Catherine A. Fromen

Assistant Professor of Chemical and Biomolecular Engineering
University of Delaware • 150 Academy Street, 209 Colburn Laboratory Newark, DE 19716
cfromen@udel.edu • sites.udel.edu/cfromen/

EDUCATION

Ph.D. Chemical Engineering — **North Carolina State University, July 2014**
Advisor: Joseph M. DeSimone
Dissertation: Monodisperse, uniformly-shaped particles for controlled respiratory vaccine delivery

B.S. Chemical Engineering — **University of Rochester, May 2009**

PROFESSIONAL APPOINTMENTS

Affiliated Faculty Member — **University of Delaware, Newark DE**
Sociotechnical Systems Center (SSC) — Summer 2020-Present
Center for Biomanufacturing Science and Technology (CBST) — Winter 2020-Present
Center for Research in Soft Matter and Polymers (CRiSP) — Spring 2019-Present
Chemistry-Biology Interface (CBI) NIH T-32 Program — Spring 2018-Present

Assistant Professor — **University of Delaware, Newark DE**
Department of Chemical and Biomolecular Engineering — Fall 2017-Present

University of Michigan's President's Postdoctoral Fellow — **University of Michigan, Ann Arbor MI**
Department of Chemical Engineering — Fall 2014-Summer 2017

CURRENT RESEARCH

My research group designs therapeutic pulmonary aerosols and 3D lung replicas by applying engineering fundamentals, biomaterials, innovative tools, and current mucosal immunology. Main research thrusts include:

- Using nano- and microparticles to probe lung innate immune function in cancer, fibrosis, and infection
- Engineering bioactive hydrogel particles for controlled pulmonary immune stimulation and anti-viral action
- Leveraging 3D printing to advance *in vitro* tools for pulmonary drug delivery testing

AWARDS AND HONORS

- AIChE 35 Under 35 (Bioengineering) — September 2020
- ASEE Chemical Engineering Division Young Faculty Mentoring and Travel Grant — April 2020
- PhRMA Foundation Pharmaceutics 2020 Research Starter Grant Award — February 2020
- Invited Participant to National Academy of Engineering's 2019 US Frontiers of Engineering Symposium, Charleston, SC — September 2019
- Inaugural Early Career Board Member *ACS Biomater Sci Eng* — Spring 2018
- Johnson and Johnson WiSTEM2D Scholar Finalist — April 2018
- Univ Michigan Outstanding Postdoctoral Fellow Award — August 2016
- Univ Michigan President's Postdoctoral Fellow, University of Michigan, MI — 2014-2017
- Travel Award Recipient to attend National Academy of Science's Committee on Key Challenge Areas for Convergence and Health Workshop, Washington DC — September 2013
- NextProf Workshop Selected Participant, University of Michigan, MI — September 2013
- Mentored Teaching Award, North Carolina State University — Spring 2013
- Shelby A. Miller Prize in Chemical Engineering Design, University of Rochester — 2009
- Eisenberg Research Fellowship, University of Rochester — 2008
- Rush Rhees Scholarship Recipient for Academic Excellence, University of Rochester — 2005-2009

PUBLICATIONS

Citations from Google Scholar Profile: (Last updated 4/1/2021) — H-index: 13; Total citations: 617
https://scholar.google.com/citations?user=YOiSE3YAAAAJ&hl=en — ORCID iD 0000-0002-7528-0997

*co-first authors, Corresponding author, #co-corresponding authors, *undergraduate authors*

Peer-Reviewed Publications

1. Kolewe, E.L., Stillman, Z.S., Woodward, I.R., **Fromen, C.A.**, Check the Gap: Facemask Performance and Exhaled Aerosol Distributions Around the Wearer. *PLOS ONE* (2020). DOI: 10.1371/journal.pone.0243885 [Journal Impact Factor: 2.74, Citations 2].

2. Jarai, B.M., Stillman, Z.S., Bomb, K., Kloxin, A.M., **Fromen, C.A.** Biomaterials-Based Opportunities to Engineer the Pulmonary Host Immune Response in COVID-19. *ACS Biomater Sci & Eng* (2020). DOI: 10.1021/acsbiomaterials.0c01287. ***Selected as ACS Editors' Choice feature article.*** [Journal Impact Factor: 4.49, Citations 0].

3. Jarai, B.M.*, Stillman, Z.*, *Attia, L.*, Decker. G.E., Bloch, E.D., **Fromen, C.A.,** Evaluating UiO-66 Metal-Organic Framework (MOF) Nanoparticles as Acid-Sensitive Carriers for Pulmonary Drug Delivery Applications. *ACS Appl Mater Interfaces* 12:35 (2020) 38989-39004. DOI: 10.1021/acsami.0c10900 [Journal Impact Factor: 8.76, Citations 5].

4. *Peterman, E.L.*, Kolewe, E. L., **Fromen, C.A.,** Evaluating Regional Pulmonary Deposition Using Patient-Specific 3D Printed Lung Models. *JOVE Bioengineering* (2020) 165, e61706. DOI:10.3791/61706 [Journal Impact Factor: n/a, Citations 0].

5. Kolewe, E.L., Feng, Y., **Fromen, C.A.,** Realizing Lobe-Specific Aerosol Targeting in a 3D Printed *In Vitro* Lung Model. *J Aerosol Med Pulm D* 33:0 (2020) 1-15. DOI: 10.1089/jamp.2019.1564. [Journal Impact Factor: 2.7, Citations 1].

6. Shirazi, J., Donzanti, M.J., Nelson, K.M., Zurakowski, R., **Fromen, C.A.**, Gleghorn, J.P., Significant unresolved questions and opportunities for bioengineering in understanding and treating COVID-19 disease progression. *Cell Mol Bioeng* 13 (2020) 259-284. DOI: 10.1007/s12195-020-00637-w. [Journal Impact Factor: 2.4, Citations 4].

7. Briddell, J.W., Vandjelovic, N.D., **Fromen, C.A.,** *Peterman, E.L.*, Reilly, J.S., Geometric model to predict improvement after lingual frenulectomy for ankyloglossia. *Int J Pediatr Otorhinolaryngol* 134 (2020) 110063. DOI: 10.1016/j.ijporl.2020.110063. [Journal Impact Factor: 1.2, Citations 0].

8. Zhao, J., Feng, Y., **Fromen, C.A.**, Glottis Motion Effects on Inhaled Particle Transport and Deposition in a Subject-Specific Human Mouth-to-Trachea Model: An in silico Study. *Comput Biol Med* 116 (2020) 103532. [Journal Impact Factor: 3.4, Citations 3].

9. Stillman, Z.S., Jarai, B.M., *Raman, N., Patel, P.*, **Fromen, C.A.,** Degradation Profiles of Poly(ethylene glycol) diacrylate (PEGDA)-based hydrogel nanoparticles. *Polym Chem* 11:2 (2020) 568-580. ***Invited for 2020 Emerging Investigators Collection***. [Journal Impact Factor: 5.3, Citations 10].

10. Decker, G.E.,* Stillman, Z.S.,* *Attia, L.*, **Fromen, C.A.,**[#] Bloch, E.,[#] Controlling Size, Defectiveness, and Fluorescence in Nanoparticle UiO-66 Through Water and ligand modulation. *Chem Mater* 31:13 (2019) 4831-4839. *co-first authors, #co-corresponding authors [Journal Impact Factor: 9.5, Citations 9].

--Work Prior to University of Delaware--

11. Fish, M.B., Braunreuther, M., Banka, A.L., **Fromen, C.A.,** Kelley, W.J., Lee, J., Adili, R., Holinstat, M., Eniola-Adefeso, O. Deformable Microparticles as Carriers for Nanoparticles: A Trojan Horse Approach to Vascular-Targeted Drug Delivery. *Scientific Reports* (2021) *Accepted 2/9/21* [Journal Impact Factor: 3.9, Citations 0].

