in comparison to standard depolymerization at **150 bar**.
- Raised > **\$ 500,000** in seed grant through NSF SBIR funds for prototyping our biobased adhesive product.

### SKILLS AND PROFICIENCIES

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Materials characterization (XRD, SEM, XPS, BET, XEDS, static and dynamic light scattering), kinetic modelling, design of experiments, parameter estimation, project management, customer discovery, new product development.

**Numerical/Graphics/Modeling:** MATLAB, Minitab, Machine learning (PCA, PLS)

### INDUSTRIAL EXPERIENCE

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#### Brewing and Effluent Treatment Support (Intern)

2013

*Diageo (Guinness Nigeria PLC)*

- Proposed an approach to reduce the company's CO<sub>2</sub> expense by 30 % by describing the effect of using High Maltose Syrup (HMS) on the amount of CO<sub>2</sub> evolved during fermentation.

## PROVISIONAL PATENTS

- 
- Ebikade E.O., Gottlieb E.R., O'Dea R. M., Epps, III T. H, Vlachos D. G. Hydrogen-Free, Low-Pressure Catalytic Depolymerization of Lignocellulosic Biomass (**U.S. Patent No.: 62/887,009**)
  - Ebikade E.O, Vlachos D. G. Production of valuable bio-based products from accessible food waste (**U.S. Patent No.: 62/862,840**)

## PUBLICATIONS

- 
- Ebikade, E.; Lym, J.; Wittreich, G.; Saha, B.; Vlachos, D. G. Kinetic Studies of Acid Hydrolysis of Food Waste-Derived Saccharides. *Ind. Eng. Chem. Res.* 2018, 57 (51), 17365–17374. **\*\*Journal cover Ind. Eng. Chem. Res. Dec 2018\*\***
  - Ebikade E.; Athaley, A.; Fisher, B.; Wu, C.; Ierapetritou, M.; Vlachos, D. G. *Joule* (*Under Revision*). The Future is Garbage: Repurposing of Food Waste in an Integrated Biorefinery.
  - Elvis Ebikade, Nicholas Samuelwicz, Changqing Wu, Dionisios G. Vlachos. From Agricultural Waste to Antimicrobials: Reductive Depolymerization of Herbaceous Biomass. (*Under Review*).
  - Elvis Ebikade, Yifan Wang, Nicholas Samuelwicz, Bjorn Hasa, Dionisios G. Vlachos. A Machine Learning Study on the Synthesis of Nitrogen Doped Carbon Catalyst for Hydrogen Evolution Reaction. (*In preparation*).
  - Elvis Ebikade, Ibukun Popoola, Tolulase Ajayi, Dionisios G. Vlachos. Life cycle Assessment of Various Food Waste Management Technologies. (*In preparation*).

## LEADERSHIP AND OUTREACH

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### Delaware Environmental Institute (DENIN) Fellow

06/2019 – present

- Organize the annual environmental research symposium and pitch 90 event for graduate students,

### Research Mentor, Delaware Energy Institute Research Internship Program

06/2019 – 08/2019

- Developed and planned a research project for an undergraduate, providing hands-on guidance and supervision.

### Member, Editorial Board for *Frontiers in Energy Research*

03/2019 – present

- Writing and reviewing articles aimed at disseminating the accomplishments and activities of the EFRCs to the broader scientific community and DOE through the Frontiers in Energy Research newsletter.

### International Student Representative, Dept. of Chemical Engineering, University of Delaware

08/2017 – present

- Organized immigration advising seminars and career panels directed towards international ChemE students.

### Research Mentor, NSF-REU Program

06/2018 – 08/2018

- This experience provided the mentee his first article authorship in a high impact (IF = 15) peer reviewed journal.

## TEACHING EXPERIENCE

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### Teaching Assistant at University of Delaware

Fall 2017

#### *Chemical Engineering Laboratory II (CHEG 445): Biodiesel production from soybean oil*

- Developed analytical methods, SOP's and supervised 70 students in the laboratory.

### Administrative Support and Teaching Assistant at University of Calabar, Calabar, Nigeria

2015 - 2016

- **Mentored the first Nigerian** to obtain a First Class Honors degree in Pure and Applied Chemistry at the university.

## HONORS AND AWARDS

- 
- **Seminar competition finalist, Inaugural, DuPont (GOLD) Competition** 2019
  - DENIN Environmental Fellow 2019 -2021
  - 1<sup>st</sup> place, Corning 3 minute (3MT) thesis competition, NOBCChE 2019, St. Louis Missouri 2019
  - 2<sup>nd</sup> place, AIChE Catalysis and Reaction Engineering Division poster competition, Orlando, Florida 2019

# Eden M. Ford

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

edenford@udel.edu

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## EDUCATION

### 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

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## RESEARCH & INDUSTRIAL EXPERIENCE

### 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 collagenous tissues to investigate the interplay of structure and biochemical content and the effects on cell function and fate.

### R&D Intern, Formulations

June – August 2019

*Fraunhofer USA, Center for Molecular Biotechnology, Newark, DE*

*Supervisor: Dr. Rikhav Gala*

Characterized hydrogel degradation kinetics and assessed particle release from hydrogels toward development of a multi-dose vaccine.

### 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.

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## RESEARCH SKILLS

### Cell Culture and Bioengineering

Mammalian cell culture, 3D cell culture, bioreactor-based cell culture, cell transfection, immunostaining (IF), colorimetric assays, fluorescent and confocal microscopy, RNA isolation, agarose gel electrophoresis, SDS-PAGE, western blot assay, 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, Origin, COMSOL, AutoCAD, Microsoft Office, Minitab, Spanish (Intermediate)

## PUBLICATIONS

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A.M. Hilderbrand, **E.M. Ford**, *et al.* "Hierarchically structured hydrogels utilizing multifunctional assembling peptides for 3D cell culture" *Biomaterials science. Manuscript accepted.*

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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Research Poster Presentation Winner

May 2018

NSF SBE2 IGERT Fellowship

February 2017 - Present

Robert L. Pigford Fellowship

August 2015 - 2016

Elton E. Staples Scholar

August 2011 - May 2015

## LEADERSHIP AND OUTREACH

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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.

WVUD Radio

September 2016 - January 2019

Hosted a morning radio show, "Rise and Science".

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.

Colburn Club Outreach

September 2016 - May 2018

Planned and led science-based activities for junior high students.

# Andrew S. Gaynor

Chemical and Biomolecular Engineering  
University of Delaware  
Email: agaynor@udel.edu

Colburn Laboratory Office #361  
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

- 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

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

## Publications

- 
- RP Chen\*, **AS Gaynor\***, and W Chen, Synthetic biology approaches for conditional protein degradation, *Biotechnology Advances*, Accepted for Publication.  
\* Authors contributed equally to this work
  - H Kim, **AS Gaynor**, and W Chen, Tunable modulation of antibody-antigen interaction by protease cleavage of protein M, *Biotechnol. Bioeng.*, **116**, 2834-2842, 2019.
  - **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.

## Conference Presentations

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- **AS Gaynor**, and W Chen. Conditional Protein Rescue (CPR) By Binding-Induced Protective Shielding, *AIChE Annual Meeting*, Orlando, FL, 2019. Oral Presentation.
- **AS Gaynor** and W Chen. Conditional Protein Rescue (CPR) by Binding-induced Protective Shielding, *Biomedical and Molecular Engineering XXI*, Mont-Tremblant, Quebec, Canada, 2019. Poster Presentation.
- **Graduate Student Poster Competition Winner**
- **AS Gaynor** and W Chen. Tunable, Post-Translational Method for Controlling Prodrug Converting enzymes in Cancer Cells, *ACS National Meeting*, New Orleans, LA, 2018. Oral Presentation.
- **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. Oral Presentation.
- 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. Oral Presentation.
- **AS Gaynor** and W Chen. Controlled Protein Degradation for the Conditional Survival of Cancer Suicide Enzymes, *ACS National Meeting*, San Francisco, CA, 2017. Oral Presentation.
- **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. Oral Presentation.

## Laboratory Skills

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- **Molecular Cloning:** PCR, 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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- **Wilfred Chen Laboratory Manager** (Fall 2017-Fall 2018)
- **Teaching Assistant** for Metabolic Engineering (Fall 2016) and Introduction to Chemical Engineering (Spring 2016)
- **Young Engineers' Camp** run by University of Delaware College of Engineering to allow local youth to explore engineering (Summer of 2015, 2016, & 2018)

# Nathaniel K. Hamaker

903 Coventry Lane | Glen Mills, PA 19342 | (215) 896-2909 | nhamaker@udel.edu

## EDUCATION

**University of Delaware** – Newark, DE

Sept. 2016 – Jan. 2021 (expected)

Ph.D. Candidate, Chemical and Biomolecular Engineering

**The Pennsylvania State University** – University Park, PA

May 2016

Schreyer Honors College

B.S. Chemical Engineering, Magna Cum Laude and with Honors

B.S. Plant Biology, Magna Cum Laude

## RESEARCH AND INDUSTRY EXPERIENCE

**Doctoral Researcher in the Lab of Dr. Kelvin H. Lee**

May 2017 – present

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

- Developed a high-yielding (>3 g/L) and reproducible bioreactor process for a mAb-expressing CHO cell line using an automated bioreactor system (AMBR 250)
- Analyzed 2DE and LCMS proteomics outputs to determine changes in host cell protein (HCP) expression as a function of cell age for two industrially relevant CHO cell lines
- Collaborated with industry partner to develop improved fluorescence-based tools and methods for CRISPR-mediated targeted integration and gene editing in mammalian cells
- Utilized bioinformatics pipelines to assemble improved CHO transcriptome
- Conducted siRNA knockdown experiments to silence expression of a problematic HCP
- Mentored one undergraduate student and taught molecular biology and transfection techniques

**Late Stage Cell Culture Intern at Genentech**

May 2015 – Aug. 2015

*Genentech, South San Francisco, CA*

- Tested enzyme inhibitors and activators as cell culture additives to assess impact on specific critical quality attributes (CQAs) for recombinant CHO cell lines in small-scale and 2L bioreactor-scale cultures
- Performed quantitative Western blots to determine differences in enzyme expression levels across various in-house cell lines and reactor runs
- Collaborated with R&D department to analyze CHO HCP proteomics
- Developed professional and scientific skills at a world-class biomanufacturing company

**Undergraduate Researcher in the Lab of Dr. Wayne R. Curtis**

Sept. 2012 – Aug. 2016

*Chemical Engineering, The Pennsylvania State University, University Park, PA*

- Honors thesis: “Development of an inducible suicide vector for the control of *Agrobacterium tumefaciens*”
- Designed and constructed a genetic switch to increase efficiency and cost effectiveness of plant transformation
- Implemented CRISPR/Cas9 for gene editing in monocot plants
- Characterized oxygen transfer limitations in hairy root cultures
- Developed propagation methods for recalcitrant plant species (*Crocus sativus* and *Theobroma cacao*)
- Assembled and annotated the genome of a novel algal symbiont using next-generation sequencing (NGS) and optical mapping
- Mentored two undergraduate students and taught plant tissue culture and molecular biology protocols

## PUBLICATIONS

**Hamaker, N.K.**, and Lee, K.H. “A site-specific integration reporter system that enables rapid evaluation of CRISPR/Cas9-mediated genome editing strategies in CHO cells,” *Manuscript in Preparation*.

**Hamaker, N.K.**, and Lee, K.H. “Site-specific integration ushers in a new era of precise CHO cell line engineering,” *Current Opinion in Chemical Engineering*. 22, 2018, pp. 152-160.

MacDonald, M.L., **Hamaker, N.K.**, and Lee, K.H. “Bioinformatic analysis of Chinese hamster ovary host cell protein lipases,” *AIChE Journal*, 62(12), 2018, pp. 4247-4254.



Florez, S.L., Curtis, M.S., Shaw, S.E., **Hamaker, N.K.**, Larsen, J.S., and Curtis, W.R. “A temporary immersion plant propagation bioreactor with decoupled gas and liquid flows for enhanced control of gas phase,” *Biotechnology Progress*, 32(2), 2016, pp. 337-345.

