Catherine A. Fromen

Centennial Term Professor for Excellence in Research and Education
Department 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 HISTORY

Associate Professor — **Univ of Delaware, Newark DE**
Centennial Term Professor for Excellence in Research and Education — Fall 2024-Present
Department of Biomedical Engineering — Fall 2024-Present
Department of Chemical and Biomolecular Engineering — Fall 2022-Present

Assistant Professor
Department of Chemical and Biomolecular Engineering — Fall 2017-Summer 2022

Affiliated Faculty Member
Department of Biological Sciences — 2022
Sociotechnical Systems Center (SSC) — 2020
Center for Biomanufacturing Science and Technology (CBST) — 2020
Center for Research in Soft Matter and Polymers (CRiSP) — 2019
Chemistry-Biology Interface (CBI) NIH T-32 Program — 2018

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

CURRENT RESEARCH

My research group designs therapeutic pulmonary aerosols and advanced lung models by applying engineering fundamentals, biomaterials, innovative tools, advanced transport understanding, 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 particles for controlled pulmonary stimulation, vaccination, and anti-viral action
- Leveraging 3D printing, biomaterials, & computational fluid dynamics to advance transport understanding and develop new *in vitro* tools for pulmonary drug delivery testing and personalized inhaled medicine

AWARDS AND HONORS

- *Adv Drug Delivery Reviews* Emerging Voices in Drug Delivery — April 2023
- NSF CAREER Award Recipient — January 2023
- *Biomaterials Science* Emerging Investigator — September 2022
- AIChE DVS Outstanding Faculty Award — April 2022
- NIH NIGMS R35 Early Stage Investigator MIRA Recipient — June 2021
- Univ Delaware Honors College 2021 Excellence in Mentoring Award — May 2021
- *AIChE Journal* Futures Investigator — 2021
- *Journal of Materials Chemistry B* Emerging Investigator — 2021
- 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
- *Polymer Chemistry* Emerging Investigator — 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 2/19/2025) H-index: 23; Total citations: 1730
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*

Submitted Peer-Reviewed Manuscripts and Preprint Articles

1. López Ruiz, A., Slaughter, E., Bomb, K., LeValley, P.J., Yun, Z., McCoskey, J., Levine, K., Steen, J., Chatterjee, A., Carbrello, C., Chang, D., Fuseini, F., Abassi, Y.A., Lenhoff, A.M., **Fromen, C.A.#**, Kloxin, A.M#, Bio-functional hydrogel coated membranes to decrease T-cell exhaustion in manufacturing of CAR T-cells. *Submitted*

Peer-Reviewed Publications

2. Trautmann-Rodriguez, M., **Fromen, C.A.,** Nanoparticle-Based Pulmonary Immune Engineering. Annual Review of Chemical and Biomolecular Engineering. 16 (2025). *Accepted in pre-publication*

3. Yu, Y., Zhang, N., Hoffman, D., Rastogi, D., Woodward, I.R., **Fromen, C.A.,** Design and Evaluation of 3D-printed Lattice Structures as High Flow Rate Aerosol Filters. *ACS Applied Engineering Materials* 2:12 (2024) 2875–2884. [Journal Impact Factor: n/a, Citations 0].

4. Sudduth, E., Lopez Ruiz, A., Trautmann-Rodriguez, M., **Fromen, C.A.,** Age-Dependent Changes in Phagocytic Activity: in vivo Response of Mouse Pulmonary Antigen Presenting Cells to Direct Lung Delivery of Charged PEGDA Nanoparticles. *J Nanobiotechnology* 22 (2024) 476. [Journal Impact Factor: 10.6, Citations 0].

5. Woodward, I.R., Yu, Yinkui, **Fromen, C.A.,** Experimental Full-volume Airway Approximation for Assessing Breath-dependent Regional Aerosol Deposition. *Device* (2024) 100514. DOI: 10.1016/j.device.2024.100514 [Journal Impact Factor: n/a, Citations 0].

6. Graf, J.,* Bomb, K.,* Trautmann-Rodriguez, M., Jarai, B.M., *Gill, N.,* Kloxin, A.M.,# **Fromen, C.A.,#** Macrophage variance: investigating how macrophage origin influences responses to soluble and physical cues with immortalized vs. primary cells in 2D and 3D culture. *Frontiers in Biomaterials Science* 3 (2024) DOI: 10.3389/fbiom.2024.1399448 [Journal Impact Factor: n/a, Citations 1].

7. López Ruiz, A.,* Slaughter, E.,* Kloxin, A.M.,# **Fromen, C.A.,#** Bridging the gender gap in autoimmunity with T-cell targeted biomaterials. *Current Opinion in Biotechnology* 86 (2024) 103075 DOI: 10.1016/j.copbio.2024.103075 [Journal Impact Factor: 7.1, Citations 0].

8. Woodward, I.R., **Fromen, C.A.**, Recent developments in aerosol pulmonary drug delivery: new technologies, new cargos, and new targets. *Annual Reviews in Biomedical Engineering* 26 (2024) 307-330. DOI: 10.1146/annurev-bioeng-110122-010848. [Journal Impact Factor: 11.3, Citations 3].

9. *Bartlett, B.A.,* Feng, Y., **Fromen, C.A.,** Ford Versypt, A.N. Computational Modeling of Aerosol Particle Transport through Lung Mucosa. *Computers and Chemical Engineering* 179 (2023) 108458. [Journal Impact Factor: 4.3, Citations 4].

10. Graf, J., Trautmann-Rodriguez, M., *Sabnis, S.*, Kloxin, A.M.,# **Fromen, C.A.,#** On the Path to Predicting Immune Responses in the Lung: Modeling the Pulmonary Innate Immune system at the Air-Liquid Interface (ALI). *European Journal of Pharmaceutical Science.* 191 (2023) 106596 DOI:

10.1016/j.ejps.2023.106596. [Journal Impact Factor: 4.6, Citations 10].

11. Stillman, Z., Decker, G.E., Dworzak, M.R., Bloch, E.D., **Fromen, C.A.**, Aluminum-Based Metal-Organic Framework Nanoparticles as Pulmonary Vaccine Adjuvants. *Journal of Nanobiotechnology* 21:1 (2023) 1-20. DOI: 10.1186/s12951-023-01782-w. [Journal Impact Factor: 10.6, Citations 24].

12. Kolewe, E.L., *Padhye, S.*, Woodward, I.R., Feng, Y., Briddell, J.W., **Fromen, C.A.**, A pediatric upper airway library to evaluate interpatient variability of in silico aerosol deposition. *AAPS PharmSciTech* 24: (2023) 16. DOI: 10.1208/s12249-023-02619-3. [Journal Impact Factor: 4.3, Citations 6].

13. Jarai, B.M., Bomb, K., **Fromen, C.A.**, Nanoparticle Pre-treatment for Enhancing the Survival and Activation of Pulmonary Macrophage Transplant Therapy. *Drug Delivery and Translational Research* (2023) DOI: 10.1007/s13346-023-01319-6. **Selected "Best Paper" in July 2023 issue.** [Journal Impact Factor: 5.7, Citations 4].

14. Bomb, K.,* *Zhang, Q.*,* **Fromen, C.A.**,[#] Kloxin, A. M.,[#] Site-specific D-amino acid substitution to control peptide and hydrogel degradation in cellular microenvironments. *ACS Macro Letters.* 12 (2023) DOI: 10.1021/acsmacrolett.3c00144. [Journal Impact Factor: 7.0, Citations 6].

15. Sudduth, E.,* Trautmann-Rodriguez, M.,* Bomb, K., *Gill, N.*, **Fromen, C.A.,** Aerosol Pulmonary Immune Engineering. *Advanced Drug Delivery Reviews.* (2023) DOI: 10.1016/j.addr.2023.114831. ***Invited for 2023 Emerging Voices in Drug Delivery Issue*** [Journal Impact Factor: 17.9, Citations 20].

16. Bomb, K.,[*] LeValley, P.J.,[*] Woodward, I.R., Cassel, S.E., Yun, Z., Sutherland, B., Bhattacharjee, A., Steen, J., Kurdzo, E., McCoskey, J., Burris, D., Levine, K., Carbrello, C., Lenhoff, A.M., **Fromen, C.A.**,[#] Kloxin, A.M.[#] Cell therapy biomanufacturing: uniting biomaterial and flow-based membrane technologies for production of engineered T-cells, *Advanced Materials Technologies* (2023) 2201155. DOI: 10.1002/admt.202201155. [Journal Impact Factor: 8.9, Citations 3].