12. Kelley, W.J., Onyskiw, P. **Fromen, C.A.,** Eniola-Adefeso, O., Model Particulate Drug Carriers Modulate Leukocyte Adhesion in Human Blood Flows. *ACS Biomater Sci Eng* 5:12 (2019) 6530-6540. [Journal Impact Factor: 4.1, Citations 1].

13. Kelley, W.J., **Fromen, C.A.,** Lopez-Cazares, G., Eniola-Adefeso, O., PEGylation of model drug carriers enhances phagocytosis by primary human neutrophils. *Acta Biomaterialia* 79 (2018) 283-293. [Journal Impact Factor: 7.2, Citations 20].

14. **Fromen, C.A.,** Kelley, W.J., Fish, M.B., Adili, R., *Noble, J.*, Hoenerhoff, M.J., Holinstat, M., Eniola-Adefeso, O., Neutrophil-Particle Interactions in Blood Circulation Drive Particle Clearance and Alter

Neutrophil Responses in Acute Inflammation. *ACS Nano* 11:11 (2017) 10797-10807. [Journal Impact Factor: 14.6 Citations 31].

15. Fish, M.B., **Fromen, C.A.,** Lopez-Cazares, G., *Golinski, A.W.*, Scott, T.F., Adili, R., Holinstat, M., Eniola-Adefeso, O., Exploring Deformable Particles in Vascular-Targeted Drug Delivery: Softer is Only Sometimes Better. *Biomaterials* 124 (2017) 169-179. [Journal Impact Factor: 10.3, Citations 30].

16. *Noble, J., Zimmerman, A.*, **Fromen, C.A.,** Potent Immune Stimulation from Nanoparticle Carriers Relies on the Interplay of Adjuvant Surface Density and Adjuvant Mass Distribution. *ACS Biomater Sci Eng* 3:4 (2017) 560-571. [Journal Impact Factor: 4.1, Citations 5].

17. **Fromen, C.A.,** Rahhal, T.B., Robbins, G.R., Kai, M.P., Shen, T.W., Luft, J.C., DeSimone, J.M., Nanoparticle Surface Charge Impacts Distribution, Uptake and Lymph Node Trafficking by Pulmonary Antigen-Presenting Cells, *Nanomed. Nanotechnol, Biol, Med* 12:3 (2016) 677-687. ***Featured Cover Article.*** [Journal Impact Factor: 5.6, Citations 94].

18. Rahhal, T.B., **Fromen, C.A.,** Wilson, E.M., Kai, M.P., Shen, T.W., Luft, J.C., *DeSimone, J.M.*, Pulmonary Delivery of Butyrylcholinesterase as a Model Protein to the Lung. *Mol Pharmaceutics* 13:5 (2016) 1626-1635. [Journal Impact Factor: 4.3, Citations 14].

19. **Fromen, C.A.,** Fish, M.B., *Zimmerman, A.*, Adili, R. Holinstat, M., Eniola-Adefeso, O., Evaluation of Receptor-Ligand Mechanisms of Dual-Targeted Particles to an Inflamed Endothelium. *Bioeng Transl Med* 1 (2016) 103–115. [Journal Impact Factor: 6.1, Citations 21].

20. Kai, M.P., Brighton, H.E., **Fromen, C.A.**, Shen, T.W., Luft, J.C., Luft, Y.E., Keeler, A.W., Robbins, G.R., Ting, J.P.Y., Zamboni, W.C., Bear, J.E., DeSimone, J.M., Tumor Presence Induces Global Immune Changes and Enhances Nanoparticle Clearance, *ACS Nano* 10:1 (2016) 861-870. [Journal Impact Factor: 14.6, Citations 40].

21. Shen, T.W.*, **Fromen, C.A.***, Kai, M.P., Luft, J.C., Rahhal, T.R., Robbins, G.R., DeSimone, J.M., Distribution and Cellular Uptake of PEGylated Polymeric Particles in the Lung Towards Cell-Specific Targeted Delivery, *Pharm Res* 32 (2015) 3248-3260. *co-first authors [Journal Impact Factor: 3.2, Citations 27].

22. Sobczynski, D.J., Fish, M.B., **Fromen, C.A.,** Carasco-Teja, M., Coleman, R.M., Eniola-Adefeso, O., Drug Carrier Interactions in Blood: A Critical Aspect for High-Efficient Vascular-Targeted Drug Delivery Systems, *Therapeutic Delivery* 6:8 (2015) 915-934. [Journal Impact Factor: n/a, Citations 9].

23. Fish, M.B., Thompson, A.J., **Fromen, C.A.,** Eniola-Adefeso, O., Emergence and Utility of Non-Spherical Particles in Biomedicine, *Ind Eng Chem Fundam* 56:16 (2015) 4043-4059. [Journal Impact Factor: 3.6, Citations 45].

24. **Fromen, C.A.*,** Robbins, G.R.*, Shen, T.W., Kai, M.P., Ting, J.P.Y., DeSimone, J.M., Controlled Analysis of Nanoparticle Charge on Mucosal and Systemic Antibody Responses Following Pulmonary Immunization, *Proc Natl Acad Sci USA* 112 (2015) 488-493. *co-first authors. [Journal Impact Factor: 9.6, Citations 99].

25. **Fromen, C.A.,** Shen, T.W., *Larus, A.E.*, Mack, P., Luft, J.C., Maynor, B.W., DeSimone, J.M., Synthesis and Characterization of Monodisperse Uniformly Shaped Respirable Aerosols, *AIChE Journal* 59:9 (2013) 3184-3194. [Journal Impact Factor: 3.5, Citations 21].

26. Garcia A., Mack P., Williams, S., **Fromen, C.A.,** Shen, T.W., Pillai, J., Kuehl, P., Napier, M.E., DeSimone, J.M., Maynor, B.W., Microfabricated Engineered Particle Systems for Respiratory Drug Delivery and Other Pharmaceutical Applications, *Journal of Drug Delivery* (2011). [Journal Impact Factor: 2.3, Citations 63].

27. Wang, Y., Merkel, T.J., Chen, K.; **Fromen, C.A.,** Betts, D.E., DeSimone, J.M., Generation of a Library of Particles Having Controlled Sizes and Shapes via the Mechanical Elongation of Master Templates, *Langmuir* 27 (2011) 524-528. [Journal Impact Factor: 3.6, Citations 45].

28. Cox, G.P., Marshall, K.L., Lambropoulos, J.C., *Leitch, M.*, ***Fromen, C.A.,*** Jacobs, S.D., Modeling the Effects of Microencapsulation on the Electro-Optic Behavior of Polymer Cholesteric Liquid Crystal Flakes, *Journal of Applied Physics* 106 (2009) 124911-1. [Journal Impact Factor: 2.3, Citations 3].

Submitted Manuscripts

29. Jarai, B.M., **Fromen, C.A.** Nanoparticle Internalization Promotes the Survival of Primary Macrophages. *Submitted 4/1/21*.

Book Chapters

1. Jarai, B.M., Kolewe, E.L., Stillman, Z.S., *Raman, N.*, **Fromen, C.A.,** "Polymer Nanoparticles" in Nanoparticles for Biomedical Applications: Fundamental Concepts, Biological Interactions, and Clinical Potential, Chung, E.J., Leon, L., Rinaldi, C., Eds.; Elsevier (2020) 303-324.

2. Tang, C., Levit, S., Zeevi, M., Vasey, C., **Fromen, C.A.,** "Polymer Colloids Enable Medical Applications" in Polymer Colloids, Priestley, R.D., Prud'homme, R.K., Eds.; Royal Society of Chemistry (2020) 358.

--Work Prior to University of Delaware--

3. **Fromen, C.A.,** Dunn, S.S., DeSimone, J.M., "Biomedical Nanopreparations with Controlled Geometries" in Handbook of Nanobiomedical Research: Fundamentals, Applications, and Recent Developments, Torchillin, Ed.; World Scientific, Vol 4. (2014) 349-400.