## POSTER PRESENTATIONS

**Hamaker\*, N.K.**, Lenhoff, A.M., Lee, K.H. Changes in CHO host cell protein expression during extended cell culture. Presented at: 2019 Advanced Mammalian Biomanufacturing Innovation Center (AMBIC) IAB Meeting; Dec. 9-11. College Park, MD.

**Hamaker\*, N.K.**, Lee, K.H. Development and application of a novel site-specific integration reporter system in CHO cells. Presented at: 12th Annual Frontiers in Chemistry and Biology Interface Symposium; 2019 May 3. Bethesda, MD.

**Hamaker\*, N.K.**, Antoniewicz, M.R. Harnessing cyanobacterial metabolism towards engineering carbon self-sufficient co-cultures. Presented at: 10th Annual Frontiers in Chemistry and Biology Interface Symposium; 2017 May 6. Newark, DE.

Legenski\*, K., **Hamaker\*, N.K.**, Yoo, J., Curtis, W.R. Optical Mapping and NGS to Characterize an Algae Biofuels Bacterial Symbiont. Presented at: 2015 Bioinformatics and Genomics Retreat; Aug. 28-29. University Park, PA.

\*Designates presenter(s)

## LEADERSHIP AND OUTREACH

### University of Delaware – Newark, DE

|   |             |
|---|-------------|
| President and Recruitment Chair, Chemical Engineering Graduate Student Body | 2018 – 2019 |
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|--|----------------|
| Industry Liaison, Chemical Engineering Graduate Student Body | 2018 – present |
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|--|----------------|
| Fellow of the UD Chemistry-Biology Interface Program | 2016 – present |
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|---|-------------|
| Volunteer at Sussex Science Nights Hosted by the DE Biotechnology Institute | 2016 – 2018 |
|---|-------------|

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

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|---|------|
| Winner of AG Springboard Entrepreneurship Competition | 2015 |
|---|------|

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| Host of Algae Bioreactor Workshop for Elementary & Middle School Science Teachers | 2014 |
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| Mentor for Science-U Day Camp | 2013 |
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## HONORS, AWARDS, AND SCHOLARSHIPS

|                                       |             |
|---------------------------------------|-------------|
| Robert L. Pigford Graduate Fellowship | 2016 – 2017 |
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| NIH Chemistry-Biology Interface Training Fellowship | 2016 – present |
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| Genentech Outstanding Student Award | 2015 |
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| Chemical Engineering Undergraduate Summer Research Fellowship | 2014 |
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| Edward C. Hammond Jr. Memorial Scholarship | 2014 – 2016 |
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|---|-------------|
| Schreyer Honors College Academic Excellence Scholarship | 2012 – 2016 |
|---|-------------|

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| College of Engineering and College of Science Dean’s List | 2012 – 2016 |
|---|-------------|

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| Leighton Riess Scholarship in Chemical Engineering | 2012 – 2014 |
|--|-------------|

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|--|-------------|
| James J. Kerrigan Memorial Scholarship | 2012 – 2013 |
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# Amber M. Hilderbrand, Ph.D.

Email: hilderbrand.amber@gmail.com

LinkedIn: <http://linkedin.com/in/amhilder/>

## OVERVIEW:

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- Engineered a nanostructured hydrogel material using assembling peptides and click chemistry to create hierarchically structured materials for *in vitro* cell culture studies.
- Led a collaborative project between a 4-person experimental and computational team to discover insights into thermal properties of self-assembled peptides.
- Served as president of graduate student organization, the Colburn Club, and coordinated the recruiting visits for ~60 prospective Chemical Engineering graduate students

## EDUCATION:

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**University of Delaware**, Newark, DE Fall 2013-August 2019  
Doctor of Philosophy in Chemical Engineering Cumulative GPA: 3.41/4.00

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

## RESEARCH EXPERIENCE:

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**University of Delaware**, Newark, DE September 2019-Present  
*Postdoctoral Researcher*

Advisor: Dr. April M. Kloxin

- Engineering peptides and peptide amphiphiles for incorporation of nanoscale structures within hydrogel biomaterials
- Evaluating experimental techniques to study assembled morphologies post-polymerization

**University of Delaware**, Newark, DE August 2013-August 2019  
*Graduate Research Assistant*

Advisor: Dr. April M. Kloxin

- Engineered a three-dimensional (3D), multiscale, hydrogel-based culture system that incorporated collagen mimetic peptides (CMPs) to impart fibrillar structure over multiple length scales
- Investigated assembled properties of CMPs in solution to promote fibrillar assembly, evaluated structure-property relationships in CMP containing hydrogels using rheology
- Collaborated with computational researchers to test a model for determining thermal properties of CMPs

**Iowa State University**, Ames, IA August 2012-August 2013  
*Undergraduate Research Assistant*

Advisor: Dr. Kaitlin Bratlie

- Induced polarization of Tumor Associated Macrophages and used biochemical assays to determine that functionalized polystyrene particles did not change cell phenotype, but induced changes in inflammatory marker expression

## INDUSTRIAL EXPERIENCE:

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**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

**RESEARCH SKILLS:**

**Peptide and protein characterization:** Reverse-phase HPLC, mass spectrometry (ESI, LC-MS), circular dichroism (CD), transmission electron microscopy (TEM), cryo-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,  $^1\text{H-NMR}$

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

**Statistics:** Minitab software, design of experiments (DOE)

**PUBLICATIONS & PROPOSALS:**

- **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**, EM Ford, C Guo, JD Sloppy, AM Kloxin, “Hierarchically structured hydrogels utilizing multifunctional assembling and reactive peptides for controlling cellular microenvironments,” *In peer review*.
- **AM Hilderbrand**, PA Taylor, F Stanzione, MA LaRue, A Jayaraman, AM Kloxin, “Understanding the impact of non-natural amino acid incorporation on the assembly of multifunctional collagen mimetic peptides,” *Target submission: Fall 2019*
- **AM Hilderbrand**, AM Kloxin, “The influence of solution conditions on properties of multifunctional collagen mimetic peptide materials,” *Target submission: Spring 2020*
- **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.

**SELECT PRESENTATIONS & AWARDS:**

- **AM Hilderbrand**, EM Ford, AM Kloxin, “Multiscale property control through self-assembly and photopolymerization,” American Chemical Society Fall Meeting, August 2019, San Diego, CA. *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, EM Ford, AM Kloxin, “Designing multifunctional collagen mimetic peptides to incorporate hierarchal structure within robust hydrogel materials,” Society for Biomaterials Annual Meeting 2017, April 2017, Minneapolis, MN. *Oral Presentation*.
- **AM Hilderbrand**, C Guo, AM Kloxin, “Multifunctional biomaterials with structural complexity,” World Biomaterials Congress, May 2016, Montreal, QC. *Poster*.

**LEADERSHIP & TEACHING EXPERIENCE:**

- **Founding member** of **Empathetic Peers Offering Wisdom Encouragement and Resources** (EmPOWER) Program in Department of Chemical & Biomolecular Engineering (2017-2019)
  - Lead Mentor from 2017-2018
- **Managed** 3 pieces of lab equipment, **corresponded with company** to troubleshoot errors, and **coordinated movement** of 2 pieces of equipment to new labs during upgrade
- **President** of graduate student organization, Colburn Club (2015-2016), Representative (2013-2017)
- **Mentored** an undergraduate student for 2 years and high school student for a summer
  - Undergraduate student won UD Summer Research Fellowship in 2016 & 2017
- Fraser and Shirley Russell **Teaching Fellow** for Heat and Mass Transfer Operations (Spring 2017)

# JULIE B. HIPPI

## Education

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- **University of Delaware, Newark, DE** Aug. 2015 - present  
Ph.D. candidate, Chemical and Biomolecular Engineering  
Advisor: Prof. Norman J. Wagner  
GPA: 3.83/4.0
- **University of Tennessee, Knoxville, TN** Aug. 2011 - May 2015  
B.S., Chemical and Biomolecular Engineering  
Graduated *Summa Cum Laude*  
GPA: 3.97/4.0

## Research Experience

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

**Guest Researcher** Jan. 2018 - present  
NIST Center for Neutron Research (NCNR), Gaithersburg, MD

- Characterized building block structures of industrially relevant conductive carbon blacks using transmission electron microscopy, dynamic light scattering, and small-angle neutron scattering (SANS)
- Investigated electrical and mechanical percolation behavior of carbon black suspensions using dielectric spectroscopy and rheology for the optimization of particle type and loading in electrode formulations
- Pursued and built universal structure-property relationships in sheared carbon black suspensions as a means to predict and control suspension properties under a wide range of processing conditions
- Developed protocols for reliable measurements of thixotropic, settling particle suspensions
- Actively identified shortcomings, proposed modifications, and worked with NIST SANS instrument scientists to improve existing Rheo-SANS instrumentation and developed new capabilities to quantify sedimentation in sheared suspensions using spatiotemporally resolved Rheo-SANS measurements
- Collaborated with Materials Measurement Science and Materials and Structural Systems divisions at NIST to study microstructure development in hydrating tricalcium silicates towards tuning cement and concrete set time for additive manufacturing applications
- Led troubleshooting and testing for various 3D printed and machined Couette geometries designed by NIST SANS instrument scientists for simultaneous measurement of time-dependent structural, rheological, and dielectric properties of tricalcium silicates in the neutron beamline
- Created user-friendly LabVIEW VIs for simultaneous rheology and dielectric spectroscopy measurements

**Undergraduate Research Assistant** Sept. 2012 - June 2015  
University of Tennessee, Knoxville, TN  
Advisor: Prof. Cong T. Trinh

- 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 through growth studies and HPLC
- Resolved bottlenecks in *Y. lipolytica* xylose utilization pathway for a 10-fold increase in cell growth using adaptive laboratory evolution and by upregulating genes in the xylose utilization pathway

## Skills

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**Characterization:** rheology, small-angle neutron scattering (SANS), dynamic light scattering (DLS), dielectric spectroscopy (EIS), transmission electron microscopy (TEM), optical microscopy

**Software:** MS Office, LabVIEW, Autodesk Inventor, IGOR Pro, MATLAB

## Publications

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- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. Universality of Agglomerate Structure and Breakup in Sheared Carbon Black Suspensions, *Soft Matter*, 2020, *in prep.*
- Jones, S.Z., **Hipp, J.B.**, Allen, A.J. Rheology and Microstructure Development of Hydrating Tricalcium Silicate, *Journal of the American Ceramic Society*, 2020, *in prep.*
- **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. *Journal of Rheology*. 2019; 63: 423-436.
- 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.
- 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.

## Selected Presentations

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- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. “The Effect of Flow and Interaction Strength on the Microstructure and Properties of a Model Carbon Black Suspension” 2019 AIChE Annual Meeting, Nov. 10-15, 2019. Orlando, FL. Oral presentation.
- **Hipp, J.B.**, Richards, J.J., Wagner, N.J. “Structural Breakdown in Sheared Carbon Black Suspensions” 93rd ACS Colloid & Surface Science Symposium, June 16-19, 2019. Atlanta, GA. 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” 90th Annual Meeting of the Society of Rheology, Oct. 14-18, 2018. Houston, TX. Oral presentation.
- **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” 88th Annual Meeting of The Society of Rheology, Feb. 12-16, 2017. Tampa, FL. Oral presentation.