17. Hayati, H., Feng, Y., Chen, X., Kolewe, E.L., **Fromen, C.A.**, Prediction of Transport, Deposition, and Resultant Immune Response of Nasal Spray Vaccine Droplets using a CFPD-HCD Model in a 6-Year-Old Upper Airway Geometry to Potentially Prevent COVID-19. *Experimental and Computational Multiphase Flow* (2023). DOI: 10.1101/2022.11.08.515673 [Journal Impact Factor: 6.5, Citations 7].

18. Sudduth, E.R., Kolewe, E.L., Graf, J., Yu, Y., *Somma, J.*, **Fromen, C.A.,** Nebulization of Model Hydrogel Nanoparticles to Macrophages at the Air-Liquid Interface. *Frontiers in Chemical Engineering* 4 *(*2023), DOI: 10.3389/fceng.2022.1086031. [Journal Impact Factor: n/a, Citations 2].

19. Kolewe, E.L., *Padhye, S.*, Woodward, I.R., Wee, J., Rahman, T., Feng, Y., Briddell, J.W., **Fromen, C.A.**, Spatial aerosol deposition correlated to anatomic feature development in 6-year-old upper airway computational models. *Computers in Biology in Medicine* 149 (2022) 106058. DOI: 10.1016/j.compbiomed.2022.106058. [Journal Impact Factor: 6.7, Citations 10].

20. Roh, E, **Fromen, C.A.,**[#] Sullivan, M.O.[#] Inhalable mRNA vaccines for respiratory diseases: A roadmap. *Current Opinion in Biotechnology* 74 (2022) 104-109. DOI: 10.1016/j.copbio.2021.10.017 [Journal Impact Factor: 7.8, Citations 18].

21. Jarai, B.M., **Fromen, C.A.** Nanoparticle Internalization Promotes the Survival of Primary Macrophages. *Advanced NanoBiomed Research* 2:5 (2022) 2100127. DOI: 10.1002/anbr.202100127 [Journal Impact Factor: 3.4, Citations 17].

22. Bomb, K., Pradhan, L., *Qi, Z.*, Jarai, B.M., Bhattacharjee, A., Burris, D., Kloxin, A.M.,[#] **Fromen, C.A.,**[#] Destructive fibrotic teamwork: how both microenvironment stiffness and profibrotic Interleukin 13 impair alveolar macrophage phenotype and function. 10:19 *Biomaterials Science* (2022) 5689-5706. DOI: 10.1039/D2BM00828A ***Invited for 2022 Emerging Investigators Series***. [Journal Impact Factor: 7.6, Citations 10].

23. Woodward, I.R., **Fromen, C.A.** Scalable, process-oriented beam lattices: generation, characterization, and compensation for open cellular structures. *Additive Manufacturing* 48A (2021) 102386 DOI: 10.1016/j.addma.2021.102386 [Journal Impact Factor: 11.6, Citations 18].

24. Woodward, I.R., *Attia, L.M., Patel, P.* **Fromen, C.A.** Scalable 3D Printed Lattices for Pressure Control in Fluid Applications. *AIChE Journal* 67:12 (2021) e17452 DOI: 10.1002/aic.17452. ***Invited for 2021 Futures Series***. [Journal Impact Factor: 4.2, Citations 23].

25. Kolewe, E.L., Feng, Y., **Fromen, C.A.,** Realizing Lobe-Specific Aerosol Targeting in a 3D Printed *In Vitro* Lung Model. *Journal of Aerosol Medicine and Pulmonary Delivery* 33:0 (2020) 1-15. DOI: 10.1089/jamp.2019.1564. ***Selected as a Rosalind Franklin Society Award***. [Journal Impact Factor: 3.4, Citations 25]

26. Jarai, B.M., Stillman, Z., **Fromen, C.A.** Hydrogel Nanoparticle Degradation Influences the Activation and Survival of Primary Macrophages. *Journal of Materials Chemistry B* 9 (2021) 7246-7257. 10.1039/D1TB00982F ***Invited for 2021 Emerging Investigators Themed Issue***. [Journal Impact Factor: 7.6, Citations 8].

27. 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 Biomaterials Science and Engineering* 7:5 (2021) 1742–1764. DOI: 10.1021/acsbiomaterials.0c01287. ***Selected as ACS Editors' Choice feature article.*** [Journal Impact Factor: 5.4, Citations 17].

28. 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: 3.8, Citations 25].

29. *Peterman, E.L.*, Kolewe, E. L., **Fromen, C.A.,** Evaluating Regional Pulmonary Deposition Using Patient-Specific 3D Printed Lung Models. *JOVE Bioengineering* 165 (2020) e61706. DOI:10.3791/61706 [Journal Impact Factor: 1.4, Citations 6].

30. 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 Applied Materials and Interfaces* 12:35 (2020) 38989-39004. DOI: 10.1021/acsami.0c10900 [Journal Impact Factor: 10.4, Citations 137].

31. 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 and Molecular Bioengineering* 13 (2020) 259-284. DOI: 10.1007/s12195-020-00637-w. [Journal Impact Factor: 3.3, Citations 13].

32. 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. *International Journal of Pediatric Otorhinolaryngology* 134 (2020) 110063. DOI: 10.1016/j.ijporl.2020.110063. [Journal Impact Factor: 1.6, Citations 2].

33. 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. *Computers in Biology and Medicine* 116 (2020) 103532. DOI: 10.1016/j.compbiomed.2019.103532 [Journal Impact Factor: 6.7, Citations 53].

34. Stillman, Z.S., Jarai, B.M., *Raman, N., Patel, P.*, **Fromen, C.A.,** Degradation Profiles of Poly(ethylene glycol) diacrylate (PEGDA)-based hydrogel nanoparticles. *Polymer Chemistry* 11:2 (2020) 568-580. ***Invited for 2020 Emerging Investigators Collection***. [Journal Impact Factor: 5.4, Citations 67].

35. 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. *Chemistry of Materials* 31:13 (2019) 4831-4839. *co-first authors, #co-corresponding authors [Journal Impact Factor: 10.5, Citations 67].

--Work Prior to University of Delaware--

36. 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) 7:17 eabe0143 [Journal Impact Factor: 5.0, Citations 35].

37. 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: 5.4, Citations 12].

38. 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: 9.7, Citations 73].

39. **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: 18.0 Citations 92].

40. *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: 5.4, Citations 12].

41. 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: 14.0, Citations 63].

42. 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: 5.4, Citations 24].

43. **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: 6.5, Citations 169].

44. **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: 7.4, Citations 37].

45. 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: 18.0, Citations 63].

46. 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: 4.6, Citations 52].

47. 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: 4.2, Citations 19].

48. 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: 4.2, Citations 63].

49. **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: 12.8, Citations 157].

50. **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: 4.2, Citations 28].

51. 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: 2.8, Citations 99].

52. 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: 4.3, Citations 53].

53. 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: 3.2, Citations 4].

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. Auguste, D., **Fromen, C.A.,** Gindy, M., Heller, D., Koppes, A., Lovell, J., McVey, S., Nguyen, J., Reker, D., Rouphael, N., Shukla, A., Suh, J., "Delivery on Target: Transforming Vaccines and Biologics Delivery" Catalyzing Across Sectors to Advance the Bioeconomy (CASA-Bio) Initiative. October (2024). https://www.casa-bio.net/

2. **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.

3. **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. *Patent Pending:* Trautmann-Rodriquez, M., **Fromen, C.A.,** Use of Synthetic Nanoparticles for the Amplification and Composition Control of Phagocyte-Generated Extracellular Vesicles. as U.S. Patent Application Serial No.: 63/677,438. Provisional Submitted July 30, 2024.

2. *Patent Pending:* Sudduth, E., **Fromen, C.A.,** Butler, N., Mayhugh, C., Kunjapur, A. Nitration of Foreign

Antigens can Increase their Immunogenicity. U.S. Patent Application Serial No.: 63/656,559. Provisional Submitted Jun 5, 2024.