Peer Reviewed Conference Proceedings

1. **Fromen, C.A.,** Enszer, J.A. "Putting Course Design Principles to Practice: Creation of an Elective on Vaccines and Immunoengineering." Presented at the American Society for Engineering Education (ASEE) 2020 Annual Meeting (Virtual). June 2020. ***Nominated for Best Paper: Chemical Engineering Division***

Additional Publications

1. **Fromen, C.A.,** Gleghorn, J.P. "Engineering Preclinical Tools and Therapeutics to Understand and Treat COVID-19" *Delaware Journal of Public Health* Vol 6: Issue 2A "From Cells to Society: Research in the time of COVID-19" (2020) 32-35.

2. **Fromen, C.A.,** Sample, W., Prasad, A., Buckley, J.M., "The HensNest: Mass Manufacturing a General Use Face Mask Here in Delaware" *Delaware Journal of Public Health* Vol 6: Issue 2B "From Cells to Society: Research in the time of COVID-19" (2020) 36-38.

--Work Prior to University of Delaware--

3. Robbins, G.R., **Fromen, C.A.,** Rahhal, T.B., Luft, J.C., Wang, A.Z., Pecot, C.V., DeSimone, J.M., "Non-Intravenous Routes of Delivery: Aerosol Therapy for Cancer Management" in *NCI Alliance for Nanotechnology in Cancer: Cancer Nanotechnology Plan 2015*. Section I: Emerging Strategies in Cancer Nanotechnology (2015) 39-43.

4. Petrosko, S.A., **Fromen, C.A.,** Auyeung, E., DeSimone, J.M., Mirkin, C.A., Nanotechnology: an Enduring Bridge Between Engineering and Medicine, *National Academy of Engineering, The Bridge* (2013) 7-15.

Patents

1. *Provisional:* Gleghorn, J.P., Nelson, K., **Fromen, C.A.,** A Microparticle To Sequester SARS-CoV-2 In The Upper Airway. U.S. Provisional Application Serial No.: 63/061,862. Submitted Aug 6, 2020.

2. *Provisional:* **Fromen, C.A.,** *Peterman, E.L.*, Kolewe, E.L., Endotracheal Tube Attachments for Inhalable Targeted Drug Delivery. U.S. Provisional Application Serial No.: 62/905,517. Submitted Sept 25, 2019.

--Work Prior to University of Delaware--

3. Cox, G. P., ***Fromen, C. A.,*** Marshall, K. L., Jacobs, S. D., PCLC Flake-based Apparatus and Method. U.S. Patent No. 8,293,135 B2. University of Rochester, Rochester, NY. Issued Oct. 23, 2012.

PRESENTATIONS

Presenting author underlined, *undergraduate authors italicized,* **C.A.F in bold**

Invited Conference Presentations

1. Stillman, Z., Jarai, B., Decker, G., Attia, L., Bloch, E., **Fromen, C.A.,** "Tunable Metal-Organic Framework (MOF) Nanoparticles as Inhaled Drug Delivery Vehicles" 2021 Middle Atlantic Regional Meeting (MARM). Virtual - Newark, Delaware, June 9-11, 2021. *Invited Speaker*
2. **Fromen, C.A.,** "Pulmonary Immune Engineering in the Time of COVID-19" 14th Northeast Complex Fluids and Soft Matter (NCS 14) Workshop. Virtual. January 15, 2021. *Invited Speaker.*
3. **Fromen, C.A.,** "Designer nanomedicines: formulation considerations for the next generation of inhalable therapeutics" 2020 Frontiers in Particle Science and Technology Forum. AIChE Spring Meeting. Houston, TX. March 30 April 1, 2020. *Invited Speaker. *conference postponed due to SARS_COV2. Delivered virtually August 18, 2020.*
4. **Fromen, C.A.,** "Leveraging molecular order of highly porous metal organic framework (MOF) nanoparticles for pulmonary drug delivery" International Conference on Bio-Nano Innovation (ICBNI 2020) International Conference on Nanoscience and Nanotechnology (ICONN). Brisbane, Australia. February 9 – 12, 2020. *Invited Speaker.*
5. **Fromen, C.A.,** "Tuning physiochemical properties of nanoparticles for pulmonary immune engineering applications" Frontiers at the Chemistry & Biology Interface Symposium (FCBIS). National Cancer Institute's Chemical Biology Laboratory. Bethesda, MD. May 3, 2019. *Invited Speaker.*
6. **Fromen, C.A.,** "Engineering Particle-Lung Interactions to Improve Pulmonary Therapeutics" Northeast Bioengineering Conference (NEBEC) Immunoengineering Session. Drexel University. Philadelphia, PA. March 30, 2018. *Invited Speaker & Panelist.*

Invited Seminars and Lectures

1. **Fromen, C.A.**, "Episode COVID19: The Immune System Strikes Back" Department of Chemical and Biomolecular Engineering, University of Delaware. Newark, DE. May 15, 2020. *Invited Department Webinar Speaker.*
2. **Fromen, C.A.**, "Breathe it in: Engineering Approaches to Improve Inhalable Medicines" Department of Chemical Engineering, University of Iowa. Iowa City, IA. April 9, 2020. *Invited Department Seminar Speaker. * postponed due to SARS_COV2. Virtual visit October 8, 2020*
3. **Fromen, C.A.,** "Breathe it in: Engineering Approaches to Improve Inhalable Medicines" Department of Chemical Engineering, Carnegie Melon University. Pittsburg, PA. March 19, 2020. *Invited Department Seminar Speaker. * postponed due to SARS_COV2. Virtual visit October 13, 2020.*
4. **Fromen, C.A.,** "Engineering Approaches to Improve Inhalable Medicines" Junior Investigators Network (JIN) Call, DE INBRE. March 19, 2020. *Invited Speaker.*
5. **Fromen, C.A.,** "Pulmonary aerosol delivery of nanomedicines: regional targeting, platform design, and innate cell regulation" Center for Targeted Therapeutics and Translational Nanomedicine (CT3N). University of Pennsylvania. Philadelphia, PA. March 11, 2020. *Invited Work In Progress Seminar Speaker. * postponed due to SARS_COV2*
6. **Fromen, C.A.,** "Using Engineering Approaches to Improve Inhalable Respiratory Therapeutics" Oklahoma State University School of Chemical Engineering, Graduate Seminar Series. Stillwater, OK. October 29, 2019. *Invited Department Seminar Speaker.*
7. Briddell, J. and **Fromen, C.A.,** "3D Printing of Pediatric Patient Airways for improved Aerosol Therapeutics" Nemours Biomedical Lunch and Learn Series, DuPont Experimental Station, Wilmington, DE. February 1, 2019. *Invited Co-Speaker.*
8. **Fromen, C.A.,** "Engineering Particle-Cell Interactions in the Lung" University of Missouri Chemical Engineering Department. Columbia, MO. April 17, 2018. *Invited Department Seminar Speaker.*

9. **Fromen, C.A.,** ""Giving Nanoparticles Directions: Surface Chemistry Modifications Guide the Fate of Nanoparticles in the Body" University of Delaware CBI Seminar Series. Newark, DE. March 14, 2018. *Invited Seminar Speaker.*