## Mentorship and Teaching Experience

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

## Selected Activities and Honors

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|--|-------------|
| • Graduate Student Professional Development Award<br>University of Delaware  | 2019        |
| • Society of Rheology Student Travel Grant   | 2018 - 2019 |
| • NIST Center for Neutron Research User Group Committee student representative                                     | 2017 - 2019 |
| • Graduate Coursework Commendations, University of Delaware<br>Department of Chemical and Biomolecular Engineering | 2016        |
| • University of Tennessee Academic Journal Club Cofounder  | 2013 – 2015 |
| • TEDxUTK 2014 member of Core Planning Committee   | 2014        |
| • BRIDGE Undergraduate Research Grant  | 2014        |

## EDUCATION

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**Doctor of Philosophy Candidate in Chemical Engineering**, University of Delaware, Expected May 2021

**Bachelor of Science in Chemical Engineering and Chemistry, Minor in Sustainability Studies**, University of Minnesota-Twin Cities, May 2016

## EXPERIENCE

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**Graduate Research Assistant, Advisor: Professor Thomas H. Epps, III, University of Delaware**, January 2017 – present

- Synthesized, fabricated, and characterized nanostructured polymer electrolytes for lithium-ion batteries
- Investigated the tuning of monomer and ion distributions in tapered block polymers, block polymer/homopolymer blends, and pseudo-single-ion electrolytes

**Undergraduate Research Assistant, Advisor: Professor Eray S. Aydil, University of Minnesota-Twin Cities**, September 2013 – May 2016

- Synthesized and characterized copper-zinc-tin-sulfide/selenium p-type microcrystals and cadmium-zinc-sulfide buffer layers for thin film solar cells
- Investigated the effects of synthesis and processing conditions on microcrystal grain sizes and composition depth profiles of the films

**Intern, Ecolab (Eagan, MN)**, June 2015 – August 2015

- Formulated and characterized low alkalinity, phosphate-free warewash detergent for industrial applications with improved resistance to hard water deposition, proteins, and starches

**Intern, Argonne National Laboratory**, June 2014 – August 2014

- Authored white paper on energy storage in residential and small commercial buildings
- Assisted supervisor with scoping financial transaction module for building information marketplace

**Course Expert and Note Taker, OneClass (Toronto, Canada)**, June 2013 – May 2016

- Tutored in calculus, chemistry, and chemical engineering with video tutorials and notes sharing

**Student Designer of Model Sustainable House, Sustainability Studies Capstone Class, University of Minnesota-Twin Cities**, September 2015 – December 2015

- Designed and retrofitted single-family house to meet Living Building Challenge requirements (net positive energy generation, net-positive water generation, and self-sustaining urban agriculture)

## PEER-REVIEWED PUBLICATIONS

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- **Ketkar, P. M.**; Shen, K-H; Hall, L. M.; Epps, T. H., III, Using tapered block polymers to manipulate the thermodynamic behavior of salt-doped electrolytes for lithium-ion batteries. (In preparation for submission).
- Morris, M. A.; Sung, S. H.; **Ketkar, P. M.**; Dura, J. A.; Nieuwendaal, R. C.; Epps, T. H., III, Enhanced Conductivity via Homopolymer-Rich Pathways in Block Polymer Blended Electrolytes. *Macromolecules* **2019** (Accepted).
- **Ketkar, P. M.**; Shen, K-H; Hall, L. M.; Epps, T. H., III, Charging toward improved lithium-ion polymer electrolytes: exploiting synergistic experimental and computational approaches to facilitate materials design. *Molecular Systems Design & Engineering* **2019**, 4 (2), 223-238.
- Chernomordik, B. D.; **Ketkar, P. M.**; Hunter, A. K.; Béland, A. E.; Deng, D. D.; Aydil, E. S., Microstructure Evolution During Selenization of Cu<sub>2</sub>ZnSnS<sub>4</sub> Colloidal Nanocrystal Coatings. *Chemistry of Materials* **2016**, 28 (5), 1266-1276.

## SELECTED PRESENTATIONS

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- Ketkar, P. M.; Epps, T. H., III, Investigation of monomer segment and salt distributions in self-assembled, tapered block polymer electrolytes. *American Physics Society March Meeting 2019*, contributed talk.
- Ketkar, P. M.; Morris, M. A.; Sung, S. H.; Dura, J. A.; Epps, T. H., III, Probing ion and monomer segment distributions in block polymer electrolytes via neutron reflectometry. *University of Delaware Center for Neutron Science and National Institute of Standards and Technology Center for Neutron Research Neutron Day 2019*, poster.

## LEADERSHIP AND MENTORSHIP

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### **Co-representative, Graduate Women in Engineering, University of Delaware**, April 2018 – present

- Organized and promoted events including interactive presentation and communication workshops, talks, panel discussions, and social events

### **Graduate student research mentor, University of Delaware**, January 2019 – present

- Mentored Joshua Watson (UD, 2018 – present) on the synthesis, fabrication, and characterization of pseudo-single-ion polymer electrolytes

### **Teaching Assistant, CHEG 231 Chemical Engineering Thermodynamics I, University of Delaware**, August 2018 – December 2018

- Designed solutions and grading rubrics for homework sets and semester project and graded projects
- Supervised 7 undergraduate graders
- Assisted students during weekly office hour sessions

### **Teaching Assistant, CHEG 600 Introduction to Polymer Science and Engineering, University of Delaware**, August 2017 – December 2017

- Designed solutions and grading rubrics for homework sets and graded homework sets
- Assisted students during weekly office hour sessions

### **Secretary, National Society of Leadership and Success, University of Minnesota-Twin Cities**, September 2013 – December 2015

- Organized meeting notes, sent email reminders, managed web page, and managed bank account
- Conducted leadership training sessions, goal-setting workshops, and community service events

## AWARDS AND HONORS

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- Perspective article was featured on the inside front cover page of *Molecular Systems Design & Engineering*, 2019
- Qualifying exam commendation, University of Delaware Department of Chemical and Biomolecular Engineering, 2017
- Cum laude, University of Minnesota Honors Program, 2016
- Inducted member of the National Society of Leadership and Success, 2015

## SKILLS

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- Chemical synthesis: atom transfer radical polymerization, aqueous- and organic-phase synthesis of metal sulfides, glove box maintenance and operation, vacuum and argon schlenk line operation
- Characterization: X-ray and neutron scattering (reflectometry, small-angle, and wide-angle), spectral reflectometry, optical microscopy, atomic force microscopy, AC impedance spectroscopy, differential scanning calorimetry, Auger electron spectroscopy, Raman spectroscopy, ellipsometry
- Computers and programming: Microsoft Office, Matlab, Mathematica, Java, AspenHYSIS, Minitab, Origin, WITec, LaTeX, LabView, Refl1D, GlobalFit
- Languages: English (native/bilingual proficiency), Marathi (native/bilingual proficiency), Spanish (professional working proficiency)

# 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: 3.8  
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: 3.8

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 and statistical mechanics: includes heterogeneous catalysis, spectroscopy, surface science, and quantum chemistry

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

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

## Honors and Awards

- 2019-2020 – Blue Waters Graduate Fellowship
- 2019 – Catalysis Club of Philadelphia (CCP) Ted Koch Travel Award
- 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 Combined Physics- and Data-based Model Development with Uncertainty Quantification for Catalyst Characterization and Kinetic Modeling

- Developed theory to explain vibrational scaling of chemisorbates on transition metal surfaces from quantum principles
- Enforced physical constraints in design of a neural network that performs multinomial regression for structure prediction from spectra using two-levels of synthetic data and a closed-form derivation of the Wasserstein loss with respect to the softmax
- Quantified uncertainty in a multi-scale oxygen reduction kinetic model using probabilistic graphical modeling (PGM)

### 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 and ran ion-exchange separations

2010

## Teaching & Research Advising

### University of Delaware

Newark, DE

REU Mentor – Combining infrared and X-ray absorption spectra to model nanoparticle structure via genetic algorithms

Summer, 2019

Undergraduate Thesis Mentor – CO oxidation descriptor selection with partial least squares

2017 – 2019

REU Mentor – Feature selection for rapid catalyst screening with principle component analysis

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, D. G. Vlachos, Generating synthetic IR spectra to reconstruct local catalyst microstructure from DFT, theory, and machine learning. Nat. Commun. (under revision)



M. Núñez, J. L. Lansford, and D.G. Vlachos, Optimization of the facet structure of transition-metal catalysts applied to the oxygen reduction reaction. *Nat. Chem.* (2019).

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).

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. L. Lansford and D. G. Vlachos, Electron Density-Based Machine Learning for Accelerating Quantum Calculations (In Preparation)

J. L. Lansford, J. Feng, M. A. Katsoulakis, and D. G. Vlachos, Combining Uncertain Data and Expert Knowledge with Physics-Based Graphical Models for Quantifying Model Uncertainty (In Preparation)

N. R. Quiroz, J.L. Lansford, and D. G. Vlachos, Coupling Experimental Kinetics and Thermodynamic Modeling with IR Spectroscopy and Machine Learning for Fundamental Studies and Fast Product Quantification (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

**Orlando, FL**

Computational Modeling of operando Infrared Spectroscopy for Site-Specific Catalyst Characterization

Nov. 2019

- First place in the Catalysis and Reaction Engineering (CRE) Division poster competition for “Combining Experimental Kinetics, IR Spectroscopy and Machine Learning for Fast Product Quantification”

#### North American Catalysis Society Meeting Presentation

**Chicago, IL**

Catalyst Site Characterization from Complex Infrared Spectroscopy

June 2019

#### Blue Waters Symposium Presentation

**Sunriver, OR**

Electron Density-Based Machine Learning for Accelerating Quantum Calculations

June 2019

#### Catalysis Club of Philadelphia Poster Competition

**Philadelphia, PA**

Forward and Inverse Surrogate Modeling for Catalyst Characterization from Complex Vibrational Spectroscopy

Nov. 2018

#### AIChE Meeting Presentation

**Pittsburgh, PA**

Catalyst Characterization from Complex Infrared Spectroscopy: A Machine Learning Approach

Oct. 2018

#### Gordon Research Conference Poster Presentation

**New London, NH**

Entropic Effects on Microkinetic Modeling

June 2018

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

**Florence, Italy**

Catalyst Structure Prediction via DFT, Theory, and Machine Learning

May 2018

#### Catalysis Club of Philadelphia Poster Competition

**Philadelphia, PA**

Scaling Relations for Adsorbate Vibrations on Transition Metal Surfaces

Nov. 2017

#### AIChE Meeting Presentation

**Minneapolis, MN**

Adsorbate Vibrations on Transition Metal Surfaces: Applications and Theory

Oct. 2017

#### AIChE Student Poster Competition

**Pittsburgh, PA**

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

Oct. 2012

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

### Industry Work Experience

#### Capital One Bank

**McLean, VA**

Senior Data Analyst: National Expansion

2014 – 2015

- Developed geocoding system to map customer ATM transactions at foreign-owned ATMs
- Created Tableau tool that provides daily updates to 10 Capital One Cafes
- Converted organization's data library to Tableau infrastructure and scaled to all markets of interest.

Data Analyst: Bank Operations

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

### University Service & Leadership

#### University of Virginia

**Charlottesville, VA**

University Dormitory Resident Advisor

2010 – 2013

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

Colburn Laboratory • 150 Academy St  
Office #219 • Newark, DE 19716

pleval@udel.edu

## EDUCATION

### **Ph.D. | Chemical Engineering | Winter 2020**

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

### **M.S. | Chemical Engineering | Summer 2015**

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

### **B.S. | Chemical Engineering | Summer 2013**

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

## RESEARCH INTERESTS

- Responsive hydrogels for controlled and tunable therapeutic delivery
- Materials for addressing global health challenges
- Development of diagnostic platforms for diseases that disproportionately effects underserved communities

## RESEARCH EXPERIENCE

### **Graduate Research | Fall 2015 – Present**

*University of Delaware | Advisor: Dr. April M. Kloxin*  
*Dept of Chemical and Biomolecular Engineering*  
Establishing a multimodal responsive hydrogel microparticle system for controlled and tailorable delivery of protein therapeutics towards development of a personalized medicine platform.

### **Graduate Research | Fall 2013 – Summer 2015**

*University of Wyoming | Advisor: Dr. John Oakey*  
*Dept of Chemical Engineering*  
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 | Summer 2012 – Summer 2013**

*University of Wyoming | Advisor: Dr. John Oakey and Dr. Kristi Anseth*  
*Dept of Chemical Engineering*  
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 | Summer 2011 – Summer 2012**

*University of Wyoming | Advisor: Dr. John Oakey*  
*Dept of Chemical Engineering*  
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.