3. *Patent Pending:* Pradhan, L., Kloxin, A.M., **Fromen, C.A.,** Swedzinski, S., Cassel, S., Sutherland, B., Bomb, K. Light-Triggered Wound Mimicking System. U.S. Patent Application Serial No.: 63/595,549. Provisional Submitted Nov 2, 2023.
4. *Patent Pending:* **Fromen, C.A.,** Woodward, I.R., A Modular Approximation for Whole-Lung Volume Spatial Deposition Measurements. PCT application (WO 2023/086355 A1). Published May 19, 2023. U.S. Patent Application Serial No.: 63/278,131. Submitted Nov 9, 2022.
5. *Provisional not pursued:* 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, 2021.
6. *Provisional (not converted):* **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--

7. 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. **Fromen, C.A.** "The Next Frontier in Inhalation Modeling: Developing Experimental Tools to Capture Disease-Specific Whole-Lung Deposition and Cellular Responses" 2025 ISAM Congress. College Park, MD. June 22-26, 2025. *Invited Workshop Speaker.*
2. **Fromen, C.A.** "From the Desimone lab to my own lab: The latest adventures in nanoparticles, lung robots, and pulmonary immune engineering" 2025 ACS Spring Annual Meeting. San Diego, CA. March 23-27, 2025. *Invited for Joe DeSimone 60th Birthday Celebration.*
3. **Fromen, C.A.,** "Designing Inhalable Nanoparticles to Direct Innate Immune Cell Responses in the Lung". 12th Annual Symposium of the Center for Targeted Therapeutics and Translational Nanomedicine. (CT3N) at Univ Pennsylvania. Philadelphia, PA. December 6, 2023. *Invited Speaker.*
4. **Fromen, C.A.,** "Evaluating design parameters for aerosol immune engineering using polymeric and metal-organic framework nanoparticles" 2023 AIChE Annual Meeting. Drug and Gene Delivery Session. Orlando, FL. November 5-10, 2023. *Invited Plenary Speaker.*
5. Woodward, I.R., Yu, Y., **Fromen, C.A.,** "Single and Multiphase Flows in Well-Defined Periodic 3D-Printed Lattices" 2023 AIChE Annual Meeting. 3D Printing Fundamentals and Applications Session. Orlando, FL. November 5-10, 2023. *Invited Speaker.*
6. **Fromen, C.A.**, "Engineering Novel Therapeutics for Controlled Immune Stimulation in the Lung" 2023 5th Annual Inhalation & Respiratory Drug Delivery Congress USA. San Diego, CA. October 2-3, 2023. *Invited Speaker.*
7. **Fromen, C.A.**, "Total Inhalable Deposition in an Actuated Lung Model" 2022 World Congress for Biomechanics. Biofluid and Transport 2: Experimental track, Airway Flows and Lung Transport Session. Taipei, Taiwan, July 10-14, 2022. *Invited Speaker.*
8. **Fromen, C.A.**, "Untangling the Pro-fibrotic loop in Pulmonary Fibrosis: Synergy between substrate stiffness and soluble factors promotes alternative activation of macrophages" 2022 Nanotechnology in Medicine III: Enabling Next Generation Therapies. Calabria, Italy. May 15-20 2022. *Invited Speaker*
9. **Fromen, C.A.**, "Nanoparticle Physiochemical Design Features to Modulate Pulmonary Innate Immune Cell Response" 2021 AIChE Annual Meeting. Bionanotechnology Plenary. Boston, MA, November 7-19,

2021. *Invited Plenary Speaker*

10. **Fromen, C.A.**, Woodward, I.R., Attia, L., Patel, P. "Scalable 3D Printed Lattices for Pressure Control in Fluid Applications" 2021 AIChE Annual Meeting. *AIChE J* Futures: New Directions in Chemical Engineering Session. Boston, MA, November 7-19, 2021. *Invited Speaker*
11. **Fromen, C.A.** "Prologue: Predictive or Non-Predictive, What Works for Special Delivery Routes?" (recorded) and "Remaining Needs for Experimental Models in Pulmonary Delivery" (live) AAPS PharmSci 360 Annual Meeting. Clinical Pharmacology – Chemical Track. Philadelphia, PA. Oct 17-20, 2021. *Invited Prologue Speaker*
12. 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*
13. **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.*
14. **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.*
15. **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.*
16. **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.*
17. **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.,** Department of Chemical Engineering. University of Washington. Seattle, WA. April 15, 2025.
2. **Fromen, C.A.,** "Tailoring Therapeutics for the Lung: Engineering Strategies for a Complex Environment." Department of Chemical Engineering. University of Houston. Houston, TX. February 7, 2025.
3. **Fromen, C.A.,** "Engineering Approaches Towards Diversifying Inhalable Therapeutics." Department of Chemical and Biomolecular Engineering. North Carolina State University. Raleigh, NC. Nov 8, 2024.
4. **Fromen, C.A.,** "Engineering Approaches Towards Diversifying Inhalable Therapeutics." Department of Pharmaceutical Sciences. University of Maryland School of Pharmacy. Baltimore, MD. October 18, 2023. *Invited Department Speaker*
5. **Fromen, C.A.,** "ISAM Webinar: What is needed to realize aerosol immune-engineering?" Virtual Webinar. March 30, 2023. *Invited ISAM Webinar Speaker*
6. **Fromen, C.A.**, "Breathe it in: Engineering Approaches Towards Diversifying Inhalable Therapeutics." Department of Chemical and Biological Engineering, Princeton University. Princeton, NJ. November 8, 2022. *Invited Department Seminar Speaker.*
7. **Fromen, C.A.**, "Breathe it in: Engineering Approaches Towards Diversifying Inhalable Therapeutics." Department of Bioengineering, Northeastern University. Boston, MA. October 5, 2022. *Invited Department Seminar Speaker.*
8. **Fromen, C.A.**, "Breathe it in: Engineering Approaches Towards Diversifying Inhalable Therapeutics"

Department of Pharmaceutics, Virginia Commonwealth University. Richmond, VA. November 12, 2021. *Invited Department Seminar Speaker.*

9. **Fromen, C.A.,** "Applications of Chemical Engineering in Designing Inhalable Therapeutics" American Institute for Chemical Engineers – Delaware Valley Section – Professional Development Hour. November 30, 2021. *Invited PDH Speaker.*
10. **Fromen, C.A.**, "Breathe it in: Engineering Approaches to Realize Pulmonary Vaccines" Department of Chemical Engineering, Stanford University. Palo Alto, CA. October 11, 2021. *Invited Department Seminar Speaker.*
11. **Fromen, C.A.**, "Breathe it in: Engineering Approaches to Realize Pulmonary Vaccines" Chemical Engineering Program, Arizona State University. Tempe, AZ. September 20, 2021. *Invited Department Seminar Speaker.*
12. **Fromen, C.A.**, "Regulating Innate Immune Cell Response and Longevity through Nanoparticle Physiochemical Design Features" Department of Biological Sciences, University of Delaware. Newark, DE. September 27, 2021. *Invited Department Seminar Speaker.*
13. **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.*
14. **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~*
15. **Fromen, C.A.,** "Breathe it in: Engineering Approaches to Improve Inhalable Medicines" Department of Chemical Engineering, Carnegie Mellon University. Pittsburgh, PA. March 19, 2020. *Invited Department Seminar Speaker. * postponed due to SARS_COV2. ~Virtual visit October 13, 2020~*
16. **Fromen, C.A.,** "Engineering Approaches to Improve Inhalable Medicines" Junior Investigators Network (JIN) Call, DE INBRE. March 19, 2020. *Invited Speaker.*
17. **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*
18. **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.*
19. 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.*
20. **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.*
21. **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. Slaughter, E., López Ruiz, A., Yun, Z., McCoskey, J., Steen, J., Almasian, J., Chatterjee, A., Fuseini, A., Chang, D., Carbrello, C., Abassi, Y., Lenhoff A., **Fromen, C.A.,** Kloxin, A., Harnessing Tangential Flow Filtration and Hydrogels to Enhance Transduction and Select Distinct Populations for CAR T Manufacturing. 2024 AIChE Annual Meeting. San Diego, CA. October 26-31, 2024.
2. Graf, J., Moore, D., **Fromen, C.A.,** Kloxin, A., Grimes, C., A High Throughput, Versatile Approach for

Probing Macrophage Responses to Microenvironment Cues in 3D Bioprinted Synthetic Extracellular Matrices. 2024 AIChE Annual Meeting. San Diego, CA. October 26-31, 2024.