Conference Oral Presentations

1. Kolewe, E.L., **Fromen, C.A.,** Lobe-Specific Aerosol Targeting in a 3D Printed Lung Model. AIChE Annual Conference, Medical Devices Session, Virtual, November 15-20, 2020.
2. Kolewe, E.L., **Fromen, C.A.,** Aerosol Therapeutic Delivery in 3D Printed Pediatric Airway Replicas. AIChE Annual Conference, Multi-scale Transport Considerations for Drug Delivery Session, Virtual, November 15-20, 2020.
3. Bomb, K., **Fromen, C.A.**, Kloxin, A.M, Utilizing Variable Substrate Stiffness to Investigate Macrophage Response in Healthy and Fibrotic Pulmonary Microenvironment. AIChE Annual Conference, Hydrogel Biomaterials: Emerging Applications Session, Virtual, November 15-20, 2020.
4. Jarai, B.M., **Fromen, C.A.,** Inert Particles for Enhancing the Survival of Primary Macrophages. AIChE Annual Conference, Bionanotechnology Graduate Student Award Session, Virtual, November 15-20, 2020. ***Second Place Graduate Student Award.***
5. Jarai, B.M., **Fromen, C.A.,** Inert Particles for Enhancing the Survival of Primary Macrophage**.** Immune Modulation & Engineering Symposium. Virtual (Drexel). November 11-13, 2020.
6. Stillman, Z.S., Jarai, B.M., *Attia, L.*, Decker, G.E., Bloch, E.D., **Fromen, C.A.**, Triggered Intracellular Release from Ph-sensitive Metal-organic Framework Nanoparticles For Pulmonary Drug Delivery. CRS 2020 Virtual Annual Meeting. June 29-July 2, 2020. On-Demand Talk.
7. **Fromen, C.A.,** Enszer, J.A. "Putting Course Design Principles to Practice: Creation of an Elective on Vaccines and Immunoengineering." ASEE 2020 Virtual Annual Meeting. June 22-26, 2020.
8. Stillman, Z.S., Decker, G.E., *Attia, L.*, Bloch, E.D., **Fromen, C.A.,** Understanding particle size measurements of UiO-66 via defectiveness. ACS Annual Spring Meeting, INORG: Chemistry of Materials, Philadelphia, PA, March 26, 2020. **conference canceled due to SARS_COV2*
9. Jarai, B.M., Stillman, Z.S., Decker, G.E., *Attia, L., Abbas, S.*, Bloch, E.D., **Fromen, C.A.,** Utilizing UiO-66 Metal-Organic Frameworks (MOFs) As Pulmonary Drug Delivery Vehicles. AIChE Annual Conference, Bionanotechnology for Drug Delivery, Orlando, FL, United States, November 2019.
10. Kolewe, E.L., Feng, Y., **Fromen, C.A.,** Realizing Lobe-Specific Targeting of Aerosols in a 3D Printed Lung Model. BMES Annual Meeting, Modeling the Respiratory System and Drug Delivery, Philadelphia, PA, October 18, 2019.
11. Zhao, J., Feng, Y., **Fromen, C.A.,** Hayati, H., The Impact of Glottis Abduction and Adduction on Particle Transport and Deposition in a Human Upper Airway Model. Third Aerosol Dosimetry Conference. Irvine, CA, October 2019.
12. Decker, G.E., Stillman, Z.S., **Fromen, C.A.,** Bloch, E.D. Particle size and defect control in nanoparticulate UiO-66 via modulator-free synthetic conditions. 258th ACS National Meeting & Exposition, San Diego, CA, United States, August 25-29, 2019.
13. Vandjelovic, N.D. (DO), Briddell, J.W. (MD), **Fromen, C.A.,** *Peterman, E.*, Johnston, D.R. (MD), Reilly, J.S. (MD), A geometric model to explain the beneficial impact of lingual frenotomy for ankyloglossia in breastfeeding women. Society for Ear, Nose, and Throat Advances in Children Annual Meeting. Houston, Texas, December 2018.

--Work Prior to University of Delaware--

14. Fish, M.B., **Fromen, C.A.,** Scott, T.F., Adili, R., Holinstat, M., Eniola-Adefeso, O., Impact of Particle Modulus on Vascular-Targeted Drug Delivery In Vitro and In Vivo. Oral Presentation in Polymer Applications & Characterization in the Biomedical Industry. ACS 253rd National Meeting, San Francisco, CA, April 2017.

15. *Noble, J., Zimmerman, A.*, **Fromen, C.A.,** Toll-like Receptor (TLR)-functionalized nanoparticle adjuvant carriers toward optimized vaccine formulations and immune-modulators. Oral Presentation in Biomaterials Faculty Candidates session at AIChE Annual Conference, San Francisco, CA, November 2016.

16. **Fromen, C.A.,** Fish, M.B., *Zimmerman*, A., Adili, R., Holinstat, M., Eniola-Adefeso, O., Evaluation of Vascular Targeted Carriers Designed with Dual Ligand Strategies to Target an Inflamed Endothelium. Oral Presentation at Bionanotechnology session at AIChE Annual Conference, San Francisco, CA, November 2016. ***Session's Best Presentation.***

17. **Fromen, C.A.,** Shen, T.W., Rahhal, T.B., Kai, M.P., Robbins, G.R., Luft, J.C., DeSimone, J.M., Particle Surface Properties of Pulmonary Drug Delivery Vehicles Impact their Distribution and Cellular Association. Oral presentation in Biomaterials for Drug Delivery session, AIChE Annual Conference, Salt Lake City, UT, November 2015.

18. **Fromen, C.A.,** Robbins, G.R., Shen, T.W., Kai, M.P., Ting, J.P.Y., DeSimone, J.M., Surface Properties of Nanoparticle Vaccines for Potent Pulmonary Mucosal Immunity. Oral Presentation in Biomaterials for Immunological Applications Session. AIChE Annual Conference, Atlanta, GA, November 2014.

19. **Fromen, C.A.,** DeSimone, J.M., Co-opting Moore's Law: Design of Shape-Specific Particulate-Based Vaccines and Therapeutics. Annual Chapel Hill Pharmaceutical Sciences Conference, Chapel Hill, NC, May 2014. ***Substitute Speaker for Plenary Lecture.***

20. **Fromen, C.A.,** Robbins, G.R., Shen, T.W., Kai, M.P., Ting, J.P.Y., DeSimone, J.M., Nanoparticle Designs for Pulmonary Vaccines. Annual Chapel Hill Pharmaceutical Sciences Conference, Chapel Hill, NC, May 2014. ***Leaf Huang Research Award for Best Oral Presentation, Third Place.***

21. **Fromen, C.A.,** Pulmonary Delivery of PRINT Nanoparticles for Novel Vaccine Strategies. Council for Chemical Research Annual Meeting, Alexandria, VA, May 2014. ***Invited Talk as Student Leader.***

22. **Fromen, C.A.,** Pulmonary Delivery of PRINT Therapeutics. NCSU Shoenborn Symposium, Raleigh, NC, February 2014. ***Third Place Oral Presentation Winner.***

23. **Fromen, C.A.,** Mueller, S.N., Roberts, R.A., Shen, T.W., Robbins, G.R., Allen, I.C., Mooney, H.J., Luft, J.C., Ting, J.P.Y., DeSimone, J.M., Nanoparticle Design for Vaccine Delivery. Oral Presentation in Biomaterials Faculty Candidates Session. AIChE Annual Conference, San Francisco, CA, November 2013.

24. Shen, T.W., **Fromen, C.A.,** Roberts, R.A., Allen, I.C., Luft, J.C., Ting, J.P.Y., DeSimone, J.M., Tailoring Macrophage Uptake of Inhaled Particles for Pulmonary Delivery Applications. International Society for Aerosols in Medicine 2013, Chapel Hill, NC, April 2013. *First Place Student Award.*

Conference Poster Presentations

1. Attia, L., **Fromen, C.A.,** Evaluation of UiO-66 Nanoparticles as Pulmonary Drug Delivery Vehicles. NCSU Future Leaders in Chemical Engineering Symposium. Raleigh, NC October 26, 2020.

2. Peterman, E.L., **Fromen, C.A.,** Integrating Computational and *In Vitro* Modeling Techniques to Elucidate Mechanisms of Pulmonary Drug Delivery. NCSU Future Leaders in Chemical Engineering Symposium. Raleigh, NC October 26, 2020.