9 Manuscripts  
Published

8 Conference  
Presentations

5 Undergraduate  
Mentees

## HIGHLIGHTED AWARDS

- University of Delaware Chemical and Biomolecular Engineering Teaching Fellow – *Spring 2019*
- Robert L. Pigford Teaching Assistant Award – *Spring 2019*
- Sigma Xi Grants in Aid of Research – *March 2019*
- University of Delaware Dissertation Fellowship – *June 2019*
- MIT ChemE Rising Stars Symposium Mentee – *October 2019*

## SELECT PUBLICATIONS

- **LeValley, P.**, Kloxin, A., *Utilizing Reversible and Dynamic Chemistries to Modulate the Properties of Synthetic Matrices*. ACS Macro Lett, 8, 2019. DOI: 10.1021/acsmacrolett.8b00808. ACS Editors' Choice.
- **LeValley, P.**, Tibbitt, M., Noren, B., Kharkar, P., Kloxin, A., Anseth, K., Toner, M., Oakey, J., *Immunofunctional Photodegradable Poly(ethylene glycol) Hydrogel Surfaces for the Capture and Release of Rare Cells*. Coll Surf B: Biointer, 2018, 483-92. DOI: 10.1016/j.colsurfb.2018.11.049.
- **LeValley, P.**, Noren, B., Kharkar, P., Kloxin, A., Gatlin, J., Oakey, J., *Fabrication of Functional Biomaterial Microstructures by In Situ Photopolymerization and Photodegradation*. 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., *Design of Functionalized Cyclic Peptides through Orthogonal Click Reactions for Cell Culture and Targeting Applications*. Chem Comm, 54, 2018, 6923-26. DOI: 10.1039/C8CC03218A. \*equal contribution

## SELECT CONFERENCE PRESENTATIONS

- **LeValley, P.**, Kloxin, A., Photodegradable hydrogels for protein delivery: Tuning degradation rates through cleavage bond chemistry. Oral Presentation at: ACS National Meeting; 2019 March 31 – April 4: Orlando, FL.
- **LeValley, P.**, Kloxin, A., *Designing Injectable Depots with Combinations of Responsive Chemistries for Controlled Delivery of Immunotherapies*. Poster Presentation at: Gordon Research Conference on Drug Carriers in Medicine and Biology; 2018 August 12 – 17: West Dover, VT.
- **LeValley, P.**, Ovadia, E., Bresette C., Sawicki, L., Kloxin, A., *Design of cyclic RGD with a functional handle through orthogonal click reactions for cell culture and targeting*. Poster Presentation at: 11<sup>th</sup> Frontiers in Chemistry and Biology Interface Symposium; 2018 May 5: Philadelphia, PA.
- **LeValley, P.**, Kharkar, P., Olney, L., Maverakis, E., Kiick, K., Kloxin, A., *Responsive hydrogels for tailored release of protein therapeutics*. Oral Presentation at: ACS National Meeting; 2017 August 20 – 24: Washington, DC.

## TEACHING AND COMMUNICATION

### Courses Instructed ([number enrolled])

University of Delaware

- CHEG304 [88] Random Variability in Chemical Processes (co-taught with Joshua Enzer) Spring 2019

### Mentoring of Undergraduate Researchers

University of Delaware

- Five students mentored Summer 2017– Spring 2019
- All accepted position as gradate students at top universities around the country

### Teaching Assistant for Chemical Engineering Kinetics and Heat and Mass Transfer

University of Delaware

Fall 2017- Spring 2018

### Radio Show Host

University of Delaware, Rise and Science (91.3 WVUD)

Spring 2017 – Present

- Discussions of current scientific advancements focusing on accessibility to the local community

### Tutoring at Serviam Girls Academy, University of Delaware

Spring 2019

### Colburn Club Outreach Chair, University of Delaware

Fall 2016 –Fall 2019

# **RACHEL M. LIESER**

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

Colburn Laboratory, 150 Academy Street, Newark, Delaware 19716 Tel +1 612-839-7066;  
[rmlieser@udel.edu](mailto:rmlieser@udel.edu)

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## **EDUCATION**

### **University of Delaware**

Department of Chemical & Biomolecular Engineering, 2015 – Present (Ph.D. Candidate)  
Advisors: Wilfred Chen and Millicent O. Sullivan  
Expected Graduation Date: December 2020

### **Iowa State University**

Department of Chemical Engineering & Biological Engineering, 2011 – 2015 (B.S.)  
Minor in Biomedical Engineering

## **RESEARCH EXPERIENCE**

### **Graduate Research Assistant**

*Department of Chemical & Biological Engineering, University of Delaware, 2015-Present*

Project: Targeted intracellular delivery of therapeutic proteins for cancer treatment through site-specific modification with unnatural amino acid incorporation

- Proficient in experimental design, mammalian cell culture techniques, recombinant protein engineering, peptide synthesis, electron and fluorescent microscopy, flow cytometry, and mass spectrometry
- Mentor undergraduate and high school students working in the laboratory
- Manage laboratory safety and equipment maintenance as lab manager

### **Undergraduate Research Assistant**

*Department of Chemical & Biological Engineering, Iowa State University, 2013-2015*

Project: Targeted drug delivery and macrophage reprogramming with functionalized alginate nanoparticles for tumor suppression

- Performed research under the direction of Dr. Kaitlin Bratlie and Dr. Hannah Bygd in targeted drug delivery for cancer therapy

## **TEACHING EXPERIENCE**

### **Graduate Teaching Assistant**

*Department of Chemical & Biomolecular Engineering, University of Delaware, 2017*

- Assisted professor in teaching Biochemical Engineering and Biomaterials in Drug Delivery courses
- Held weekly office hours to assist with course material and homework
- Graded homework, quizzes, group projects, and exams

## **PROFESSIONAL EXPERIENCE**

### **Research & Development Intern**

*Microneedle Drug Delivery Systems, 3M Corporation, 2015*

- Developed and conducted experiments to validate the clinical readiness of the 3M™ Hollow Microstructured Transdermal Device for drug delivery
- Assisted with animal studies to test the efficiency and safety of the device
- Presented results of research at weekly group meetings

### **Process Engineering Co-op**

*Olefins Engineering Division, Lyondellbassel, 2014*

- Evaluated the inspection frequency of relief valves in the Olefins unit by organizing and evaluating past inspection data
- Documented each step in the relief valve inspection process for other sites in the company to follow
- Managed design projects to improve safety and ease of operation

### **Project Engineering Intern**

*Flour Milling Department, General Mills, 2013*

- Analyzed the downtime on sifters in the flour mill to mitigate stoppage time
- Coordinated the install of vending machines containing operating supplies and PPE for employee use

## **PUBLICATIONS**

1. **Lieser, R.M.**, Chen, W., and Sullivan, M.O. (2019) Controlled EGFR ligand display on cancer suicide enzymes via UAA engineering for enhanced intracellular delivery in breast cancer cells. Bioconjugate Chemistry, **30(2)**: 432-442  
DOI: 10.1021/acs.bioconjchem.8b00783

## **ORAL PRESENTATIONS**

1. ACS Spring Meeting, New Orleans, LA, April 2018  
“Controlled EGFR Ligand Display on Cancer Suicide Enzymes for Targeted Intracellular Delivery”
2. Best of BIOT Webinar Series, January 2019  
“Controlled EGFR Ligand Display on Cancer Suicide Enzymes for Targeted Intracellular Delivery”

## **POSTER PRESENTATIONS**

1. Engineering Conferences International: Nanotechnology in Medicine II, Grande Real Santa Eulalia Hotel, Albufeira, Portugal, June 2018  
“Controlled EGFR Ligand Display for Tunable Targeted Intracellular Delivery of Cancer Suicide Enzymes” **\*INTERNATIONAL**

# ARNAV S. MALKANI

329 Delaware Circle, Newark, DE 19711 • (607) 379-3801 • amalkani@udel.edu

## EDUCATION

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**University of Delaware**, Newark, DE

PhD Candidate in Chemical and Biomolecular Engineering

August 2016-Present

**Cornell University**, Ithaca, NY

Bachelor of Science in Chemical Engineering • Minor in Sustainable Energy Systems

May 2016

*Magna Cum Laude* • Dean's List all semesters • Tau Beta Pi National Engineering Honor Society

## RESEARCH AND PROFESSIONAL EXPERIENCE

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

*Graduate Research Assistant in Dr. Bingjun Xu's Group*

January 2017-Present

- Performed reactivity tests to study the electrochemical reduction of CO<sub>2</sub> and CO using gold and copper catalysts.
- Designed an operando infrared (IR) spectroscopic stir cell to track surface bound CO<sub>2</sub> reduction intermediates.
- Prepared chemically deposited thin metal catalysts films on silicon crystals for surface-enhanced IR studies.
- Developed a method to extend the use of surface-enhanced IR spectroscopy to metal nanoparticle catalysts.
- Set up a transmission FTIR cell for catalyst characterization at cryogenic temperatures under vacuum.
- Built a high-pressure batch cell for electrochemical reactivity tests.

**Cornell University, School of Chemical and Biomolecular Engineering**, Ithaca, NY

*Undergraduate Research Assistant in Dr. Jefferson Tester's Group*

May 2015-May 2016

- Operated a hydrothermal liquefaction reactor to convert organic matter into biofuels.
- Built a cooling jacket heat exchanger to sample the reactor's products at working conditions.
- Extracted bio-oil from the reactor's products and analyzed its composition using an elemental analyzer.
- Modeled a similar reactor setup on Aspen Plus.

*Undergraduate Research Assistant in Dr. Paul Steen's Group*

October 2013-May 2015

- Prepared surfaces using techniques such as sandblasting, electroplating, chemical vapor deposition and polymer recrystallization to measure droplet contact angles, contact angle hysteresis and surface energy gradients.
- Operated a high-speed camera to obtain images and made contact angle measurements using a MATLAB script.
- Modeled the effect of forces on droplets by varying shape parameters and generated images using Mathematica.

**Urban Design Research Institute**, Mumbai, India (Public Charitable Trust)

July-August 2013

*Research Intern*

- Studied Geographic Information System (GIS)-based applications to model an interactive GIS map for Mumbai.
- Researched methods to engage citizens to participate in the city's governance through mobile-based applications.

**Oil, Gas & Hydrocarbon Department at Tata Projects Ltd.**, Mumbai, India

June-July 2013

*Summer Intern*

- Learned the basics of pumps, valves and piping and participated in project management.
- Analyzed and suggested changes to process flow and piping and instrumentation diagrams.

## TEACHING EXPERIENCE

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*Graduate Teaching Assistant, University of Delaware*, Newark, DE

- Chemical Engineering Laboratory I - Kinetics Unit
- Chemical Engineering Thermodynamics

Spring 2018

Fall 2017

*Undergraduate Teaching Assistant, Cornell University*, Ithaca, NY

- Chemical Engineering Thermodynamics

Fall 2015

## PUBLICATIONS

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- Malkani, A.;** Li, J.; He, M.; Xu, B.; Li, Q. Cation Effect on the Electrochemical Reduction of CO: An In Situ Surface Enhanced Spectroscopic Investigation. (*in preparation*)
- Anibal, J.; **Malkani, A.;** Xu, B. Stability of the Ketyl Radical as a Descriptor in the Electrochemical Coupling of Benzaldehyde. (*in preparation*)
- Li, Y.; Intikhab, S.; **Malkani, A.;** Xu, B.; Snyder, J. Ionic Liquid Additives for the Mitigation of Nafion Specific Adsorption on Platinum. (*in preparation*)
- Atifi, A.; **Malkani, A.;** Kunene, T.; Lu, X.; Xu, B.; Rosenthal, J. Interfacial Dynamics of Imidazolium Active Sites in Bi/RTIL System for CO<sub>2</sub> Reduction. (*in preparation*)
- Chang, X.; **Malkani, A.;** Yang, X.; Xu, B. Mechanistic Insights into Electroreductive C–C Coupling between CO and Acetaldehyde into Multi-Carbon Products. (*under review*)
- Malkani, A.;** Li, J.; Anibal, J.; Lu, Q.; Xu, B. Impact of Forced Convection on Spectroscopic Observations of the Electrochemical CO Reduction Reaction. *ACS Catal.* 2019. (*accepted*)
- Li, J.; Wu, D.; **Malkani, A.;** Chang, X.; Cheng, M.; Xu, B.; Lu, Q. Hydroxide is not a promoter of C<sub>2+</sub> product formation in electrochemical reduction of CO on copper. *Angew. Chemie Int. Ed.* 2019. (*accepted*)
- Malkani, A.;** Dunwell, M.; Xu, B. Operando Spectroscopic Investigations of Copper and Oxide-Derived Copper Catalysts for Electrochemical CO Reduction. *ACS Catal.* 2019, 9, 474-478.
- Posmanik, R.; Cantero, D. A.; **Malkani, A.;** Sills, D. L.; Tester, J. W. Biomass Conversion to Bio-Oil Using Sub-Critical Water: Study of Model Compounds for Food Processing Waste. *J. Supercrit. Fluids* 2017, 119, 26–35.