3. López Ruiz, A., Slaughter, E., LeValley, P., Yun, Z., McCoskey J., Levine, K., Chatterjee, A., Carbrello, C., Chang, D., Abassi, Y., Lenhoff, A., Kloxin, **Fromen, C.A.,** Engineering Hydrogel Coated Membranes to Modulate Activation and Transduction of T-Cells. 2024 AIChE Annual Meeting. San Diego, CA. October 26-31, 2024.
4. Sudduth, E., López Ruiz, A., Trautmann-Rodriguez, M., **Fromen, C.A.**, Age Matters: in vivo Charged PEGDA Nanoparticle Phagocytotic Capacity of Murine Pulmonary Antigen Presenting Cells via Direct Lung Delivery. 2024 BMES Annual Meeting. Baltimore, MD. October 23-26, 2024.
5. McCauley, P., **Fromen, C.A.,** Bayles, A., Plug-and-play patterning: bioprinting via rheologically-dictated advective assembly extrusion. The Society of Rheology 95th Annual Meeting. Austin, TX. October 13th to 17th, 2024.
6. Slaughter, E., López Ruiz, A., Yun, Z., Bomb, K., LeValley, P., McCoskey, J., Levine, K., Chatterjee, A., Chang, D., Carbrello, C., Abassi, Y., Lenhoff, A., **Fromen, C.A.,*** Kloxin, A.M.,* "Tangential flow filtration device flow patterns enhance T-cell transduction for CAR T-cell manufacturing" 2024 ACS BIOT Annual Meeting. New Orleans, LA. March 17-21, 2024.
7. López Ruiz, A., Slaughter, E., Yun, Z., Bomb, K., LeValley, P., McCoskey, J., Levine, K., Chatterjee, A., Chang, D., Carbrello, C., Abassi, Y., Lenhoff, A., **Fromen, C.A.,*** Kloxin, A.M.,* "Production of Cell Therapies: Integration of co-stimulatory ligands with hydrogel coated membranes to activate and transduce T cells" 2024 ACS BIOT Annual Meeting. New Orleans, LA. March 17-21, 2024. ***Selected as Best of BIOT***
8. Trautmann-Rodriguez, M., Sabnis, S., Gill, N.A., **Fromen, C.A.,** "Macrophage Internalization of PEGDA Nanoparticles Drives Secretion of Pro-Survival Signals" 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023.
9. López-Ruiz, A. Bomb, K., Slaughter, E., LeValley, P.J., Yun, Z., McCoskey, J., Levine, K., Carbrello, C., Lenhoff, A.M., **Fromen, C.A.,** Kloxin, A.M., "Flow-Based Membrane Technology to Engineer T-Cells" 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023.
10. Sudduth, E., **Fromen, C.A., "**Desirable Formulations for Inhalable Particulate Immunotherapeutics Using Model Peg-Based Nanoparticles" 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023.
11. Woodward, I.R., **Fromen, C.A.**, "Multi-Order Combinatorial Lattices for Spatial Control of Transport Phenomena" 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023.
12. Woodward, I.R., **Fromen, C.A.**, "Directionally Dependent Fluid Behavior from Uniform Periodic Structures: Influence of Design and Additive Process Parameters" 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023.
13. **Fromen, C.A.,** Hot Topics: Inhalable Aerosol Immune Engineering. 2023 AAPS Annual Meeting. Orlando, FL. October 22-25, 2023.
14. **Fromen, C.A.,** How Professionals Keep Work-Life Balance and What is Work-Culture? 2023 AAPS Annual Meeting. Orlando, FL. October 22-25, 2023.
15. **Fromen, C.A.,** Construction of a Full Airway Volume "Total Inhalable Deposition in an Actuated Lung" (TIDAL) Model for Approximating Spatial Deposition Under Breathing Profiles. Drug Delivery to the Lungs (DDL) 2022. Edinburgh, Scotland. December 7-9, 2022. *Selected Podium Talk.*
16. Woodward, I.R., **Fromen, C.A.,** Understanding multiphase behavior of additively manufactured lattices: Developing *in vitro* tools for personalized inhalable medicine. AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
17. Woodward, I.R., **Fromen, C.A.,** Directionally dependent fluid behavior from uniform periodic structures: Influence of design and additive process parameters. AIChE Annual Meeting, Phoenix, AZ, November 13-

18, 2022.

18. Kolewe, E.L, **Fromen, C.A.,** Computational Fluid Particle Dynamics Illuminates Developmental Anatomical Feature Influence on Aerosol Deposition Patterns in 6-Year-Old Upper Airway CT-Scan Models. AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
19. Bomb, K., Kloxin, A.M., **Fromen, C.A.,** Combining Tunable Biomaterials and Flow-Based Membrane Technologies for Improved Biomanufacturing of T Cell Therapies. AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022. ***Third place Graduate Student Award in Biomaterials***
20. Bomb, K., Kloxin, A.M., **Fromen, C.A.,** Probing Synergistic Effect of Substrate Stiffness and Profibrotic Soluble Cues on Macrophage Response. BMES Annual Meeting. San Antonio, TX, October 12-15, 2022.
21. **Fromen, C.A.,** Inhalable Aluminum-based Metal Organic Framework Nanoparticles as Humoral Pulmonary Adjuvants. BMES Annual Meeting. San Antonio, TX, October 12-15, 2022.
22. **Fromen, C.A.,** Scalable 3D Printed Lattices for Control in Fluid and Aerosol Applications. POLY: E.V. Murphree Award in Industrial and Engineering Chemistry in Honor of Joseph Desimone. ACS Spring 2022, San Diego, CA, March 23, 2022.
23. Kolewe, E.L., Padhye, S., Woodward, I.R., Briddel, J., Feng, Y., **Fromen, C.A.**, Spatial deposition and larynx developmental analysis of 6 year-olds through Computational Fluid Particle Dynamics. Society for Computational Fluid Dynamics of the Nose & Airway (SCONA) Virtual Meeting, January 28, 2022.
24. Woodward, I.R., *Attia, L., Patel, P.,* **Fromen, C.A.,** Design and Processing of Open Lattice Structures for Tunable Fluid Phenomena. AIChE Annual Meeting, Boston, MA, November 7-19, 2021.
25. Jarai, B.M., **Fromen, C.A.,** Internalization of Nanoparticles Enhances the Survival of Primary Macrophages. Northeast Regional IDeA Conference (NERIC), Lightning Talk- Technology Section. Virtual, August 2021. ***First place Lightning Talk Award.***
26. **Fromen, C.A.,** Nanoparticle-induced Regulation of Primary Macrophage Survival. CRS Annual Meeting, Virtual, July 25-29, 2021.
27. LeValley, P.J., Bomb, K., Sutherland, B., Steen, J., Kurdzo, E., Du, Z., Carbrello, C., Lenhoff, A.M., **Fromen, C.A.**, Kloxin, A. M., Combining flow-based membrane and tunable biomaterial technologies to improve the scalability and efficiency of biomanufacturing approaches for cell therapies. ACS Annual Meeting, BIOT Division, Virtual, August 2021.
28. 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.
29. 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.
30. 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.
31. 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.***
32. 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.
33. 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.
34. **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.

35. 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*

36. 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.

37. 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.

38. 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.

39. 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.

40. 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--

41. 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.

42. *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.

43. **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.***

44. **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.

45. **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.

46. **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.***

47. **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.***

48. **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.***

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

50. **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.

51. 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. Somma, J., Padhye, S., Briddell, J., **Fromen, C.A.,** Using 3D Printing to Correlate Tonsil Size to Aerosol Deposition in the Upper-Airways. 2024 AIChE Annual Meeting. San Diego, CA. October 26-31, 2024.

2. Trautmann-Rodriguez, M., Sudduth, E., Sabnis, S., Gill, N., **Fromen, C.A.**, PEGDA NP Internalization by Bone-Marrow Derived Macrophages Drives Extracellular Vesicle Secretion, Inducing a Pro-Survival Response. 2024 BMES Annual Meeting. Baltimore, MD. October 23-26, 2024.

3. Mayhugh C.; Butler, N.; Sudduth, E.R.; Trautmann-Rodriguez, M.; **Fromen, C.A.**; Kunjapur, A.M.; Nitration of a foreign antigen can elicit a stronger immune response. BMES Annual Meeting. Baltimore, MD. October 2024.