3. Minahan, D., Donzati, M., **Fromen, C.A.,** Gleghorn, J.P. Tracking Nanoparticle Deposition And Dynamics In An Ex Vivo Neonatal Mouse Lung To Guide Therapeutic Nanoparticle Design. ATS International Conference, Philadelphia, PA, May 2020. **conference canceled due to SARS_COV2*

4. Kolewe, E.L., Briddell, J.W., **Fromen, C.A.** Aerosol Deposition Patterns in 3D Printed Pediatric Throat Replicas. ATS International Conference, Philadelphia, PA, May 2020. **conference canceled due to SARS_COV2*

5. Kolewe, E.L., Feng, Y., **Fromen, C.A.** Assessment of Regional Aerosol Deposition in 3D Printed Lung Replicas. ATS International Conference, Philadelphia, PA, May 2020. **conference canceled due to SARS_COV2*

6. Kolewe, E.L., *Peterman, E.L.,* Feng, Y., **Fromen, C.A.** Assessment Of Regional Aerosol Deposition In 3D Printed Lung Replicas. ATS International Conference, Philadelphia, PA, May 2020. **conference canceled due to SARS_COV2*

7. Stillman, Z.S., Decker, G.E., *Attia, L.*, Bloch, E.D., **Fromen, C.A.,** Tuning Uio-66 Particle Size, Defectiveness, and Fluorescence Via Modulation of Water and Ligand Equivalents. AIChE Annual Conference, Orlando, FL, November 2019.

8. *Attia, L.,* Stillman, Z.S., Decker, Bloch, E.D., **Fromen, C.A.,** Evaluating the Fluid and Aerodynamic Properties of Uio-66 Nanoparticles. AIChE Annual Conference, Orlando, FL, United States, November 2019. *Second Place Student Award - Materials Science and Engineering*.

9. *Raman, N.,* Stillman, Z.S., **Fromen, C.A.,** Modulation of Adjuvant Loading and Degradation Profiles of Biocompatible Polymeric Nanoparticles for Immune Stimulation. AIChE Annual Conference, Orlando, FL, United States, November 2019. *First Place Student Award - Food, Pharmaceutical and Biotechnology.*

10. *Peterman, E.L.,* Kolewe, E.L., **Fromen, C.A.,** Utilizing Endotracheal Tubes to Modulate Particle Deposition Profiles in a 3D-Printed Lung Model. AIChE Annual Conference, Orlando, FL, United States, November 2019.

11. *Lane, K.,* **Fromen, C.A.,** Ford Versypt, A.N., A Systems Biology Model of Myeloid-Derived Suppressor Cells and Cancer Immunotherapy. AIChE Annual Conference, Orlando, FL, United States, November 2019.

12. *Bartlett, B.,* Feng, Y., **Fromen, C.A.,** Ford Versypt, A.N., Computer Modeling of Aerosol Diffusion through Lung Mucosa. AIChE Annual Conference, Orlando, FL, United States, November 2019. *Third Place Student Award - Computing, Simulation and Process Control.*

13. *Peterman, E.L.*, Kolewe, E.L., **Fromen, C.A.,** Utilizing Endotracheal Tubes to Analyze and Manipulate Particle Deposition in a 3D-Printed Lung Model, BMES Annual Meeting, Philadelphia, PA, October 18, 2019.

14. *Papoutsakis, E.*, **Fromen, C.A.,** Culture of Epithelial Cell Monolayers on 3D Printed Surfaces Towards Development of a Novel *In Vitro* Respiratory Deposition Tool, BMES Annual Meeting, Philadelphia, PA, October 18, 2019.

15. *Attia, L.,* Stillman, Z., Decker, J., Jarai, B.M., Bloch, E., **Fromen, C.A.,** Fluid and Aerodynamic Properties of UiO-66 Nanoparticles with Varying Defectiveness and Cargo-Loading, BMES Annual Meeting, Philadelphia, PA, October 18, 2019.

16. *Raman, N.,* Stillman, Z.S., **Fromen, C.A.,** Modulation of Adjuvant Loading and Degradation Profiles of Biocompatible Polymeric Nanoparticles for Immune Stimulation, BMES Annual Meeting, Philadelphia, PA, October 18, 2019.

17. *Attia, L.*, Stillman, Z., Decker, J., Jarai, B.M., Bloch, E., **Fromen, C.A.,** Fluid and Aerodynamic Properties of UiO-66 Nanoparticles with Varying Defectiveness and Cargo-Loading, Biotechnology and Biomedical Career Fair Poster Reception, Newark, DE, October 2019. *Third Place Student Award.*

18. Kolewe, E.L., Feng, Y., Briddell, J., **Fromen, C.A.,** Realizing Localized Aerosol Targeting: Right and Left Lung Deposition. International Society of Aerosols in Medicine, Montreux, Switzerland, May 2019.

19. Zhao, J., Liu, L., **Fromen, C.A.,** Feng, Y. Predicting Transport and Deposition of Inhaled Microparticles in an Elastic Lung Model. BMES/FDA Frontiers in Medical Devices Conferences, College Park, MD, April 2019.

20. *Abbas, S.,* Stillman, Z., Decker, J., *Attia, L.*, Bloch, E., **Fromen, C.A.,** Loading UIO-66 MOF with Fluorescent Molecules for Drug Delivery. Undergraduate Poster Session at AIChE Annual Conference, Pittsburgh, PA, November 2018.

21. *Attia, L.*, Stillman, Z., *Abbas, S.,* Decker, J., Bloch, E., **Fromen, C.A.,** Evaluating Metal-Organic Frameworks as Pulmonary Drug Delivery Vehicles, Undergraduate Poster Session at AIChE Annual Conference, Pittsburgh, PA, November 2018.

22. **Fromen, C.A.,** Jarai, B., Stillman, Z., *Noble, J., Zimmerman, A.,* Engineered Nanotherapeutics for Pulmonary Aerosol Delivery. ECI Nanotechnology in Medicine II, Albuferia, Portugal, June 2018.

--Work Prior to University of Delaware--

23. **Fromen, C.A.,** Engineering Intelligently Designed Nano- and Microparticles to Control Interactions with the Immune System. Poster Presentation at Meet the Faculty Candidate session at AIChE Annual Conference, San Francisco, CA, November 2016.

24. Fish, M.B., **Fromen, C.A.,** Scott, T.F., Adili, R., Holinstat, M., Eniola-Adefeso, O., Deformable Particles for Vascular-Targeted Drug Delivery: Softer is Not Always Better, Blue Green Seminar, East Lansing, October 2016. *First Place Poster Winner.*

25. **Fromen, C.A.,** *Noble, J.N., Zimmerman, A.,* Particle Surface Properties Direct Cellular Immune Responses in the Lung. Engineering Conferences International- Nanotechnology: from Molecules to Humans, Herrnstein, Austria, July 2016. ***Poster Presentation Winner.***

26. Fish, M.B., **Fromen, C.A.,** Adili, R., Holinstat, M., Eniola-Adefeso, O., Experimental Evaluation of Receptor-Ligand Interactions of Dual-Targeted Particles to Inflamed Endothelium. Engineering Conferences International- Nanotechnology: from Molecules to Humans, Herrnstein, Austria, July 2016.

27. Fish, M.B., **Fromen, C.A.,** Adili, R., Holinstat, M., Eniola-Adefeso, O., Evaluation of Ligand-Receptor Interactions of Dual-Targeted Particles to a Diseased Endothelium. UM Chemical Engineering Graduate Symposium, Ann Arbor, MI, May 2016.

28. **Fromen, C.A.,** Shen, T.W., Rahhal, T.B., Kai, M.P., Robbins, G.R., Luft, J.C., DeSimone, J.M., Evaluating the Role of Particle Surface Properties on their Distribution and Cellular Association Following Pulmonary Delivery. Poster presentation at Nano Drug Delivery Symposium (NanoDDS), Seattle, WA, September 2015.

29. **Fromen, C.A.,** Robbins, G.R., Rahhal, T.B., Kai, M.P., Shen, T.W., Luft, J.C., Ting, J.P.Y., DeSimone, J.M., The Role of Nanoparticle Surface Charge in the Generation of Mucosal and Systemic Antibody Responses Following Pulmonary Delivery. Poster Presentation at International Congress of Mucosal Immunology (ICMI), Berlin, Germany, July 2015.