## PRESENTATIONS

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- Malkani, A.;** Xu, B. Operando Spectroscopic Investigations of Copper Catalysts for Electrochemical CO<sub>2</sub> and CO Reduction. *North American Catalysis Society Meeting*, Chicago, IL, June 2019. (Oral)
- Malkani, A.;** Dunwell, M.; Xu, B. Operando Spectroscopic Investigations of Copper and Oxide-Derived Copper Catalysts for Electrochemical CO<sub>2</sub> and CO Reduction. *Catalysis Society of Metropolitan New York Annual Symposium*, Princeton, NJ, March 2019. (Poster)
- Malkani, A.;** Dunwell, M.; Xu, B. Operando Spectroscopic Investigations of Copper and Oxide Derived Metal Catalysts for Electrochemical CO<sub>2</sub> and CO Reduction. *AIChE Annual Meeting*, Pittsburgh, PA, November 2018. (Oral)

## HONORS & AWARDS

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Poster Award, *Catalysis Society of Metropolitan New York Annual Symposium*, Princeton, NJ March 2019

## SKILLS

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**Experimental:** Attenuated Total Reflection Surface Enhanced Infrared Absorption Spectroscopy (ATR-SEIRAS), Surface Enhanced Raman Spectroscopy (SERS), Electrochemical Impedance Spectroscopy (EIS), Cyclic Voltammetry (CV), Gas Chromatography (GC), Mass Spectrometry (MS), Nuclear Magnetic Resonance spectroscopy (NMR), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray spectroscopy (EDX), e-beam evaporation, cleanroom training for nanofabrication.

**Data Analysis:** MATLAB, Mathematica, Aspen Plus, Minitab, IGOR Pro, MestReNova, ChemDraw, Microsoft Office.

**Language:** Fluent in English and Hindi.

## LEADERSHIP

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|  |                      |
|--|----------------------|
| Laboratory Safety Manager of Xu Research Group   | August 2019-Present  |
| Fourth Year Representative of Colburn Club (department's graduate student organization)          | August 2019-Present  |
| President 2015-16, Vice President 2014-15, Secretary 2013-14 of Cornell Table Tennis Club        | August 2012-May 2016 |
| Co-Founder of Illuminating Indian Lives (organization that distributed solar lamps to villagers) | May 2010-August 2012 |

# DOUGLAS NMAGU

Work Address  
15 Innovation Way  
Newark, DE 19711

nmagu12@gmail.com  
301-613-8801

Home Address  
928 Rahway Drive  
Newark, DE 19711

## EDUCATION

### University of Delaware

Newark, DE

P.h.D Candidate - Chemical and Biomolecular Engineering (expected - 2021)

### Massachusetts Institute of Technology (MIT)

Cambridge, MA

B.S. in Chemical Engineering

GPA: 4.0 out of 5.0

## WORK EXPERIENCE

### Delaware Biological Institute (DBI)

Newark, DE

Graduate Researcher

11/2016-current

- Characterized Chinese Hamster Ovary (CHO) cell cultures in batch and fed batch processes at shake flask and bioreactor level
- Thesis: Study and analyze transcriptomic and genomic data using small molecule inducers for potential manipulation of gene expressions using CRISPR Cas9 system to increase titer via increase in specific productivity of individual CHO cells.

### University of Delaware CBE Department

Newark, DE

Senior Lab Instructor

08/2017-12/2017

- Provided instruction and technical support to senior undergraduates for lab comprising E. coli fermentation and isolation of produced recombinant GFP using bioreactors, high pressure homogenizer, ionic chromatography with AKTA purifier, HPLC, and SDS Page gels.

### Eli Lilly and Company

Indianapolis, IN

Scientist-TS/MS, IndyDry Tech Svcs/Mfg Sci-Product Stewardship

08/2014-09/2016

- Provided TS/MS and Engineering support to manufacturing operations by driving safe operational execution, ensuring high quality of medication, and pursuing continuous improvement opportunities to enhance productivity.
- Served as Manufacturing Science and Technology Product Steward for Prozac Daily. Developed, validated, and reviewed Prozac Daily manufacturing process such that it maintained a constant state of validation, control, and capability.

### Novartis Research and Development

Cambridge, MA

Research and Lab Specialist

06/2013-09/2013

- Designed and performed chemical process using intermediate compounds in order to identify those that eliminate impurities from crystalized target
- Provided and analyzed extensive data using HPLC and Crystal 16 methods

### MIT Office of Engineering Outreach Programs

Cambridge, MA

Science, Technology, Engineering, & Math (STEM) Instructor

06/2012-08/2012

- Designed and implemented an intensive six-week curriculum
- Lectured and tutored 26 rising ninth-graders on physics topics including 3-D kinematics and extended application of Newton's three laws of Motion
- Evaluated and provided extensive feedback to students through exams, projects and final reports

### MIT Industrial Performance Center

Cambridge, MA

UROP Intern

05/2012-07/2012

- Created an elaborate inventory of over 200 biomanufacturing companies and their biopharmaceutical productions in the Massachusetts region using excel
- Researched progress in biomanufacturing industry and provided team with extensive science background of companies

### Enis' Petroleum & Oil

Abia State, Nigeria

Petroleum Gas Station Manager

06/2011-08/2011

- Managed the transport of fuel from the refinery to the station
- Obtained fuel related permits and determined when it necessary to restock on materials and fuel

### NASA GODDARD SPACE FLIGHT CENTER

Greenbelt, MD

Academic Intern

09/2009-06/2010

- Created a system of systems known as WICKisphere (Wireless Integrated Control and Knowledge center) while working with smart sensors and circuiting
- Executed study comparing functionality and cost of smart sensors and other material from supplying companies



## **LEADERSHIP EXPERIENCE**

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### **Eli Lilly IndyDry Tablet Coating Operations**

Coating Unit Team Leader

11/2014-09/2016

- Lead operator meeting discussions on continual improvement items regarding equipment, safety, tools, and manufacturing ticket instructions
- Identified and adjusted process bottlenecks based on their upstream and downstream implications.
- Handled equipment installation and vendor interactions for coating unit tools.

### **Eli Lilly IndyDry Exposure Assessment Safety Team**

TS/MS Team Leader Representative

11/2014-09/2016

- Assessed potential exposure levels of developing drug products while making necessary adjustments to safety requirement in manufacturing area.
- Presented safety updates to IndyDry site in regards to exposure and gowning.

### **Delta Kappa Epsilon Executive Board**

House Steward

08/2013-05/2014

- Planned weekly meals to feed 40 people and organized formal events such as Alumni BBQ and Brothers' Formal
- Estimated the cost of weekly lunches and dinners and made purchases of materials

### **Resident Associate Advisor**

New House 1 RAA

04/2012-06/2013

- Worked collaboratively with other associate advisors in residence hall to provide academic and social support to all freshmen, including organizing and promoting programs such as four- year planning seminar and faculty receptions

### **National Society of Black Engineers Executive Board**

Public Relations Chair

03/2012-06/2103

- Served as liason between corporations and NSBE-MIT
- Oversaw the success of all NSBE-MIT meetings and career fairs

### **MIT Varsity Football**

Starter

09/2010-11/2014

## **EXTRACURRICULAR ACTIVITIES/ACHIEVEMENTS**

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- NSF IGERT Fellowship
- National Society of Black Engineers (NSBE)
- National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCHE)
- American Institute of Chemical Engineers (AIChE)
- American Chemical Society Scholar

## **PUBLICATIONS**

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- Weber, Cameron & Wood, Geoffrey & Kunov-Kruse, Andreas & Nmagu, Douglas & L. Trout, Bernhardt & Myerson, Allan. (2014). Quantitative Solution Measurement for the Selection of Complexing Agents to Enable Purification by Impurity Complexation. Crystal Growth & Design. 14. 3649–3657. 10.1021/cg500709h

## **SKILL SET**

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- Matlab Programming
- MiniTab Programming and Statistical Analysis
- Microsoft Excel
- Cell Cultivation
- CRISPR, HPLC, Western Blot, SDS Page, Transcriptomic/Genomic analysis, Mass Spec analysis

# Natalia Rodriguez Quiroz

331 Delaware Circle, Newark, DE, 19711, USA, Cell: +1-515-735-8289 nataqr@udel.edu

## EDUCATION

---

**University of Delaware (UD)**, Newark, DE  
PhD Candidate in Chemical and Biomolecular Engineering

*Fall 2016~Fall 2021*

**Iowa State University (ISU)**, Ames, Iowa  
Bachelor of Science in Chemical Engineering  
Cumulative GPA: 3.70/4.00 • *Magna Cum Laude* • Dean's List all semesters

*Fall 2011-Spring 2015*

**Ecolé Polytechnique Fédérale de Lausanne (EPFL)**, Lausanne, Switzerland  
Study abroad • Chemical engineering department – Masters and Undergraduate Coursework

*Fall 2013-Spring 2014*

## RESEARCH EXPERIENCE

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**UD | Graduate Research Assistant | Dr. Dion Vlachos Lab**

*January 2017-Present*

- **Project Objective:** Understanding the effects of metal salts in key reactions for upgrading biomass to chemicals
- Performed thermodynamic modeling of salt / acid solutions using OLI Systems Software together with kinetic experiments and <sup>13</sup>C-NMR spectroscopy to identify and quantify the active species of Bronsted acid catalyzed reactions in the presence of metal halides
- Developed a spectroscopic method to estimate acidity of super acidic solutions in concentrated salt systems
- Carried out reaction rate studies in batch reactors and performed analysis of liquid streams using liquid chromatography.
- Developed an analytical technique to quantify sugars using FT-IR spectroscopy

**ISU | Research Associate I(40hrs/week) | Dr. Brent Shanks Lab**  
**2016**

*Fall 2015-Summer*

NSF Engineering Research Center for Biorenewable Chemicals (CBiRC)

- **Project Objective:** Study different purification pathways for selected organic molecules in fermentation broths for further catalytic upgrading.
- Perform and analyze experiments on purification of organic acids specifically terephthalic acid (TAL) and HMF
- Developed analytical methods for quantification of dilute solution of organic acids and targeted chemicals in UPLC

**3M | Industrial Research Intern (40hrs/week) | 3M, Traffic safety systems division**

*Summer 2015*

- **Project Objectives:**
  - Investigate the effects of different cross linker levels in adhesive rheology and performance
  - Perform weather acceleration experiments to determine outdoor ink durability and modify current formula to improve ink durability

**ISU | Undergraduate Research Assistant (15hrs/week)**  
**2015**

*Spring 2012- Spring*

NSF Engineering Research Center for Biorenewable Chemicals (CBiRC)

- Investigated efficiency of different homogeneous and heterogeneous catalysts in selected reactions for biomass upgrading (Reactions were performed on a CSTR and samples analyzed using HPLC and UPLC).

## PUBLICATIONS

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- **Rodriguez Quiroz, N.;** Padmanathan, A. M. D.; Mushrif, S. H.; Vlachos, D. G. Understanding Acidity of Molten Salt Hydrate Media for Cellulose Hydrolysis by Combining Kinetic Studies, Electrolyte Solution Modeling, Molecular Dynamics Simulations and <sup>13</sup>C-NMR Experiments. *ACS Catal.* 2019, 9, 10551–10561.
- **Rodriguez Quiroz, N.;** Norton, A. M.; Nguyen, H.; Vasileiadou, E.; Vlachos, D. G. Homogeneous Metal Salt Solutions for Biomass Upgrading and Other Select Organic Reactions. *ACS Catal.* 2019, 9, 9923–9952.