4. Hoffman, D., Woodward, I.R., Yu, Y., **Fromen, C.A.**, Enhancing Pulmonary Drug Delivery with the TIDAL Model: A New Approach to In Vitro Aerosol Dosimetry. Fourth Aerosol Dosimetry Conference; Inhaled Aerosol Dosimetry: Advances, Applications and Impacts on Risk Assessment and Therapeutics. UC Irvine, Irvine, CA. October 16-18, 2024.

5. Trautmann-Rodriguez, M., Sabnis, S., Gill, N., **Fromen, C.A.**, PEGDA NP Internalization by Bone-Marrow Derived Macrophages Drives Extracellular Vesicle Secretion, Inducing a Pro-Survival Response. 2024 Drug Carrier Design for Cell and Tissue Specific Delivery Gordon Conference. Portland, ME. August 4-9, 2024.

6. Kloxin, A.M., Slaughter, E., López Ruiz, A., Yun, Z., Bomb, K., LeValley, P., McCoskey, J., Levine, K., Chatterjee, A., Chang, D., Carbrello, C., Abassi, Y., Lenhoff, A., **Fromen, C.A.**, PC 5.2T-108 Flow-based membrane technology to engineer T-cells. NIIMBL 2024 National Meeting. Washington DC. June 27, 2024.

7. López-Ruiz, A., **Fromen, C.A.**, Kloxin, A.M., McEnnis, K. Engineering Biomaterials for Women's Health. 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023.

8. Gill, N., Trautmann-Rodriguez, M., **Fromen, C.A.,** Designing Nanoparticle-Loaded Aerosols for Controlled Interactions with Pulmonary Immune Cells for Treatment of Respiratory Diseases. 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023. *Third Place Student Award - Food, Pharmaceutical and Biotechnology.*

9. Padhye, S., **Fromen, C.A.,** Modeling the Impact of Pediatric Tonsil Size on Aerosol Deposition and Drug Delivery. 2023 AIChE Annual Meeting. Orlando, FL. November 5-10, 2023. *First Place Student Award - Food, Pharmaceutical and Biotechnology.*

10. Woodward, I.R., Yu, Y., **Fromen, C.A.**, Development of an *in vitro* Full-volume Airway Approximation for Assessing Breath-dependent regional aerosol deposition. ISAM Congress, Saarbrucken, Germany, August 27-30, 2023.

11. Sudduth, E.R., **Fromen, C.A.**, Designing Inhalable Particulate Immunotherapies using Relevant In Vitro Models. CRS Annual Meeting, Las Vegas, NV, July 24-28, 2023.

12. López-Ruiz, A., Bomb, K., Slaughter, E., LeValley, P.J., Yun, Z., McCoskey, J., Levine, K., Carbrello, C., Lenhoff, A.M., **Fromen, C.A.*** and Kloxin, A.M.,* Flow-based membrane technology to engineer T-cells.

CRS Annual Meeting, Las Vegas, NV, July 24-28, 2023.

13. **Fromen, C.A.,** Woodward, I.R., Yu, Y., Approximating Spatial Deposition in a Full Volume 3D-Printed Model of the Human Lung Under Physiological Breathing Profiles. ATS Annual Meeting, Washington DC, May 19-24, 2023.
14. *Padhye, S.* Kolewe, E.L., Feng, Y., Briddell, J.W., **Fromen, C.A.**, Effects of Patient Age on Simulated Aerosol Particle Deposition in the Upper Airways of Pediatric Patients. AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
15. Jarai, B.M., Bomb, K., **Fromen, C.A.,** Nanoparticle-pretreatment to regulate pulmonary macrophage transplant survival and *in situ* phenotype. BMES Annual Meeting. San Antonio, TX, October 12-15, 2022.
16. Jarai, B.M., Bomb, K., **Fromen, C.A.,** Nanoparticle-induced Regulation of Pulmonary Macrophage Transplant Survival. 2022 Controlled Release Society Annual Meeting. Montreal, Canada, July 11-14, 2022.
17. Bomb, K., Kloxin, A.M., **Fromen, C.A.**, Establishment of a mechanically and biochemically tunable culture platform to probe key factors in macrophage responses during the initiation and progression of fibrosis. 2022 SFBiomaterials Annual Meeting. Baltimore, MD, April 27-30, 2022.
18. Woodward, I.R., **Fromen, C.A.** Next-gen devices: Design, processing, and fluid behavior of scalable 3D printed lattices. 2021 Merck Emerging Talent Symposium. November 4, 2021. Virtual.
19. Bomb, K., LeValley, P.J., Sutherland, B., Steen, J., Kurdzo, E., Du, Z., Carbrello, C., Kloss, C., Lenhoff, A.M., **Fromen, C.A.**, Kloxin, A.M. Combing flow-based membrane and tunable biomaterials technologies to improve the scalability and efficiency of biomanufacturing approaches for cell therapies. 2021 Merck Emerging Talent Symposium. November 4, 2021. Virtual.
20. Kolewe, E.L., Feng, Y., Briddell, J., **Fromen, C.A.** Throat Deposition Variations with Pediatric Airway Development *In Silico*. ISAM Congress. Boise ID and virtual, May 22-26, 2021.
21. Stillman, Z.S., Jarai, B.M., Decker, G.E., *Attia, L.,* Bloch, E.D., **Fromen, C.A.,** Utilizing Tunable, Acid-Degradable UiO-66 Metal-Organic Framework (MOF) Nanoparticles for Pulmonary Drug Delivery. ISAM Congress. Boise ID and virtual, May 22-26, 2021.
22. *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.
23. *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.
24. 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*
25. 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*
26. 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*
27. 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*
28. 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.

29. *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.*

30. *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.*

31. *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.

32. *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.

33. *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.*

34. *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.

35. *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.

36. *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.

37. *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.

38. *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.*

39. 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.

40. 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.

41. *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.

42. *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.

43. **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--

44. **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.

45. 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.*

46. **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.***

47. 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.

48. 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.

49. **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.

50. **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.

51. 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.*

52. 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.*

53. **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.

54. **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.***

55. **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.

56. 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.

57. **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.***

58. **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.

59. ***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 for Fromen lab to date: $3,298,807

Current Research Support

1. W911NF2520036 PI: Kloxin, A. M., co-PI: **Fromen, C.A.**, "Incorporating immune response into high-throughput bioprinted skin and lung models for medical counter measure development" CB11437 DTRA CBM subcontract through U.S. Army Contracting Command – Aberdeen Proving Ground – Research Triangle Park Division (ACC-APG-RTP Division). Project Period: 1/15/2025-1/15/2027. $600,000 total, $382,902 direct.
2. W911NF2420135 PI: **Fromen, C.A.**, "Development of an Autonomous Inhalation Robot for Chem/Bio (AIR-CB) for real-world estimation of aerosolized threats" U.S. Army Contracting Command – Aberdeen Proving Ground – Research Triangle Park Division (ACC-APG-RTP Division). Project Period: 6/1/2024-5/31/2025. $244,143 total, $153,497 direct.
3. PI: Bayles, A., (co-I **Fromen, C.A.,)** "Optimizing 3D printing nozzle geometry to improve cell viability and resolution in extrusion-based bioprinting" Univ Delaware Research Foundation-Strategic Initiative (UDRF-SI). Project Period: 2/1/2024-1/31/2026. $55,000 total.
4. PI: **Fromen, C.A.**, co-PI Kloxin, A., "Engineering functional macrophage immune cells for persistent phenotype and survival" Univ Delaware Institute for Engineering Driven Health. Project Period: 7/1/2023-6/30/2025. $146,867 total.
5. 2237430 PI: **Fromen, C.A.**, "CAREER: Aerosol transport in well-defined periodic porous metamaterials" National Science Foundation – Division of Chem, Bioeng, Env & Transp Sys (CBET). Project Period: 2/1/2023-1/31/2028. $615,000 total.
6. PC5.2-108. PIs: Kloxin, A.M., Lenhoff, A.M., **Fromen, C.A.**, "PC5.2-108 Innovative scalable technologies for production of cell therapies" National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL). Project Period: 1/1/2023-6/30/2025. $1,000,000 total (~$215,000 for Fromen lab).
7. 1R35GM142866 PI: **Fromen, C.A.,** "Multiscale considerations for immune engineering at mucosal interfaces" National Institutes of Health – National Institute for General Medicine. Project Period: 7/2/2021- 05/31/2026. $2,000,000 total, $1,250,000 direct.