30. Rahhal, T.B., **Fromen, C.A.,** Shen, T.W., Luft, J.C., DeSimone, J.M., Inhaled Particle Technology for Nerve Agent Inactivation. Poster Presentation at Translational Medicine Symposium, Chapel Hill, NC, April 2015. *Third Place Poster Presentation Winner.*

31. Shen, T.W., **Fromen, C.A.,** Kai, M.P., Roberts, R.A., Luft, J.C., Ting, J.P.Y., DeSimone, J.M., Distribution and clearance of PRINT particles in the lung. Annual Chapel Hill Pharmaceutical Sciences Conference, Chapel Hill, NC, May 2014. *Leaf Huang Research Award for Best Poster Presentation, First Place.*

32. **Fromen, C.A.,** Fabrication of Engineered, Monodisperse Particles for Respiratory Drug Delivery. Meet the Faculty Candidates Session. AIChE Annual Conference, San Francisco, CA, November 2013.

33. **Fromen, C.A.,** Shen, T.W., Mack, P., Garcia, A., Mitran, S., Napier, M.E., Maynor, B.W., DeSimone, J.M., Fabrication and Characterization of Engineered Particles for Respiratory Drug Delivery. North Carolina State University Graduate Research Symposium, Raleigh, NC, March 2012. ***Department Representative.***

34. **Fromen, C.A.,** Shen, T.W., Mack, P., Garcia, A., Mitran, S., Napier, M.E., Maynor, B.W., DeSimone, J.M., Fabrication and Characterization of Engineered Particles for Respiratory Drug Delivery. Drug Delivery to the Lungs 22, Edinburgh, Scotland, December 2011.

35. Garcia, A., Mack, P., Tully, J., **Fromen, C.A.,** Shen, T.W., DeSimone, J.M., Maynor, B.W., Microfabricated, engineered particles for respiratory drug delivery of proteins. American Association of Pharmaceutical Scientists (AAPS) Inhalation and Nasal Technology Focus Group (INTFG) Workshop, Baltimore, MD, September 2011.

36. **Fromen, C.A.,** Shen, T., Forman, N., Stiles, C., *Larus, A.,* Mitran, S., Napier, M., DeSimone, J., Characterizing shaped PRINT aerosols for pulmonary delivery. International Fine Particle Research

Institution General Meeting, Chapel Hill, NC, June 2011 *AND* UNC-CH Materials Research Society Chapter's (MRS) Graduate Poster Symposium, Chapel Hill, NC, August 2011. ***Award for Second Place.***

37. **Fromen, C.A.,** Pillai, J., Forman, N., Shen, T., Mitran, S., Napier, M., DeSimone, J. M., Engineered PRINT aerosols for pulmonary delivery. NCSU Shoenborn Symposium, Raleigh, NC, 2011. ***Award for Second Place.***
38. ***Fromen, C.A.,*** Cox, G. P., Marshall, K. L., Jacobs, S. D., Microencapsulation of doped, multilayer PCLC flakes for color reflective displays. University of Rochester Undergraduate Research Symposium, Rochester, NY, 2009. ***Professor's Choice Award.***

FUNDING

Direct funds generated in Fromen lab to date: $972,815

Current Research Support

1. PI: **Fromen, C.A.,** "Surface-functionalized nanoparticle adjuvants for pulmonary immune modulation" UD COBRE Phase II Project 4 Lead. COBRE PI Fox - Discovery of Chemical Probes and Therapeutic Leads. National Institutes of Health. Project Period: 8/10/2020-6/30/23. $1,500,000 total annual direct ($433,000 direct to Fromen).
2. PI: **Fromen, C.A.,** "Spatial measurement of aerosol deposition in 3D-printed structures" Delaware COBRE MRI Pilot Award. National Institutes of Health. Project Period: 8/1/2020-8/31/2021. $7,000 direct.
3. PIs: Kloxin, A.M., Lenhoff, A.M., **Fromen, C.A.**, "Cell Separation, Processing, and Expansion for Cell Therapy Applications" Project Call 3.1-132. National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL). Project Period: 1 year. 9/1/2020-8/31/2021. $343,750 direct. ($114,583 for Fromen lab).
4. PI: **Fromen, C.A.,** "Tuning degradation rates of dry powder hydrogel nanoparticle formulations to drive antigen-specific immune responses in the lung" 2020 Research Starter Grant in Pharmaceutics. PhRMA Foundation. Project Period: 02/01/2020-12/31/2021. $100,000 direct.

Completed Research Support

1. PI: Gleghorn, J.P. "Inhalable microparticles for the treatment of COVID-19 within the airspaces" ACCEL Rapid Science Grants Program. DE-CTR ACCEL Program, National Institutes of Health. Project Period: 7/1/2020 – 1/31/2021. $40,000 direct. ($18,982 for Fromen lab; role: co-I).
2. PI: **Fromen, C.A.,** "Aged to Perfection: Enhancing Survival of Antigen Presenting Cells for Cancer Therapies" Delaware INBRE Pilot Project. National Institutes of Health. Project Period: 12/3/2019-10/31/2021 (early end date of 7/31/20 due to Fox COBRE award). $160,000 direct.
3. PI: **Fromen, C.A.,** "Enhancing survival of phagocytes using inert-nanoparticle hydrogels" Delaware INBRE Core Center Access Award; DNA Sequencing & Genotyping Center and the CBCB Bioinformatics Core. National Institutes of Health. Project Period: 9/1/2019-5/1/2020. $8,000 direct.
4. PI: **Fromen, C.A.,** "Optimizing Nanoparticle Delivery to Lung Dendritic Cell Subsets for Development of New Pulmonary Therapeutics" 2018 UDRF Award. University of Delaware Research Foundation. Project Period: 6/1/2018-5/31/2020. $35,000 direct.
5. PIs: Bloch, E.D, **Fromen, C.A.,** "Molecularly-Defined Porous Nanoparticle Drug Carriers for Pulmonary Antimicrobial Therapeutics" UD COBRE Phase I Discovery pilot project. COBRE PI Fox - Discovery of Chemical Probes and Therapeutic Leads. National Institutes of Health. Project Period: 1/16/2019-5/31/2019. $97,500 ($48,750 direct for Fromen lab).
6. PIs: Bloch, E.D, **Fromen, C.A.,** "Design of Metal-Organic Cage Molecules for Aerosol Pulmonary Theranostics" UD COBRE Phase I Discovery pilot project. COBRE PI Fox - Discovery of Chemical Probes and Therapeutic Leads. National Institutes of Health. Project Period: 1/15/2018-5/31/2018. $95,000 ($47,500 direct for Fromen lab).

--Work Prior to Univ. Delaware--

7. PI: **Fromen, C.A.** "Nanoparticle adjuvant carriers for optimized vaccine designs and immune-modulators" UMOR Small Scale and Preliminary Projects Faculty Award. University of Michigan Office of Research. Project Period: 7/2016-5/2017. $17,650 direct.

RESEARCHERS SUPERVISED

Current Graduate Students

1. Areej Shahid — CBE PhD candidate — Fall 2020-present
2. Kartik Bomb — CBE PhD candidate, co-advised with A. Kloxin — Fall 2018-present
   Awards: 2019 Collins Chemical Engineering Fellow
3. Ian Woodward — CBE PhD candidate — Fall 2018-present
   Awards: 2019 Collins Chemical Engineering Fellow; UD CBE Qualifier commendation; 2019 NSF GRFP Honorable Mention; 2020 Robert L. Pigford Teaching Assistant Award
4. Bader Jarai — CBE PhD candidate — Fall 2017-present
   Awards: 2020-2021 CBE Teaching Fellow
5. Emily Kolewe — CBE PhD candidate — Fall 2017-present
   Awards: UD CBE Qualifier commendation, 2020-2021 CBE Teaching Fellow
6. Zachary Stillman — CBE PhD candidate — Fall 2017-present
   Awards: UD CBE Coursework commendation; 2019 G2/G3 CBI Fellow; 2019-20 Saurabh A. Palkar Graduate Award for Mentoring; 2020-21 Fraser and Shirley Russell Teaching Fellow