- Gao, M.; Cao, M.; Suástegui, M.; Walker, J.; **Rodriguez Quiroz, N.**; Wu, Y.; Tribby, D.; Okerlund, A.; Stanley, L.; Shanks, J. V.; et al. Innovating a Nonconventional Yeast Platform for Producing Shikimate as the Building Block of High-Value Aromatics. *ACS Synth. Biol.* 2017, 6.
- Matthiesen, J. E.; Suástegui, M.; Wu, Y.; Viswanathan, M.; Qu, Y.; Cao, M.; **Rodriguez-Quiroz, N.**; Okerlund, A.; Kraus, G.; Raman, D. R.; et al. Electrochemical Conversion of Biologically Produced Muconic Acid: Key Considerations for Scale-Up and Corresponding Technoeconomic Analysis. *ACS Sustain. Chem. Eng.* 2016, 4.
- Suastegui, M.; Matthiesen, J. E.; Carraher, J. M.; Hernandez, N.; **Rodriguez Quiroz, N.**; Okerlund, A.; Cochran, E. W.; Shao, Z.; Tessonnier, J.-P. Combining Metabolic Engineering and Electrocatalysis: Application to the Production of Polyamides from Sugar. *Angew. Chemie - Int. Ed.* 2016, 55.

## SELECT PRESENTATIONS

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- **AiChE 2019| Orlando, FL:** *Combining Experimental Kinetics and Thermodynamic Modeling with IR Spectroscopy and Machine Learning for Fundamental Studies and Fast Product Quantification.* (Fall 2019) (**Poster - Winner**)
- **Catalysis Center for Energy Innovation | Newark, DE:** *Homogeneous Metal Salt Solutions for Biomass Upgrading and Other Select Organic Reactions.* (Summer 2019) (**POSTER - Winner**)
- **Catalysis Club of Philadelphia | Wilmington, DE:** *Homogeneous Metal Salt Solutions for Biomass Upgrading.* (Spring 2019) (**Invited Talk**)
- **Catalysis Society of Metropolitan New York | Princeton, NJ:** *Understanding the Effect of LiBr on the Rate of Cellobiose Hydrolysis Using Thermodynamic Modeling and Spectroscopy.* (Spring 2019) (**POSTER - Winner**)
- **AiChE 2018 | Pittsburgh, PN:** *Understanding Acidity of Molten Salt Hydrate Media for Cellulose Hydrolysis by Combining Kinetic Studies, Electrolyte Solution Modeling, and 13C-NMR Experiments.* (Fall 2018) (ORAL, POSTER)
- **Catalysis Club of Philadelphia | Wilmington, DE:** *Understanding Acidity of Molten Salt Hydrate Media for Cellulose Hydrolysis Through Thermodynamic Modeling.* (Fall 2018) (**POSTER - Winner**)
- **Traffic Systems - 3M | Maplewood, MN:** Internship final project presentation, Effect of cross linker level in adhesive rheology and durability study of outdoor inks as a function of humidity and light exposure levels, Poster and Oral Presentation (Summer 2015) (ORAL and POSTER)
- **ISU | Ames, IA:** Undergraduate research poster presentation, Integration of the Pyrone Testbed (TAL Purification from fermentation broth), Annual Meeting, CBiRC, Poster Presentation (Spring 2015) (ORAL and POSTER)

## TEACHING EXPERIENCE

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**UD** | Graduate Teaching Assistant

- Chemical Engineering Department– Transport Phenomena Spring 2018
- Mathematics Department – Applied Mathematics for Engineers Fall 2017

**ISU** | Undergraduate Teaching assistant- – Transport Phenomena Spring 2018

## LEADERSHIP EXPERIENCE

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**UD** | DOE EFRC representative for the Catalysis Center for Energy Innovation (CCEI)

**UD** | Vice-President, Graduate Student Body, Dept. of Chemical and Biomolecular Engineering (Colburn Club)

**UD** | International Chair, Graduate Student Body, Dept. of Chemical and Biomolecular Engineering (Colburn Club)

**UD** | Chemical Engineering Chair, Graduate Women in Engineering

**EPFL** | Student Logistics Coordinator, UNESCO Conference: “Tech4Dev2014”

**EPFL** | Chair, Engineers Without Borders

**ISU** | Tau Beta Pi Engineer Honor Society

**ISU** | Society of Women Engineers (SWE)

## SELECTED SKILLS

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**Experimental:** Liquid Chromatography (HPLC and UPLC), Gas Chromatography (GC), Mass Spectrometry (MS), Nuclear Magnetic Resonance spectroscopy (NMR), IR spectroscopy, UV-Vis spectroscopy, ICP-MS

**Languages:** English • Spanish • French  
**Computational:** Thermodynamic Modeling (OLI Software), MATLAB, Mathematica, Aspen Plus, Minitab, IGOR Pro, MestReNova, ChemDraw, Origin, Microsoft Office.

# Y. Summer Tein

ystein@udel.edu • (713) 505-0926 • [linkedin.com/in/summertein](https://www.linkedin.com/in/summertein)

## Education

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### Ph.D. Candidate, Chemical & Biomolecular Engineering

2016-present

University of Delaware, Newark, DE

**Advisor:** Dr. Norman J. Wagner

**Thesis Topic:** I utilize interfacial rheology and neutron reflectivity to study complex fluids at the air-water interface and to determine their structure-flow relationships. Additionally, I am developing a novel neutron sample environment with both shearing and dilatational capabilities to systematically deform the interface and study its structural behavior; this instrument is publicly accessible at the NIST Center for Neutron Research facility. I have investigated industrially relevant and fundamentally interesting systems, such as monoclonal antibody-surfactant complexations, phospholipids, and colloidal nanoparticles at the air-water interface.

**Guest Researcher, *NIST Center for Neutron Research***

2018- present

**Guest Researcher, *ETH Zurich, Soft Material***

November 2017

### B.S., Chemical Engineering

2011-2015

University of Texas, Austin, TX

## Skills

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**Characterization:** Atomic force microscopy, Brewster angle microscopy, contact angle, ellipsometry, differential scanning calorimetry, dynamic light scattering, interfacial & bulk rheology (double wall ring, cone and plate, parallel plate, rolling ball viscometry, capillary viscometry), Fourier-transform infrared spectroscopy, optical microscopy, PyMOL, small angle neutron and x-ray scattering, neutron and x-ray reflectometry, neutron magnetic resonance, surface tensiometry, scanning electron microscopy, thermogravimetric analysis, zeta potential analysis

**Computer skills:** Aspen, AutoCad, Creo Elements/Direct (3d printing and machining parts), Labview, LaTeX, MATLAB, Microsoft Office & Visio, Minitab, Origin, TRIOS

## Professional Experiences

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### Undergraduate Research Assistant, *University of Texas at Austin*

2013-2015

Advisor: Dr. C. Grant Willson

- Synthesized and characterized high- $\chi$  block copolymers for precise orientation control to self-assemble them into patterns viable for lithographic purposes

### Summer Undergraduate Research Fellow, *NIST*

May-August 2014

- Characterized the relative hydrogen-bonding in AB block copolymer/C homopolymer blends for self-assembly of thin film lithographic patterns

## Teaching Experiences

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### Guest Lecturer, Rheology Short Course, *University of Delaware*

2019

- Lectured one session on the introductory theory and methods of interfacial rheology

### Graduate Teaching Assistant, CHEG 445 Senior Lab, *University of Delaware*

Fall 2017

- Troubleshoot distillation column operations, taught separation theory of the distillation column, oversaw experiments for  $\sim 80$  students, and mentored/trained next year teaching assistants on lab experiments

### Undergraduate Teaching Assistant, Introductory Research Methods, *University of Texas*

Fall 2012

- Mentored students in research projects and proposal writing

## Awards & Activities

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|  |      |
|--|------|
| Professional Development Award, University of Delaware             | 2019 |
| Robert L. Pigford Teaching Assistant Award, University of Delaware | 2018 |
| Student Travel Grant, American Conference on Neutron Scattering    | 2018 |
| NIST Summer Undergraduate Research Fellowship                      | 2014 |
| Internal Affairs Committee, The Society of Women Engineers         | 2013 |

## Publications

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1. Tein, Y.S.; Zhang, Z.; Wagner, N.J.; Competitive Surface Activity of Monoclonal Antibodies and Non-ionic Surfactants at the Air-water Interface Determined by Interfacial Rheology and Neutron Reflectometry. (**In prep for submission**)
  2. Sunday, D. F.; Maher, M. J.; Hannon, A. F.; Liman, C. D.; **Tein, S.**; Blachut, G.; Asano, Y.; Ellison, C. J.; Willson, C. G.; Kline, R. J. Characterizing the Interface Scaling of High  $\chi$  Block Copolymers near the Order-Disorder Transition. *Macromolecules* 2018, *51* (1), 173–180.
  3. Durand, W. J.; Carlson, M. C.; Maher, M. J.; Blachut, G.; Santos, L. J.; **Tein, S.**; Ganesan, V.; Ellison, C. J.; Willson, C. G. Experimental and Modeling Study of Domain Orientation in Confined Block Copolymer Thin Films. *Macromolecules* 2016, *49* (1), 308–316.
  4. Sunday, D. F.; Hannon, A. F.; **Tein, S.**; Kline, R. J. Thermodynamic and Morphological Behavior of Block Copolymer Blends with Thermal Polymer Additives. *Macromolecules* 2016, *49* (13), 4898–4908.
  5. Sunday, D. F.; Maher, M. J.; **Tein, S.**; Carlson, M. C.; Ellison, C. J.; Willson, C. G.; Kline, R. J. Quantifying the Interface Energy of Block Copolymer Top Coats. *ACS Macro Lett.* 2016, 1306–1311.
  6. Durand, W. J.; Blachut, G.; Maher, M. J.; Sirard, S.; **Tein, S.**; Carlson, M. C.; Asano, Y.; Zhou, S. X.; Lane, A. P.; Bates, C. M.; et al. Design of High- $\chi$  Block Copolymers for Lithography. *J. Polym. Sci. Part A Polym. Chem.* 2015, *53* (2), 344–352.

## Selected Oral Presentations

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1. **Y.S. Tein**, C. Majkrzak, B. Maranville, J. Vermant, N.J. Wagner, “Rheo-MAGIK: Instrument Development for Investigating 2D Soft Materials via Interfacial Rheology and Structural Analysis”, Society of Rheology: 91<sup>st</sup> Meeting, Oct. 20-24, 2019. Raleigh, NC
  2. **Y.S. Tein**, C. Majkrzak, B. Maranville, J. Vermant, N.J. Wagner, “Rheo-MAGIK: A Novel Instrument to Study Interfacial Structure-Property Relationships”, 33<sup>rd</sup> Conference of the European Colloid and Interface Society, Sept. 8-13, 2019. Leuven, Belgium
  3. **Y.S. Tein**, Z. Zhang, Y. Liu, A.M. Woys, I.E. Zarraga, N. J. Wagner, “Connecting Structure and Rheology of Therapeutic Protein-Surfactant Complexes at Air-Water Interfaces”, 92<sup>nd</sup> ACS Colloid & Surface Science Symposium, June 10-13, 2018, State College, PA (Oral presentation)
  4. **Y.S. Tein**, Z. Zhang, Y. Liu, A.M. Woys, I.E. Zarraga, N. J. Wagner, “Therapeutic Protein-Surfactant Complexes at the Air-Water Interface: A Neutron Reflectivity and Interfacial Rheology Study”, 9<sup>th</sup> American Conference on Neutron Scattering, June 24-28, 2018. College Park, MD Skills

## Professional Course & Workshops

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2018 Summer School on the Fundamentals of Neutron Scattering. NIST Center for Neutron Research. Gaithersburg, MD. June 19-23, 2018.

Introduction to Interfacial Rheology Short Courses. Society of Rheology. Tampa, FL, Feb. 4-5, 2017.