Completed Research Support

1. 12A00448; PI: Kloxin, A., CoPI: **Fromen, C.A.**, Industrial Partner: Inventia Life Science; State of Delaware through the Delaware Biotechnology Institute (DBI) Bioscience Center for Advanced Technology (CAT) program. Project Period: 9/1/2023-08/31/2024. $100,000 (plus $100,000 in-kind match)
2. P200A210065 Project Director: Blenner, M., (Co-Director: **Fromen, C.A.**) "GAANN: Inclusive Teaching in Chemical Engineering (ITChE)" US Department of Education. Project Period: 10/1/2021 – 9/30/2024. $910,188.
3. PI: **Fromen, C.A.,** "Epigenetic changes following the internalization of PEGDA nanoparticles in murine primary macrophages" Delaware INBRE Core Center Access Award; DNA Sequencing & Genotyping Center. National Institutes of Health. Project Period: 2/19/2024-8/15/2024. $3,900 direct.
4. 8A00279 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. 9/1/2020-2/28/2022. $343,750 direct. ($114,583 for Fromen lab).

5. 20A00066 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.
6. P20GM104316B 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 lab). (early end date of 9/30/20 due to R35 award).
7. 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.
8. 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).
9. 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.
10. 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.
11. 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.
12. 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).
13. 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--

14. 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.	Dhana Mahadik *Awards:* 2024 Rama Marda Scholar	BME PhD candidate	Winter 2025-present
2.	Logan Whitesel	BME PhD candidate	Winter 2025-present
3.	Katherine Austin *Awards:* 2024 NSF GRFP Fellow	CBE PhD student	Fall 2024-present
4.	Richard Zhang	CBE PhD student, co-advised w/M. Sullivan	Fall 2024-present
5.	Kyle Hess	Chem PhD student, co-advised w/BJ Chain	Spring 2024-present

Awards: 2024 CBI G2 Fellow

6. Sam Fine — CBE PhD student, co-advised w/M. Blenner — Fall 2023-present
   Awards: 2024 CBI G2 Fellow
7. Dominic Hoffman — CBE PhD student — Fall 2023-present
8. Lisa Bain — CBE PhD student — Fall 2023-present
   Awards: 2023 NSF GRPF Fellow
9. Jodi Graf — CBE PhD student, co-advised w/A. Kloxin — Fall 2022-present
   Awards: 2023 Collins Chemical Engineering Fellow; 2023 NSF GRPF Fellow
10. Eric Slaughter — CBE PhD student, co-advised w/A. Kloxin — Fall 2022-present
    Awards: 2024 CBE ITChE GAANN Fellow
11. Emma Sudduth — CBE PhD student — Spring 2022-present
    Awards: 2022 CBI G1 Fellow
12. Michael Trautmann-Rodriguez — CBE PhD candidate — Fall 2021-present
    Awards: 2023 CBE ITChE GAANN Fellow

Current Undergraduate Students

1. Vilina Akala — BME Class of 2027 — Fall 2024-present
2. Avery Tran — CBE Class of 2026 — Fall 2024-present
3. Adhya Anilkumar — BME class of 2026 — Summer 2023-present
4. Joaquina Somma — CBE class of 2025 — Spring 2022-present
   Awards: UD Summer Scholar 2022; NCCR Bio-Inspired Materials Summer Research Assistant (Switzerland) 2023

Current Postdoctoral Trainees

1. Patrick McCauley — Univ Minnesota (M. Calabrese) — Sept 2023-present
   Awards: UD EDH Postdoctoral Research Award 2023
2. Aida López-Ruiz — NJIT Chemical Eng (K. McEnnis) — Jan 2023-present
   Awards: MIT CHEME Rising Stars Program Attendee 2023

Graduate Student Alumni

1. Yinkui Yu — CBE Masters graduate Winter 2024 — Fall 2021-Winter 2024
   Thesis: Design, Manufacturing, and Implementation of 3D-printed Lattice Structures in Aerosol Filtration
   Awards: 2021 Collins Chemical Engineering Fellow; UD CBE Qualifier & coursework commendation
2. Ian Woodward — CBE PhD graduate Summer 2023 — Fall 2018-Summer 2023
   Dissertation: Additive Manufacturing and Open Lattice Structures for Applications in Chemical Engineering and Pulmonary Drug Delivery
   Awards: 2019 Collins Chemical Engineering Fellow; UD CBE Qualifier commendation; 2019 NSF GRFP Honorable Mention; 2020 Robert L. Pigford Teaching Assistant Award; 2022 CBE ITChE GAANN Fellow
3. Kartik Bomb — CBE PhD graduate Spring 2023, co-advised w/A. Kloxin — Fall 2018-Spring 2023
   Dissertation: Designing Hydrogel-Based Tunable Platforms to Investigate and Modulate Immune Cell Responses
   Awards: 2019 Collins Chemical Engineering Fellow; Saurabh A. Palkar Graduate Award for Mentoring Fellowship
   Currently: Research scientist at Merck
4. Emily Kolewe — CBE PhD graduation Spring 2023 — Fall 2017-Spring 2023
   Dissertation: In Silico/In Vitro Pulmonary Airway Models for Novel and Targeted Aerosols and

Inhalable Therapeutics

Awards: UD CBE Qualifier commendation, 2020-2021 CBE Teaching Fellow, 2021 NIH NHLBI F31 Fellowship Recipient "*Dynamic, Cellularized, 3D Printed Model Development for Aerosol Targeting in Pediatric JORRP Patients*". 2022 Rosalind Franklin Society Award.

Currently: Research scientist Fisher & Paykel Healthcare

5. Zachary Stillman — CBE PhD graduation Summer 2022 — Fall 2017-Summer 2022

Dissertation: Evaluating the Properties and Uses of Metal-Organic Framework (MOF) and Polymer Nanoparticles for Applications in Vaccines and Pulmonary Drug Delivery

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

Currently: Assistant Professor Teaching position, Univ Villanova, Chemical Engineering

6. Bader Jarai — CBE PhD graduation Spring 2022 — Fall 2017-Spring 2022

Dissertation: Engineering Nanoparticle Interactions with Innate Immune Cells to Develop Pulmonary Therapeutic Vehicles and Cell Therapies

Awards: 2020-2021 CBE Teaching Fellow

Currently: Research scientist at Janssen Pharmaceuticals

7. Rickey Egan — MEPT Masters student — 2019-2020

Awards: 2019-2020 UD Graduate Scholars Award

Currently: Research scientist at Johns Hopkins Applied Physics Laboratory

Undergraduate Student Alumni

1. Ansolei Taliaferro — Biol Sci, Del State Univ CHARM REU (co-advised w/Muir) — Summer 2024
2. Hannah Higgins — BME Class of 2025, Mercer Univ — Summer 2024
3. Ning Zhang — CBE class of 2024 — Summer 2023-present
4. Nicole Gill — CBE class of 2024 — Fall 2022-present

Senior Thesis: Characterization of Nanoparticle Loading in Aerosols for Pulmonary Nucleic Acid Delivery

Awards: UD Summer Scholar 2023, NSF GRFP Honorable Mention 2024

5. Saurav Padhye — CBE class of 2024 — Spring 2021-present

Senior Thesis: Modeling the Impact of Pediatric Tonsil Size on Aerosol Deposition and Pulmonary Drug Delivery

Awards: UD Summer Scholar 2021, 2022; NCSU Future Leaders in Chemical Engineering 2023

6. Simone Sabnis — BME class of 2023 — Spring 2021-present

Senior Thesis: Identification of Pro-Survival Signal Secretions from Macrophages Treated with PEG-Based Nanoparticles

Awards: UD Summer Scholar 2021

7. Hannah Bockius — BME class of 2023 — Spring 2021-Winter 2023
8. Emmanuel Ortiz — CBE class of 2026, UD Rise — Summer 2022
9. Brendan Boggs — CBE class of 2022 — Summer 2021-Spring 2022
10. Aaron Lam — CBE class of 2022 — Spring 2021- Spring 2022

Awards: UD Summer Scholar 2021

11. Emma Peterman — CBE class of 2021 — Spring 2018-Spring 2021

Senior Thesis: Computational and *In Vitro* Modeling of Aerosol Diffusion Through Pulmonary Mucus to Optimize Viral Sponge Delivery for SARS-CoV-2 Treatment

Awards: 1743 Distinguished Scholarship; 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; 2021 Charles B. Evans Prize; 2021 AAUP-UD Student Award