Current Undergraduate Students

1. Aaron Lam — CBE class of 2022 — Spring 2021-present
2. Saurav Padhye — CBE class of 2024 — Spring 2021-present
3. Simone Sabnis — BME class of 2023 — Spring 2021-present
4. Emma Peterman — CBE class of 2021 — Spring 2018-present
   Senior Thesis: Computational and *In Vitro* Modeling of Aerosol Diffusion Through Pulmonary Mucus to Optimize Viral Sponge Delivery for SARS-CoV-2 Treatment
   Awards: UD Summer Scholar 2019, 2020; UD Goldwater Nomination 2019; CUR 2020 Posters on the Hill Honorable Mention, UD Summer Scholar 2020, NCSU Future Leaders in Chemical Engineering 2020; 2021 NSF GRFP Awardee
5. Lucas Attia — CBE class of 2021 — Fall 2017-present
   Senior Thesis: Theoretical and Computational Modeling and Optimization of Fluid Flow through Regular Lattice Structures
   Awards: NASA DESG Summer Research Internship 2018, UD Summer Scholar 2019; UD Goldwater Nomination 2019; 2020-2021 Goldwater Scholar, NCSU Future Leaders in Chemical Engineering 2020, Harward Munson Fellowship 2021; 2021 NSF GRFP Awardee; 2021 DOE Computational Science Graduate Fellowship (CSGF)
6. Premal Patel — CBE class of 2021 — Fall 2017-present
   Senior Thesis: Modeling and Simulation of Porous Nanoparticle Diffusion and Mucosal Penetration

Former Graduate Students

1. Rickey Egan — MEPT Masters student — 2019-2020
   Awards: 2019-2020 UD Graduate Scholars Award

Former Undergraduate Students

1. Nisha Raman — CBE class of 2020 — Winter 2019-Spring 2020
   Senior Thesis: Modulating Immune Stimulation From TLR-Functionalized Nanoparticles to Optimize Adjuvant-Based Immunotherapies

Awards: McNair Scholar 2019; Harward Munson Fellowship 2020; COE Charles B. Evans Prize 2020

2. Ellie Papoutsakis — BME class of 2020 — Winter 2019-Spring 2020
   Senior Thesis: Culture of Epithelial Cell Monolayers on 3d Printed Surfaces Towards Development of a Novel In Vitro Respiratory Deposition Tool
   Awards: UD Summer Scholar 2019
3. Azeem Sharief — CBE class of 2021 — Fall 2017-Spring 2019
   Awards: UD Summer Scholar 2018
4. Shuja Abbas — CBE class of 2020 — Fall 2017-Winter 2019
   Awards: NASA DESG Summer Research Internship 2018
5. Daksh Jain — CBE class of 2021 — Fall 2017-Winter 2019
   Awards: UD Summer Scholar 2018
6. Justin Chernokal — CBE class of 2020 — Winter 2018-Winter 2019
   Awards: UD Summer Scholar 2018

Thesis Committees of Graduate Students

1.	Brian S. Bentley	Chemistry & Biochemistry PhD candidate, advisor Grimes	Fall 2020-present
2.	Joshua Jachuck	CBE PhD candidate, advisor Papoutsakis	Fall 2020-present
3.	Mackenzie Scully	BME PhD candidate, advisor Day	Spring 2020-present
4.	N'Dea Irvin-Choy	BME PhD candidate, advisor Day/Gleghorn	Spring 2020-present
5.	Christian Heil	CBE PhD candidate, advisor Jayaraman	Winter 2020-present
6.	Michael Donzanti	BME PhD candidate, advisor Gleghorn	Winter 2020-present
7.	Jessica Belliveau	CBE PhD candidate, advisor Papoutsakis	Winter 2020-present
8.	William Thompson	CBE PhD candidate, advisor Papoutsakis	Fall 2019-present
9.	Jonathan Otten	CBE PhD candidate, advisor Papoutsakis	Spring 2019-present
10.	Benjamin Luo	BME PhD candidate, advisor Day	Spring 2019-present
11.	Samantha Castle	CBE PhD candidate, advisor A Kloxin	Spring 2019-present
12.	Esther Roh	CBE PhD candidate, advisors Epps/Sullivan	Spring 2019-present
13.	Samik Das	CBE PhD candidate, advisor Papoutsakis	Spring 2019-present
14.	Megan Dang	BME PhD candidate, advisor Day	Spring 2019-present
15.	Dan Minahan	BME PhD candidate, advisor Gleghorn	Winter 2019-present
16.	Jay Decker	Chemistry PhD candidate, advisor Bloch	Spring 2018-present
17.	Colleen Fridley	CBE Masters candidate, advisors Sullivan/Kiick	Fall 2017-Aug 2019

Thesis Committees of Undergraduate Students

1.	Lucas Attia	CBE major, advisor Fromen	Spring 2020-present
2.	Emma Peterman	CBE major, advisor Fromen	Spring 2020-present
3.	Premal Patel	CBE major, advisor Fromen	Spring 2020-present
4.	Shirley Jin	CBE major, advisor Papoutsakis, second reader	Spring 2020-present
5.	Nisha Raman	CBE major, advisor Fromen	2019-2020
6.	Ellie Papoutsakis	BME major, advisor Fromen	2019-2020

CBI Rotation Graduate Students

1.	Teresa Cruz	Biology PhD candidate	Spring 2021
2.	Ellie Meck	Chemistry PhD candidate; D Watson	Fall 2020
3.	Stephanie Tsang	Chemistry PhD candidate; Fox	Fall 2020
4.	Joshua Jachuck	CBE PhD candidate; Papoutsakis	Spring 2020
5.	Samantha Gillis	Biology PhD candidate; Yien	Winter 2019
6.	Katherine Nelson	CBE PhD candidate; Gleghorn	Spring 2018

TEACHING EXPERIENCE

Courses Instructed

• CHEG 667/867 Vaccines & ImmunoEngineering	51 students; online	Spring 2021
• CHEG 341 Fluid Dynamics	97 students, core, online Mentored teaching fellow E. Kolewe	Fall 2020
• CHEG 667/867 Vaccines & ImmunoEngineering	32 students; online transition due to SARS-CoV-2	Spring 2020
• CHEG 341 Fluid Dynamics	78 students; co-taught with J. Tilton, core; Mentored teaching fellow J. Horner	Fall 2019
• CHEG 667/867 Vaccines & ImmunoEngineering	39 students; new elective	Spring 2019
• CHEG 341 Fluid Dynamics	69 students; co-taught with J. Tilton, core; Mentored teaching fellow K. Wiley	Fall 2018
• CHEG 341 Fluid Dynamics	86 students; co-taught with J.Tilton, core	Fall 2017

Guest Lectures

- CHEG 867–016/667-01 Advanced Cell Culture Biomanufacturing — Fall 2020
- HONR 267-081 Grand Challenges for Innovation and Society — Spring 2020
- HONR 267-081 Grand Challenges for Innovation and Society — Spring 2018

Teaching & Mentoring Workshops

- National Research Mentoring Network Culturally Aware Mentoring (CAM), virtual — January 2021
- Optimizing the Practice of Mentoring 101: For Research Mentors of Graduate Students, Fellows, and Early-Career Faculty, virtual (Univ. Minnesota) — December 2020
- Delivering Learning Experiences Online (DLEO) — July 2020
- Problem Based Learning (PBL) 2019, University of Delaware — January 2019

Student Advising

- UD Engineering Senior Design Mentor (Two teams) — Fall 2020
- Undergraduate Academic Advisor (24 students in class of 2022) — Fall 2018-present

PROFESSIONAL SERVICE

Membership in Professional Organizations

- Society for Women in Engineering (SWE) — 2020-present
- American Society for Engineering Education (ASEE) — 2020-present
- Biomedical Engineering Society (BMES) — 2019-present
- European Respiratory Society (ERS) — 2018-present
- American Association for Cancer Research (AACR) — 2018-present
- American Thoracic Society (ATS) — 2017-present
- American Association for the Advancement of Science (AAAS) — 2017-present
- American Chemical Society (ACS) — 2016-present
- International Society for Aerosols in Medicine (ISAM) — 2013-present
- American Institute of Chemical Engineers (AIChE) — 2009-present