# Yifan Wang

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 [github.com/wangyifan411](https://github.com/wangyifan411)  
 [linkedin.com/in/wangyifan411](https://www.linkedin.com/in/wangyifan411)

## Skills

- Languages: (proficient): Python, MATLAB; (familiar): R, SQL, Fortran, UNIX Shell
- Tools: Scikit-learn, PyTorch, TensorFlow, NumPy, Pandas, Git, Jupyter Notebook, Matplotlib, Plotly
- Experienced with stochastic models, linear models, Gaussian processes, Bayesian optimization, experimental design

## Education

### University of Delaware – Newark, DE

August 2016 – August 2021 (expected)

- Ph.D. Candidate in Chemical and Biomolecular Engineering; GPA: 3.76/4.00
- Related coursework: Chemical Engineering Principles (linear algebra, differential equations, numerical methods, probability and statistics, design of experiments); Applied Mathematics Topics - asymptotic analysis

### National University of Singapore – Singapore

August 2012 - July 2016

- Bachelor of Engineering (Chemical), with Honors and with Highest Distinction; GPA 3.83/4.00

## Experience

### Graduate Research Assistant, University of Delaware

January 2017 – Present

Thesis: machine-learning-assisted first-principles modeling of subnanometer catalysts for automobile emission control

Advisor: Dionisios G. Vlachos. Selected research projects:

- **Nanocluster structure and dynamics (Python, R, Fortran)**
  - Developed a framework predicting nanocluster energies using graph theory and linear machine learning models. Saved ~1000 hours of CPU time compared with energy calculations from quantum theory
  - Engineered a structure optimization algorithm based on Metropolis Monte Carlo and the genetic algorithm. The algorithm converged 50% faster
  - Supervised an undergrad researcher performing kinetic Monte Carlo simulations. Predicted the timescale for nanocluster sintering for the first time in literature
  - Leveraged knowledge in regularization, supervised learning, cross-validation, stochastic models
- **Model-driven design of experiments (Python)**
  - Built a wrapper for Bayesian Optimization package BoTorch (under PyTorch) and tailored it for designing chemistry experiments
  - Employed the wrapper to both computational reactor simulations and pyrolysis experiments. Saved experimental time/materials by 40%
  - Leveraged knowledge in multivariate Gaussian processes, global optimization, sampling methods
- **Single-atom catalysts stability (Python, MATLAB)**
  - Determined a theoretical correlation for stability using various machine learning regression models from first-principles data. Accelerated catalyst material screening by 20 times
  - Leveraged knowledge in data cleaning, data pipelining, symbolic regression, genetic programming
- **Python Wrapper for kinetic Monte Carlo simulations (Python, Fortran)**
  - Created visualization tools and documentation for the theory and software using matplotlib and Jupyter Notebook
  - Leveraged knowledge in parallelization, data visualization

### Graduate Teaching Assistant, University of Delaware

August 2017 – May 2018

- Obtained two awards based on teaching performance and student feedback for two classes (see below)

### Teaching Assistant, School of Computing, National University of Singapore

August 2014 – December 2015

- Guided two classes of 40 students through lab sessions and provided programming help in a MATLAB programming course

## Leadership and Awards

- Organized the workshop "Theory, Applications, and Tools for Kinetic Modeling" at North American Catalysis Society Meeting 2019 as one of five presenters for 50+ registrants
- **Robert L. Pigford Teaching Assistant Award** (May 2019): Guided undergraduate students through fluid dynamics lab sessions
- **Excellence in Graduate Student Teaching Award** (May 2018): Taught review lectures with MATLAB coding examples for 36 students in a grad-level engineering math class and selected as one of 4 recipients university-wide for the award

## Publications

1. Su, Y. Wang, Y. (co-first author), et al. *ACS Catal.* 9, 3289–3297 (2019). Doi: 10.1021/acscatal.9b00252
2. Alexopoulos, K., Wang, Y. & Vlachos, D. G. *ACS Catal.* 5002–5010 (2019). Doi:10.1021/acscatal.9b00179

## Conference Presentations

Gave more than 10 oral and poster presentations at national and local conferences. Selected presentations are listed below:

- "Model-driven Design of Experiments and Optimization" - American Institute of Chemical Engineers Conference 2019
- "Statistical-Learning, First-Principles Modeling of the Stability and Dynamics of Single Atom Catalysts" - North American Catalysis Society Meeting 2019
- Poster presentation - Machine Learning in Science and Engineering (MLSE) Conference at Georgia Tech 2019

## Professional Development

Coursera MOOC: Machine Learning by Andrew Ng

November 2019

XSEDE High Performance Computing Workshop on Introduction to Deep Learning, TensorFlow and Spark

May 2019

# Michiel G. Wessels

Newark, DE | Email: [michieltg@udel.edu](mailto:michieltg@udel.edu) | Cell: (302) 333-5965

## EDUCATION

### Ph.D. in Chemical & Biomolecular Engineering

Anticipated: March 2021

University of Delaware (Newark, DE)

Awards: Robert L. Pigford Teaching Assistant Award

### B.Sc. in Chemical Engineering

November 2015

University of Witwatersrand (Johannesburg, South Africa)

Awards: Dean's List (2012, 2013, 2014), David Glasser Prize, Graduated with Distinction

## RESEARCH EXPERIENCE

### Ph.D. Student, Department of Chemical & Biomolecular Engineering

August 2016 – Present

University of Delaware (Newark, DE, USA)

Advisor: Professor Arthi Jayaraman

Thesis: Role of polymer architecture on self-assembly in amphiphilic polymer solutions: A computational study

- Develop coarse-grained polymer models to capture self-assembly of non-linear polymer architectures
- Investigate effect of macromolecular design on soft material self-assembly by applying computational techniques (molecular dynamics simulations)
- Extend and develop a method for computational reverse-engineering analysis for scattering experiments to investigate complex micelle systems
- Collaborate with experimentalists and theorists to validate simulation models and guide soft materials design
- Mentor an undergraduate student in professional skills such as research design and presentation

### Research Assistant

January 2016 – June 2016

University of Witwatersrand (Johannesburg, South Africa)

Advisor: Professor Lorenzo Woollacott

- Designed a method to analyze packing density from three-dimensional images in collaboration with technical experts
- Analyzed packing density in stratified beds of multi-sized spherical particles systems imaged with X-ray tomography

### Undergraduate Research

May 2015 – October 2015

University of Witwatersrand (Johannesburg, South Africa)

Advisors: Associate Professor Lizelle D. van Dyk and Professor Karl Rumbold

- Synthesized fly ash derived supports for growth of organic materials
- Tested porosity and strength of fly ash derived supports and imaged microstructure with SEM

## SKILLS

- Programming languages and simulation packages: Matlab, Python, LAMMPS, Visual Molecular Dynamics, Voronoi++
- Operating systems: Unix, Windows, experience with Unix-based high-performance computer clusters
- Software: Microsoft Office, Adobe, Minitab, Aspen, AutoCad
- Languages: English and Afrikaans (bilingual), French (conversational)



# Michiel G. Wessels

Newark, DE | Email: [michieltg@udel.edu](mailto:michieltg@udel.edu) | Cell: (302) 333-5965

## TEACHING EXPERIENCE

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### Teaching Assistant

August 2017 – May 2018

University of Delaware (Newark, DE, USA)

- Managed experiments of 8 groups of 4-5 senior undergraduate students in a distillation lab course
- Demonstrated operation of and safety guidelines for a distillation column
- Assisted 2 professors in introductory chemical engineering class to ~120 undergraduate students

### Math and Science Tutor

January 2016 – June 2016

YourTutor (Online)

- Communicated with students online using limited means (only text and images) within time limits
- Coached students from a variety of age groups to solve homework problems through prompting

### Academic Tutor

February 2013 – November 2014

Alpha Tuition (Johannesburg, South Africa)

- Designed and taught personal bi-weekly lessons for 5 high school students to supplement school curriculum
- Assessed student learning with quizzes to modify lessons based on individual student's needs

## PUBLICATIONS

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- **Wessels, M. G.** & Jayaraman, A. (2020). Self-assembly of amphiphilic polymers of varying architectures near attractive surfaces. *Soft matter*, DOI: 10.1039/C9SM02104C
- Beltran-Villegas, D. J., **Wessels, M. G.**, Lee, J. Y., Song, Y., Wooley, K. L., Pochan, D. J., & Jayaraman, A. (2019). Computational Reverse-Engineering Analysis for Scattering Experiments on Amphiphilic Block Polymer Solutions. *Journal of the American Chemical Society*, 141(37), 14916-14930.
- \*Dong, M., \***Wessels, M. G.**, Lee, J. Y., Su, L., Wang, H., Letteri, R. A., Song, Y., Lin, Y., Chen, Y., Li, R., Pochan, D. J., Jayaraman, A., Wooley, K. L. (2019). Experiments and Simulations of Complex Sugar-Based Coil-Brush Block Polymer Nanoassemblies in Aqueous Solution. *ACS Nano*, 13(5), 5147-5162.
- **Wessels, M. G.** & Jayaraman, A. (2019). Molecular dynamics simulation study of linear, bottlebrush, and star-like amphiphilic block polymer assembly in solution. *Soft matter*, 15(19), 3987-3998.
- \*Lyubimov, I., \***Wessels, M. G.**, & Jayaraman, A. (2018). Molecular Dynamics Simulation and PRISM Theory Study of Assembly in Solutions of Amphiphilic Bottlebrush Block Copolymers. *Macromolecules*, 51(19), 7586-7599.

(\*co-first author)

## CONFERENCE PRESENTATIONS

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- **Wessels, M. G.** & Jayaraman, A. Self-assembly of Bottlebrush Block Polymers at Surfaces using Coarse-grained Molecular Dynamics Simulations (Talk) APS March Meeting 2019
- **Wessels, M. G.** & Jayaraman, A. Self-Assembly of Bottlebrush and Star-like Copolymer Architectures in Solution: A Coarse-Grained Molecular Simulation Study (Talk) AIChE Annual Meeting 2018
- **Wessels, M. G.** & Jayaraman, A. Effects of Copolymer Architecture on the Structure and Thermodynamics of Self-Assembly in Block Copolymer Solutions: A Coarse-Grained Molecular Dynamics Study (Talk) APS March Meeting 2018





## EDUCATION

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

University of Delaware, Department of Chemical and Biomolecular Engineering

expected February 2020

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

Bucknell University, Department of Chemical Engineering

Spring 2014

University of Queensland, Brisbane, Australia (International study)

Spring 2013

## RESEARCH EXPERIENCE

### Doctoral Research

University of Delaware

Fall 2014-present

Advisor: Dr. April M. Kloxin

- Developed a stimuli-responsive, biomimetic, 3D synthetic cell culture scaffold system to study the influence of tissue aging on progression of diseases such as metastatic breast cancer
- Designed, synthesized, and characterized scaffold building-block materials (light responsive polymers and small molecules, enzyme responsive peptides)
- Optimized scaffold composition and formation conditions to achieve tissue-mimetic mechanical and structural properties
- Evaluated *in vitro* biocompatibility and characterized disease cell response

### Undergraduate Research

Bucknell University

Spring 2011-Spring 2014

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

## PROFESSIONAL EXPERIENCE

### Research Science Intern

Fraunhofer, Leipzig, Germany

Fall 2016

- Developed immunobiological assay procedures to evaluate bioceramic material fitness for dentistry and endoprosthetics
- Presented evaluation of prototype material samples to client

### Process Engineering Intern

Corning Incorporated

Summer 2012

- Interfaced with R&D team to design, execute, and analyze experiments to elucidate cause of chronic production variability
- Six Sigma yellow belt certified

## KEY SKILLS

### Hard Skills

Biomaterial design, rheology, dynamic mechanical analysis, HPLC purification, LC-MS, NMR spectroscopy, UV/Vis spectroscopy, aseptic technique, lyophilization, organic synthesis, peptide synthesis, confocal microscopy, mammalian cell culture

### Soft Skills

Communication, interdisciplinary collaboration, problem solving, leadership, mentorship

## TEACHING AND COMMUNICATION EXPERIENCE

### Graduate Teaching Fellow

#### University of Delaware

Undergraduate Fluid Mechanics

Fall 2018

- Selected to co-teach 1/3 of lectures with experienced faculty
- Developed new design focused term project
- Prepared homework and exam questions for 80+ students

### Radio Show Host and Director

#### Rise and Science (93.1 WVUD)

Podcast version available on iTunes

Spring 2016-Fall 2018

- Interviewed local and visiting scientists, reported on the latest science news, and demystified science we see in everyday life
- Managed a team of 10 hosts
- Hosted, edited, and produced 20+ original episodes

## LEADERSHIP EXPERIENCE

### Empathetic Peers Offering Wisdom, Encouragement, and Resources, University of Delaware

Mentor and Founding Member (2017-present)

### Colburn Club, University of Delaware

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)

### Colburn Outreach Committee, University of Delaware

Volunteer and Founding Member (2015-17)

## PUBLICATIONS

**KL Wiley**, AM Kloxin, "Mechanically dynamic hydrogel matrices to investigate breast cancer cell response to matrix remodeling," *In Preparation*.