Currently: PhD student at MIT Chemical Engineering (PI Galloway)

12. Lucas Attia — CBE class of 2021 — Fall 2017- Spring 2021
    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 (deferred); 2021 DOE Computational Science Graduate Fellowship (CSGF); 2021 AAUP-UD Student Award
    Currently: PhD student at MIT Chemical Engineering (PI Doyle)

13. Premal Patel — CBE class of 2021 — Fall 2017- Spring 2021
    Senior Thesis: Modeling and Simulation of Porous Nanoparticle Diffusion and Mucosal Penetration
    Currently: Associate Software Engineer, Veeva Systems

14. 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; 2023 NSF GRFP recipient
    Currently: Associate Scientist Merck

15. 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
    Currently: Masters of Science and Business Program at Rutgers

16. Azeem Sharief — CBE class of 2021 — Fall 2017-Spring 2019
    Awards: UD Summer Scholar 2018

17. Shuja Abbas — CBE class of 2020 — Fall 2017-Winter 2019
    Awards: NASA DESG Summer Research Internship 2018

18. Daksh Jain — CBE class of 2021 — Fall 2017-Winter 2019
    Awards: UD Summer Scholar 2018

19. Justin Chernokal — CBE class of 2020 — Winter 2018-Winter 2019
    Awards: UD Summer Scholar 2018

Postdoc Alumni

1.	Dewansh Ragosti	Univ Maryland College Park (A. Asa-Awuku)	Jan 2024-Jun2024

Other Trainee Alumni

1.	Spencer Wolfe	CBE MSChE student	F22-S24
2.	Saiful Roslan	CBE MSChE student	F22-Sp24
3.	Daniel Liu	CBE MSChE student	F21-Sp23
4.	Teresa Cruz	BISC graduate student	Sp21-Su22
5.	Areej Shahid	CBE graduate student	W21-Su21

Thesis Committees of Graduate Students

1.	Sriram Tendulkar	CBE PhD candidate, advisor Day	Sp24-present
2.	Claire Lois	CBE PhD candidate, advisor Sullivan/A Kloxin	Sp24-present
3.	Rylee King	BISC MS student, advisor Parreno	Sp24-present
4.	DeVonte Moore	Chemistry PhD candidate, advisor A Kloxin/Grimes	F23-present
5.	Raghed Kurbaj	Chemistry PhD candidate, advisor Alperstein	Su23-present
6.	Bahar Bahramimeimandi	BME PhD candidate, advisor Gleghorn	Su23-present
7.	Luisa Fink	BME PhD candidate, advisor Gleghorn	Su23-present
8.	Shweta Burgula	CBE PhD candidate, advisor Jayaraman/A Kloxin	Sp23-present

9. Emily Doleh	CBE PhD candidate, advisor Blenner	Sp23-present
10. Erik Anderson	CBE PhD candidate, advisor Jayaraman	Sp23-present
11. Blake Richards	CBE PhD candidate, advisor Sullivan/Chen	Sp23-present
12. Austin Desmarais	Microbiology PhD candidate, advisor Kunjapur	Sp23-present
13. Hugo Hu	CBE PhD candidate, advisor Sullivan	Sp23-present
14. James Mullin	CBE PhD candidate, advisor Sullivan	Sp23-present
15. Rachel Silvestri	CBE PhD candidate, advisor Blenner	Sp23-present
16. Samantha Swedzinski	MSEG PhD candidate, advisor A Kloxin	Sp23-present
17. Harrison Lawson	ChemE CMU PhD student, advisor Wayne/Zheng	Sp23-present
18. Somdeepa Chakraborti	Biology PhD student, advisor Duncan	Sp22-present
19. Bree Huntington	CBE PhD candidate, advisor A Kloxin/Furst	Sp22-present
20. Christopher Mayhugh	CBE PhD candidate, advisor Kunjapur	F21-present
21. Akash Vaidya	CBE PhD candidate, advisor Solomon	Sp21-present
22. Elise Hoover	BME PhD candidate, advisor Day	Sp21-present
23. Brian S. Bentley	Chemistry PhD candidate, advisor Grimes	F20-present
24. Mackenzie Scully	BME PhD candidate, advisor Day	Sp20-F23
25. N'Dea Irvin-Choy	BME PhD candidate, advisor Day/Gleghorn	Sp20-S23
26. Christian Heil	CBE PhD candidate, advisor Jayaraman	W20-W23
27. Michael Donzanti	BME PhD candidate, advisor Gleghorn	W20-W24
28. Jessica Belliveau	CBE PhD candidate, advisor Papoutsakis	W20-Su23
29. William Thompson	CBE PhD candidate, advisor Papoutsakis	F19-Sp23
30. Jonathan Otten	CBE PhD candidate, advisor Papoutsakis	Sp19-present
31. Benjamin Luo	BME Masters graduate, advisor Day	Sp19-W21
32. Samantha Cassel	CBE PhD candidate, advisor A Kloxin	Sp9-Sp23
33. Samik Das	CBE PhD candidate, advisor Papoutsakis	Sp19-Sp23
34. Esther Roh	CBE PhD candidate, advisors Epps/Sullivan	Sp19-W22
35. Megan Dang	BME PhD graduate, advisor Day	Sp19-S22
36. Jay Decker	Chemistry PhD graduate, advisor Bloch	Sp18-Sp21

Thesis Committees of Undergraduate Students

1. Nicole Gill	CBE major, advisor Fromen	F23-Sp24
2. Saurav Padhye	CBE major, advisor Fromen	F23-Sp24
3. Simone Sabnis	BME major, advisor Fromen	F22-Sp23
4. Jacob Hewes	CBE major, advisor Sullivan, second reader	F22-Sp23
5. Tohn Borjigin	CBE major, advisor Sullivan, second reader	F21-Sp22
6. Nolan Petrich	CBE major, advisor C. Kloxin, second reader	F21-Sp22
7. Geoffrey Bonnanzio	CBE major, advisor Jayaraman, second reader	F21-Sp22
8. Lucas Attia	CBE major, advisor Fromen	F20-Sp21
9. Emma Peterman	CBE major, advisor Fromen	F20-Sp21
10. Premal Patel	CBE major, advisor Fromen	F20-Sp21
11. Shirley Jin	CBE major, advisor Papoutsakis, second reader	F20-Sp21
12. Nisha Raman	CBE major, advisor Fromen	F19-Sp20
13. Ellie Papoutsakis	BME major, advisor Fromen	F19-Sp20

Rotation Graduate Students

1. Dhana Mahadik	BME PhD candidate; Fromen	Winter 2025
2. Logan Whitesel	BME PhD candidate; Fromen	Winter 2025
3. Lauren Porter	BME PhD candidate; Oakes	Fall 2024
4. James MacAuley	BME PhD candidate; Jia	Fall 2024
5. Kyle Hess	Chemistry PhD candidate; Chain/Fromen	Fall 2023
6. Emma Sudduth	CBE PhD candidate; Fromen	Winter 2022
7. Teresa Cruz	Biology PhD candidate; Fromen	Spring 2021
8. Ellie Meck	Chemistry PhD candidate; D Watson	Fall 2020
9. Stephanie Tsang	Chemistry PhD candidate; Fox	Fall 2020
10. Joshua Jachuck	CBE PhD candidate; Papoutsakis	Spring 2020

11. Samantha Gillis	Biology PhD candidate; Yien	Winter 2019
12. Katherine Nelson	CBE PhD candidate; Gleghorn/Sullivan	Spring 2018

TEACHING EXPERIENCE

Courses Instructed

• CHEG 112 Intro to Chemical Engineering	112 students, core, with J. Enszer	Spring 2025
• CHEG 654/854 Vaccines & ImmunoEngineering	49 students, grad elective	Fall 2023
• CHEG 800 Graduate Seminar	78 students, core	Fall 2023
• CHEG 843 Rate Processes & Dynamics for Mammalian Cellular Systems	20 students, grad core, with Z. Stillman	Spring 2023
• CHEG 603/803 Science Communication	61 students, grad core, with A. Kloxin	Spring 2023
• CHEG 654/854 Vaccines & ImmunoEngineering	48 students, grad elective	Fall 2022
• CHEG 800 Graduate Seminar	47 students, core	Fall 2022
• CHEG 843 Rate Processes & Dynamics for Mammalian Cellular Systems	18 students, new core, with A. Kloxin	Spring 2022
• CHEG 603/803 Science Communication	56 students, new core, with A. Kloxin	Spring 2022
• CHEG 800 Graduate Seminar	42 students, new core	Fall 2021
• 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	Spring 2020
• CHEG 341 Fluid Dynamics	78 students; core; with J. Tilton Mentored teaching fellow J. Horner	Fall 2019
• CHEG 667/867 Vaccines & ImmunoEngineering	39 students; new elective	Spring 2019
• CHEG 341 Fluid Dynamics	69 students; core with J. Tilton Mentored teaching fellow K. Wiley	Fall 2018
• CHEG 341 Fluid Dynamics	86 students; core with J.Tilton,	Fall 2017