Leadership Roles in Professional Organizations

- Women in ISAM Networking Chair — June 2019-present

Review Panels

- CDMRP Peer Review Medical Research Program PRMRP panel reviewer — 2020
- Ad hoc technical reviewer for Maryland Industrial Partnerships Program — 2020
- Ad hoc reviewer BSF (United States-Israel Binational Science Foundation) — 2020
- NSF GRFP panel member – Biomedical Engineering — 2020

- NSF DMR ad hoc member 2018

Invited Workshops

- "Physics to Pharma: Using Surfactant Driven Flows to Improve Inhaled Therapies –a translational workshop" Pittsburgh, PA. 13 total expert participants September 21-22, 2018

Workshop Organization

- ISAM 2020 Workshop Organizing Committee Member. Workshop in Philadelphia, PA, May 15, 2020. **conference canceled due to SARS_COV2* May 15, 2020

Conference Organization - Programming

- Area 22B Bionanotechnology Co-Chair in Nanoscale Science and Engineering Forum program, AIChE Annual Meeting, Boston, MA 2021 November 2021
- ACS 2021 Middle Atlantic Regional Meeting (MARM) "Diversity in Polymer Chemistry and Engineering" Session Organizer June 2021
- ISAM 2021 "Hot Topics" and "Best in Oral" Sessions Organizer May 2021
- ATS Respiratory Structure and Function (RSF) Assembly Programming Committee. ATS 2021 Annual Meeting, San Diego, CA, May 14-19, 2021. **virtual* May 2021
- Abstract Reviewer for Respiratory Bioengineering Track, BMES Annual Meeting, San Diego, CA 2020 **virtual due to SARS-CoV-2* October 2020
- Area 15D/E Drug Delivery Co-Chair in Engineering Fundamentals in Life Sciences program, AIChE Annual Meeting, San Francisco, CA 2020 **virtual due to SARS-CoV-2* November 2020
- Area 22B Bionanotechnology Co-Chair in Nanoscale Science and Engineering Forum program, AIChE Annual Meeting, San Francisco, CA 2020 **virtual due to SARS-CoV-2* November 2020
- Abstract Reviewer for BIOT Biomolecular Technology Area, ACS National Meeting, Philadelphia, PA 2020 **rescheduled due to SARS-CoV-2* March/August 2020
- Area 22B Bionanotechnology Co-Chair in Nanoscale Science and Engineering Forum program, AIChE Annual Meeting, Orlando, FL 2019 November 2019
- Abstract Reviewer for Respiratory Bioengineering Track, BMES Annual Meeting, Philadelphia, PA 2019 October 2019

Conference Organization – Session Chair or Co-Chair

- Session chair for: Area 8B "Plenary in Biomaterials" and Area 22B "Bionanotechnology Graduate Student Award Session". AIChE Annual Meeting, Boston, MA 2021 November 2021
- BIOT "Formulation strategies and novel routes of administration" and "How COVID-19 Changed My Research Path: The Good, the Bad, and the Ugly" Session Chair, ACS National Meeting, Atlanta, GA 2021 August 2021
- ISAM 2021 "Hot Topics" and "Best-in-Oral-Presentation" Session Chair May 2021
- Session chair for: Area 8B "Biomaterials for Drug Delivery: Controlled Release", "Biomaterials for Drug Delivery: Overcoming Barriers", "Biomaterials for Drug Delivery: New Approaches" Area 15D/E "Multi-scale Transport Considerations for Drug Delivery", and Area 22B "Bionanotechnology Graduate Student Award Session". AIChE Annual Meeting, virtual San Francisco, CA, 2020 **virtual due to SARS-CoV-2* November 2020
- BIOT Biomolecular Technology Area Session Chair, ACS National Meeting, Philadelphia, PA 2020 **conference postponed due to SARS_COV2* March 2020
- Area 22B "Bionanotechnology Graduate Student Award Session I and II" AIChE Annual Meeting, Orlando, FL 2019 November 2019
- Area 8B "Biomaterials for Immunological Applications", AIChE Annual Meeting, Orlando, FL 2019 November 2019
- Respiratory and Vascular Drug Delivery, BMES Annual Meeting, Philadelphia, PA 2019 October 2019
- Modeling the Respiratory System and Drug Delivery, BMES Annual Meeting, Philadelphia, PA 2019 October 2019

- PMSE Young Investigator Symposium, ACS National Meeting, Boston MA, 2018 August 2018

Journal Boards

- Inaugural Early Career Board Member *ACS Biomaterials Science and Engineering* Spring 2018-present

Journal Editor

- Guest Associate Editor, *Frontiers in Pharmacology* March 2020

Journal Reviewer

ACS Biomater Sci Eng, Sci Rep, Biochem Eng J, J Mater Chem B, PlosOne, Integrat Biol, Micromachines, Colloid Surface B, AIChE J, Pharmaceutics, Biomicrofluidics, J Polym Res, Mol Pharm, J Biomed Mater Res B, Nanoscale Advances, J Aerosol Sci, RCS Advances, Macromol Biosci, J Am Chem Soc, Eur J Pharm Biopharm, PNAS, Sci Advances, Nat Materials, Adv Therapeutics, J Royal Soc Interfaces, Adv Healthcare Materials, Exp Biol & Med, Colloids & Surfaces:B,

University of Delaware CBE Department Level Service

- UD CBE Safety Committee Member Fall 2019-present
- UD CBE Undergraduate Study Hall Faculty Leader Fall 2019-Spring 2020
- EmPOWER Faculty Member Mentor Fall 2018-present
- REACH Faculty Member Mentor Fall 2018-Spring 2019
- Faculty Search Committee Member Fall 2018-Spring 2019
- Fraser and Shirley Russel Graduate Teaching Fellow Committee Member Spring 2018-Spring 2019
- CBE Seminar Organizer Fall 2017-Spring 2019

University of Delaware Service

- Women in Engineering (WIE) Graduate Student Steering Group Faculty Advisor Summer 2020-present
- COE Young Faculty Chair Winter 2020-present
- Society of Women Engineers (SWE) Faculty Advisor Winter 2020-present
- COE Faculty Secretary November 2019-present
- Faculty Search Committee Member, UD Chemistry Dept. Inorganic Search Fall 2019-Spring 2020

Community Outreach

- NCS Outstanding Student Awards Ceremony 35U35 Panelist November 19. 2020
- Alpha Omega Epsilon's Engineering Discovery Day "What is Chemical Engineering" invited speaker. ~20 female high school participants. virtual November 7, 2020
- Fresh EGGG Podcast Guest Speaker (UD EGGG101 course) August 27, 2020
- MRS Bulletin Podcast Guest Speaker with Phillip Ball July 2020
- Science Café Presentation ""Breathe it in: the Next Generation of Inhaled Medicines" November 19, 2019
- UD COE K-12 Outreach Camp Lecturer Summer 2019
- Governor's School Guest Speaker July 2019
- UD CBE REACH Engineering Day Faculty Leader. ~30 high school participants. March 8, 2019
- Alpha Omega Epsilon's Engineering Discovery Day "What is Chemical Engineering" invited speaker. ~50 female high school participants. November 10, 2018
- Women Success Panel Member at University of Missouri's Women in Engineering Week. ~50 female and minority undergraduate participants. April 16, 2018
- UD GOLEAD "Why get a PhD" invited speaker. ~20 female undergraduate participants. April 14, 2018
- UD Rise and Science radio interview. Episode 76 "Journey to Professorship and Engineering Lung-Particle Interactions" November 2017
- UM ChE GradChat invited panelist in "How to get a Great Postdoc/Faculty Position" August 2016
- DeSimone Lab Organizer of UNC Science Expo Annual Booth, University of North Carolina at Chapel Hill 2011-2013
- Secretary of Chemical and Biomolecular Engineering Graduate Student Association, North Carolina State University 2010-2011