**KL Wiley\***, EM Ovadia\*, CJ Calo, RE Huber, AM Kloxin, "Rate-based approach for controlling the mechanical properties of 'thiol-ene' hydrogels formed with visible light," *Polymer Chemistry*, **10**, 4428-4440, 2019. [**\*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.

## SELECTED PRESENTATIONS & SEMINARS

### ORAL PRESENTATIONS

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

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

### POSTER PRESENTATIONS

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

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

## 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—Fall 2020 (expected)  
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
- Developed a rapid, small-volume approach for studying air interface-mediated particle formation in protein formulations

Undergraduate Research Assistant, 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 independent work: 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 material quality checks, glass sterilization, and cartridge assembly in clean room. Cartridges were 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.**, Razinkov, V., Qi, W., Furst, E., and Roberts, C. A Rapid, Small-Volume Approach for Protein Aggregation via Air-Water Interfaces (in preparation)
- **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 (submitted)
- 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

## SELECTED PRESENTATIONS

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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. *AbbVie Analytical Research Symposium*. July 2019.
- **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. *Biotherapeutics and Vaccines Development Gordon Research Conference*. Jan. 2019.
- **Wood, C.**, Razinkov, V., Qi, W., Furst, E., and Roberts, C. 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.**, Razinkov, V., Qi, W., Furst, E., and Roberts, C. Combined Effects of Temperature and Compression/Dilation of Air-Water Interfaces on Therapeutic Protein Aggregation. *Colloidal, Macromolecular, and Polyelectrolyte Solutions Gordon Research Conference*, Feb. 2018.

## SKILLS

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Analytical: HPLC, Static and Dynamic light scattering, UV-Vis spectroscopy, particle counting (flow and backgrounded membrane imaging), differential scanning calorimetry, microscopy, interfacial rheometry, tensiometry (microbubble, Du Nuoy ring, Wilhelmy plate), MALDI, instrument design and validation  
Molecular Biology: Cell culture, PCR, DNA and Protein Gels, Western Blot  
Software: LabVIEW, Java, MATLAB, Aspen Plus, PyMOL  
Languages: French (elementary proficiency)

## AWARDS

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2018: Robert L. Pigford Teaching Assistant Award, University of Delaware  
2015: Robert L. Pigford Fellow, University of Delaware

## LEADERSHIP AND MENTORSHIP

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- Mentored two undergraduate students during research internships (Summer 2018, Winter 2018)
- Graduate teaching assistant, CHEG345 Chemical Engineering Laboratory (2017)
- AIChE: Princeton University Chapter president (2014), Treasurer (2013), Class of 2015 rep. (2012)
- Princeton Engineering School: Mentor to freshman class (2012-2015)

## OTHER ACHIEVEMENTS

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- Marathon runner: 13-time finisher (2016-present); Boston Marathon qualifier
- Violinist: Concertmaster, Princeton University Orchestra (2013-2015); Winner, Princeton University Concerto Competition (2012); Semifinalist, Stradivarius International Violin Competition (2010); Assistant Concertmaster, Orchestra of the Closing Ceremonies of the 2010 Winter Olympics (2010)

# OU YANG

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(612)-845-1776

## EDUCATION

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|  |                    |
|--|--------------------|
| <b>Rutgers, The State University of New Jersey, New Brunswick, NJ</b><br>Ph.D. Candidate, Chemical and Biochemical Engineering | Sep 2016 – Present |
| <b>University of Delaware, Newark, DE</b><br>Visiting Scholar, Chemical and Biomolecular Engineering                           | Sep 2019 – Present |
| <b>University of Minnesota – Twin Cities, Minneapolis, MN</b><br>B.S. Chemical Engineering; Minor in Chemistry and Mathematics | May 2015           |

## RESEARCH EXPERIENCE

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|   |                   |
|---|-------------------|
| <b>Graduate Research Assistant</b> , Rutgers University | Jan 2017– Present |
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**Thesis title: Modeling and optimization of biopharmaceutical manufacturing**

Advisor: Prof. Marianthi Ierapetritou,

Batch and continuous biopharmaceutical processes for mAbs production on flowsheet modeling

- Conduct techno-economic analysis to evaluate cost-effectiveness of novel biopharmaceutical processes
- Evaluate continuous and batch operations by sensitivity analysis and scenario studies for decision making

FDA funded project on advanced upstream manufacturing of biotherapeutics

- Develop mechanistic model to simulate cell activities and protein glycosylation for bioreactor operations
- Explore effects of operating conditions on critical quality attributes for bioreactor process optimization

**Research Assistant**, University of Minnesota-Twin Cities

Advisor: Prof. Xiang Cheng

July 2015 – May 2016

- Tracked and analyzed fluid dynamics and diffusion in active fluid algal suspensions

**Research Assistant**, University of Minnesota-Twin Cities

October 2013 – May 2015

Advisor: Prof. Veglia Gianluigi

- Investigated function of protein kinases A associated mutant and test its effect to protein phosphorylation
- Analyzed the mechanism of Raf kinase inhibitor protein binding to PKA using NMR

## PUBLICATIONS

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- 1) **Yang O.**, Peng Y., Tang C., Xu X., Cheng X., "Dynamics of ellipsoid dal tracers in swimming algal suspensions." Physical Review E (2016): 10.1103/PhysRevE.94.042601
  - 2) **Yang O.**, Qadan M., Ierapetritou M., "Economic analysis of Batch and Continuous Biopharmaceutical Antibody Production: A review." Journal of Pharmaceutical Innovation (2019):10.1007/s12247-018-09370-4
  - 3) **Yang O.**, Prabhu S., Ierapetritou M., "A Comparison Between Batch and Continuous Monoclonal Antibody Production and Economic Analysis." Industrial & Engineering Chemistry Research (2019): 10.1021/acs.iecr.8b04717

## CONFERENCE PRESENTATIONS

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- 1) **Yang O.**, Ierapetritou M., (Oct. 2018). "Comparison of Batch and Continuous Biopharmaceutical Antibody Production Based on Techno-Economic Analysis", AIChE Annual Meeting, Pittsburgh, USA, Poster
  - 2) **Yang O.**, Chopda V., Muddu S., Gyorgypal A., Hausner D., Singh R., Tsilomelekis G., Zhang, H., Chundawat S., Ramachandran R., Ierapetritou M. (Sept. 2019)." Continuous Upstream Biopharmaceuticals Manufacturing", Advanced Process Modeling Forum (APM) 2019, Tarrytown, USA, Poster
  - 3) **Yang O.**, Ierapetritou, M., (Nov. 2019). "Mathematical Modeling and Optimization of the Upstream Monoclonal Antibody Production" AIChE Annual Meeting, Orlando, USA, Oral

## TEACHING EXPERIENCE

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Graduate Teaching Assistant, Rutgers University, NJ

Fall 2017- Spring 2018

Course: 155:427/428 Chemical Engineering Design

Instructor: Prof. Fuat Celik

- Supervised undergraduate students in design and analyses of a complete chemical process plant
- Guided undergraduate students in trouble shooting and developing a flowsheet model in Aspen

## SKILLS

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**Software** SuperPro, SchedulePro, MATLAB, GAMS, Aspen, Sparky, FinchTV, Origin

**Laboratory** Bio-structure property identification & analysis, NMR, IR, GC/LC, FPLC, PCR

**Language** English, Mandarin

## HONORS AND AWARDS

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Rutgers University SGS/CBE Conference Travel Award

Fall 2018

Teaching Assistant and Graduate Assistant Professional Development Fund Award

Spring 2018

## LEADERSHIP

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Director, Global China Connection (GCC)

Fall 2013 – Spring 2014

- Brainstormed ideas for networking events and responsible for overall execution
- Managed internal and external affairs for the organization to expand its scope and coverage

## ACTIVITIES

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Member, Society of Women Engineers (SWE)

Fall 2012 – Now

Member, American Institute of Chemical Engineers (AIChE)

Fall 2012 – Now

Departmental tour guide at Rutgers University

Fall 2017 – Spring 2018

# Daniel Yur

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Phone: 408-960-5092

Address: 142 Steven Ln. Wilmington, DE 19808

## Education

### **2016-Present University of Delaware**

Ph.D. Candidate in Chemical and Biomolecular Engineering (2021)

GPA: 3.97

### **June 2016 University of California – Santa Barbara (UCSB)**

Bachelor of Science in Chemical Engineering

GPA: 3.80 (High Honors)

## Experience

### **2016-Present Graduate Researcher, University of Delaware, Chemical and Biomolecular Engineering**

Advisors: Wilfred Chen and Millicent O. Sullivan

- Engineering modular virus-like particle platform for therapeutic protein delivery
- Exploring the use of prodrug converting enzymes and siRNA silencing to treat inflammatory breast cancer cells

### **2015-2016 Undergraduate Researcher, University of California – Santa Barbara, Chemical Engineering**

Advisor: Michelle O'Malley

- Cloning, expression and characterization of anaerobic gut fungal membrane proteins in *Escherichia coli* and *Saccharomyces cerevisiae*

### **2014 Summer Undergraduate Intern, Fudan University, Material Science**

Advisor: Fan Zhang

- Synthesis of upconversion and downconversion nanoparticles for bioimaging applications

## Oral Presentation

**2019 Daniel Yur, Wilfred Chen, Millicent O. Sullivan** "Modular Hepatitis B Virus-Like Particles for Targeted siRNA Delivery" American Chemical Society 257<sup>th</sup> National Meeting, Orlando FL 2019

## Posters

### **2016 Research in Science and Engineering Symposium UCSB**

**Daniel Yur, Susanna Seppälä, Justin Yoo, Michelle O'Malley**

"Functional Expression of Anaerobic Gut Fungal Fluoride Transporters in *Saccharomyces cerevisiae*"

### **2015 Summer Undergraduate and Graduate Research Colloquium UCSB**

**Daniel Yur, Ella Stimson, Susanna Seppälä, Sean Gilmore, Michelle O'Malley**

“Characterization of Anaerobic Gut Fungi by Heterologous Protein Production and Optimization of Enzymatic Reaction Conditions”

### Manuscripts

**2019** S. Seppälä, J.I. Yoo, **D. Yur**, M.A. O’Malley, “Heterologous transporters from anaerobic fungi bolster fluoride tolerance in evolutionarily adapted *Saccharomyces cerevisiae*”

### Mentorship and Teaching

**2018-Present** **Research Supervisor – Undergraduate Senior Thesis:** Morgan Meyers  
“Developing organophosphorus hydrolase encapsulated nanocarriers for organophosphate pesticide degradation”

**2019-Present** **Research Supervisor – Undergraduate Senior Thesis:** Rohan Narayan  
“Application of coil-coiled peptide fused nanoparticles for rapid protein purification”

**Spring 2018** **Teaching Assistant – CHEG 345: Chemical Engineering Lab**  
- Supervised and operated a fluid dynamics lab and graded students’ reports

**2013-2015** **Campus Learning Assistance Services Drop-In Tutor, University of California, Santa Barbara**  
- Taught introductory physics and mathematics course material

### Research Skills and Techniques

- Bacterial and Mammalian Cell Culture
- Molecular Cloning and Genetic Engineering
- Protein Expression and Purification
- SDS-PAGE, EMSA, and Western Blot
- Fluorescence Microscopy and Flow Cytometry

### Affiliations

- American Chemical Society-Biochemical Technologies (BIOT) Division, *Member*
- Tau Beta Pi Honors Society (CA Sigma), *Member*

### Honors

**2019** American Chemical Society BIOT Division “Best of BIOT” Award

**2017** National Science Foundation Integrative Graduate Education and Research Traineeship Fellowship (NSF IGERT)

**2016** University of Delaware Robert L. Pigford Merit Fellowship

**2016** University of California, Santa Barbara Materials Research Laboratory Research in Science and Engineering Fellowship (UCSB MRL RISE)

**2015** Army Education Outreach Program Undergraduate Research Apprenticeship Program Fellowship (AEOP URAP)

**2012-6** University of California, Santa Barbara Dean’s Honor’s List



# CHEMICAL & BIOMOLECULAR ENGINEERING