Guest Lectures

• CHEG 867–016/667-01 Advanced Cell Culture Biomanufacturing	Fall 2022
• CHEG 867–016/667-01 Advanced Cell Culture Biomanufacturing	Fall 2021
• 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

Participation in 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

• Undergraduate Academic Advisor (22 CHEG students in class of 2026)	F2022-present
• UD Engineering Senior Design Mentor (Two teams)	Fall 2020
• Undergraduate Academic Advisor (24 CHEG students in class of 2022)	F2018-Sp2022

PROFESSIONAL SERVICE

Membership in Professional Organizations

• Society for Biomaterials (SFBiomaterials)	2022-present

- American Association of Pharmaceutical Scientists (AAPS) 2021-present
- Controlled Release Society (CRS) 2020-present
- 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) 2018-2019
- 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

Participation in Professional Development Courses

- AIChE CH138VTL: Project Management for Chemical Engineers Sept 2022

Leadership Roles in Professional Organizations

- ISAM Board Member Summer 2023-present
- ISAM Award Committee Chair Spring 2021-present
- Women in ISAM Networking Chair Summer 2019-present
- AAPS Inhalation and Nasal Community (INC) Learning Opportunity Manager Fall 2021-present

Review Panels

- NSF CBET review panel member 2025
- NIH DBTD Standing Study Section Panel Member 2024-present
  - Panel dates: 10/24, 2/25,
- NIH NHLBI Catalyze ad hoc review panel member 2023
- NIH DBTD ad hoc review panel member 2023
- DE ACCEL Professional Development Core Pilot and MRDA Review 2023
- NASA HRP mail-in reviewer 2023
- NIH BBBT Small Business: Biomaterials, Delivery, and Nanotechnology review panel member 2023
- NSF CBET review panel member 2023
- Ad hoc consultant NIH NIGMS Council 2023
- National Science Centre Poland Proposal Evaluation 2021
- DE ACCEL Professional Development Core Pilot and MRDA Review 2021
- Ad hoc technical reviewer for European Science Foundation - Research Projects of the Research Foundation Flanders (FWO) 2021
- 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 2020
- NSF DMR review panel 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

- Personalized Health and Medicine for Vaccine and Biologics Delivery - Catalyzing Across Sectors to Advance the Bioeconomy. Co-Chair. Virtual Workshop. Final report: https://www.casa-bio.net/ "Delivery on Target: Transforming Vaccines and Biologics Delivery" Sept 8-13, 2024
- SCONA - Society for Computational fluid dynamics Of the Nose and Airway 2022. Co-Convener. Virtual workshop January 28, 2022 January 28, 2022
- 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

- 25th Annual ISAM Congress, Conference Co-President. Washington DC, 2025 — Sept 23-present
- Area 8B Biomaterials 2024 Chair, AIChE Annual Meeting, San Diego, CA 2024 — November 2024
- Area 8B Biomaterials 2023 Vice Chair, AIChE Annual Meeting, Orlando, FL 2023 — November 2023
- Area Coordinator, Biomedical Technologies. ACS BIOT Fall Annual Meeting San Francisco, CA 2023 — August 2023
- ATS Respiratory Structure and Function (RSF) Assembly Programming Committee. ATS 2023 Annual Meeting Washington, DC 2023 — May 2023
- Area 22B Bionanotechnology Co-Chair in Nanoscale Science and Engineering Forum program, AIChE Annual Meeting, Phoenix, AZ 2022 — November 2022
- ATS Respiratory Structure and Function (RSF) Assembly Programming Committee. ATS 2022 Annual Meeting — May 2022
- E.V. Murphee Award in Industrial and Engineering Chemistry Award Symposium, ACS Spring Meeting, POLY Division, San Diego, CA 2022 — March 2022
- 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 "Graduate Student Award Session in Biomaterials", AIChE Annual Meeting, San Diego, CA 2024 — November 2024
- Session chair for Area 8B Biomaterials "Biomaterials in the Clinic", AIChE Annual Meeting, Orlando, FL 2023 — November 2023
- Session chair for ATS Respiratory Structure and Function (RSF) RSF-TP03: Airway Injury And Repair: Mechanisms And Treatment. ATS 2023 Annual Meeting Washington, DC. — May 2023
- Session chair for: Area 8B "Plenary in Biomaterials" and Area 22B "Bionanotechnology Graduate Student Award Session" and "Bionanotechnology Plenary". AIChE Annual Meeting, Phoenix, AZ. — November 2022
- Poster judge and Young Scientist Committee Scientific Workshop for CRS 2022 Annual Meeting, Montreal CA — July 2022
- Session chair for BIOT "Imaging, Diagnostics, and Other Integrative Approaches to Study and Model Diseases" ACS BIOT Spring 2022. San Diego CA — March 2022
- Session chair for: Area 8B "Plenary in Biomaterials" and Area 22B "Bionanotechnology Graduate Student Award Session" and "Bionanotechnology Plenary". AIChE Annual Meeting, Boston, MA — November 2021

- Moderator "Preclinical Development/ Clinical Pharmacology 4" AAPS National Meeting, Philadelphia, PA 2021 — October 20, 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 2018-2021

Journal Editor

- Guest Editor for Special Edition "Respiratory Biomechanics" in *J Biomechanics* — 2024
- Guest Associate Editor, *Frontiers in Pharmacology* — March 2020

Journal Reviewer

PNAS, Sci Advances, Nat Materials, Adv Therapeutics, Adv Healthcare Materials, Exp Biol & Med, ACS Biomater Sci Eng, Sci Rep, Biochem Eng J, J Mater Chem B/C, PLOS One, 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, J Royal Soc Interfaces, Colloids & Surfaces:B, ASME Journal, Int J Pharmaceutics, Colloid & Polym Sci, Interface Focus, Advanced Materials, J Exposure Sci & Environ Epidemiol, Biomacromolecules, Cellular and Molecular Bioengineering, Biomaterials Sci, Pharm Res, Bioactive Materials, Additive Manufacturing, Matter, ACS Nano, PLOS Computational Biology, ACS Applied Nano Materials, Acta Biomaterialia, ACS Applied Materials, Aerosol Sci & Technol, Therapeutic Delivery, ACS Inorganic Chem, Adv Drug Deliv, J Biomedical Mat A,

University of Delaware CBE Department Service

- UD CBE Graduate Admissions Director — Summer 2023-present
- UD CBE ad hoc Bylaws Committee — Fall 2022-Spring 2023
- Faculty Mentor –A. Bayles (CBE) — Fall 2022-present
- Co-Chair of ad hoc UD CBE Community/Mentoring & Morale Committee — Spring 2021-Fall 2022
- UD CBE Safety Committee Member — Fall 2019-Summer 2023
- 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

- Engineering Driven Health Institute Steering Committee Member — Summer 2023-present
- Graduate College Council Committee Member — Summer 2023-present
- DCMR Faculty Mentor –Brian Kwee (BME) — Spring 2023-present
- 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 — Nov 19-Dec 22
- Faculty Search Committee Member, UD Chemistry Dept. Inorganic Search — Fall 2019-Spring 2020

External Mentorship

- Lexie Adams, Stanford PhD Student, ~1-2 meetings /semester — S23-present
- Mariah Arral, CMU PhD Student, ~2-3 meetings/semester — F20-present

Community Outreach

- Speaker at UD CHARM REU Seminar "How to read Scientific Literature" — June 2024
- Speaker at "From Postdoc to Faculty Position" Panel - Postdoctoral Association of Colorado, Boulder (PAC Boulder) — June 2023
- "Negotiating Faculty Compensation and Start-up" Panel – Postdoctoral Association of University of Delaware — March 2023
- Fresh EGGG Podcast Guest Speaker (UD EGGG101 course) — August 2021
- 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
- DE 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