Lauren D. Zarzar

The Pennsylvania State University
104 Chemistry
University Park, PA 16802

ldz4@psu.edu
(814) 865 -1316
www.zarzarlab.com

Academic Appointments

The Pennsylvania State University, University Park, PA

Associate Professor, Department of Chemistry, Department of Materials Science and Engineering (courtesy)	2022 - present
Assistant Professor, Department of Chemistry	2016 - 2022
Assistant Professor, Department of Materials Science and Engineering (courtesy)	2019 - 2022
Assistant Professor, Department of Materials Science and Engineering	2016 - 2018

Education

Harvard University, Cambridge, MA
Ph.D., Chemistry 2013
Advisor: Prof. Joanna Aizenberg
Dissertation: "Dynamic Hybrid Materials: Hydrogel Actuators and Catalytic Microsystems"

University of Pennsylvania, Philadelphia, PA
B.A., Chemistry from the College of Arts and Sciences 2008
B.S., Economics from the Wharton School 2008

Honors and Awards

Simons Foundation Pivot Fellowship	2023
Camille Dreyfus Teacher-Scholar Award	2022
Penn State Eberly College of Science Distinguished Mentoring Award	2022
American Chemical Society Polymeric Materials Science and Engineering (PMSE) Division Young Investigator Award	2021
National Science Foundation CAREER Award	2021
Marion Milligan Mason Award for Women in the Chemical Sciences (AAAS)	2020
Air Force Office of Scientific Research Young Investigator Program Award	2020
Sloan Research Fellowship	2020
Packard Fellowship for Science and Engineering	2019
Rustum and Della Roy Innovation in Materials Research Award (Penn State)	2019
American Chemical Society Chemical & Engineering News "Talented 12" Class of 2019	2019
Unilever Award, ACS Division of Colloid and Surface Chemistry	2019
Army Early Career Award for Scientists and Engineers (Army-ECASE)	2018
3M Non-Tenured Faculty Award	2018
Gladys Snyder Award (Penn State)	2018
Virginia S. and Philip L. Walker, Jr. Faculty Fellowship (Penn State)	2016
NSF and the Japan Society for the Promotion of Science, East Asia and Pacific Summer Institute Fellowship (EAPSI)	2013
American Chemical Society AkzoNobel Student Award in Applied Polymer Science	2011
National Defense Science and Engineering Graduate Fellowship (NDSEG)	2010
National Science Foundation Graduate Research Fellowship (NSF-GRFP)	2010
American Chemical Society Achievement Award, Philadelphia Section	2008
National Science Foundation Research Experiences for Undergraduates Fellowship	2007
Novartis Undergraduate Summer Research Fellowship at UPenn	2006

Past Research Experience

Massachusetts Institute of Technology, Department of Chemistry, Cambridge, MA 2013 – 2016
Postdoctoral Research Advisor: Prof. Timothy Swager
Investigated the chemical and physical properties of complex emulsions that dynamically reconfigure between encapsulated and Janus morphologies in response to changes in the balance of interfacial tensions

University of Tokyo, Department of Chemistry and Biotechnology, Tokyo, Japan Summer 2013
Research Advisor: Prof. Takashi Kato
Explored the self-assembly of functional liquid crystals and liquid crystal polymers within microscale patterned surface confinement

Harvard University, Department of Chemistry and Chemical Biology, Cambridge, MA 2008 – 2013

Graduate Research Advisor: Prof. Joanna Aizenberg
Investigated bio-inspired, chemo-mechanical actuation systems in which stimuli-responsive hydrogel drives the controlled movement of surface-attached, high-aspect-ratio polymeric microstructures

Sandia National Laboratories, Albuquerque, NM Summers 2010 – 2012
Collaborators: Dr. Bryan Kaehr and. Prof. C. Jeffrey Brinker
Conducted research in the Advanced Materials Laboratory in a collaboration with the National Institute for Nano Engineering developing methods for multiphoton patterning of responsive hydrogels and metal catalysts as well as exploring their subsequent integration into functional 3D microsystems

Columbia University, Nanoscale Science and Engineering Center, New York, NY Summer 2007
Research Experiences for Undergraduates Advisor: Prof. Shalom Wind
Studied the selective synthesis of carbon nanotubes by patterned hexabenzocoronene on ruthenium nanodots

University of Pennsylvania, Department of Chemistry, Philadelphia, PA 2005 – 2008
Undergraduate Research Advisor: Prof. So-Jung Park
Synthesis and properties of gold nanoclusters, fluorescent gold-thiolate complexes, and quantum dot/diblock copolymer assemblies

Peer-Reviewed Publications

*corresponding, †equal contribution

46. K. E. Kim†, W. Xue†, **L. D. Zarzar***, "Multi-timescale contact line dynamics of sessile oil droplets in water arising from surfactant partitioning." *submitted*

45. S. Krishna Mani, S. Al-Tooqi, J. Song, A. Sapre, **L. D. Zarzar**, A. Sen*, "Dynamic oscillation and motion of oil-in-water emulsion droplets" *submitted*

44. A. C. Castonguay, N. N. Nova, L. M. Dueñas, S. McGee, M. J. K. Lodhi, Y. Yang, **L. D. Zarzar***, "Direct laser synthesis and patterning of high entropy oxides from liquid precursors." *submitted*, available https://doi.org/10.26434/chemrxiv-2023-bls76

43. R. V. Balaj†, W. Xue†, P. Bayati, S. Mallory, **L. D. Zarzar***, "Dynamic partitioning of surfactants into non-equilibrium emulsion droplets." *submitted.* available https://doi.org/10.26434/chemrxiv-2023-0t2w2

42. C. M. Wentworth† Ryan L. Myers†, Paul S. Cremer*, **L. D. Zarzar***, "Investigating oil solubilization into nonionic micelles by Raman multivariate curve resolution", *Aggregate* **2023**, *00*, e385.

41. S. G. Birrer, P. Quinnan, **L. D. Zarzar***, "Ionic liquid-in-water emulsions stabilized by molecular and polymeric surfactants." *Langmuir* **2023**, 39, 10795-10805.

40. K. Hirsch, N. E. Sturniolo, C. H. Meredith, M. S. Rayes, **L. D. Zarzar***, "Tuning structural coloration through evanescent wave absorption at microscale concave interfaces." *ACS Applied Optical Materials* **2023**, *1*, 1377-1386

39. Y. Cheng, L. Li, C. H. Meredith, R. V. Balaj, D. Wang, M. Pan, T. Han, J. Yang, Q. Wang, L. Dong* and **L. D. Zarzar***, "Sensitive, stretchable and healable photoluminescent humidity sensors based on droplet-enabled porous composite gels." *ACS Materials Letters* **2023**, *5,* 2074–2083.

38. S. McGee, A. Fest, C. Chandler, N. N. Nova, Y. Lei, J. Goff, S. B. Sinnott, Ismaila Dabo, M. Terrones*, **L. D. Zarzar***, "Direct laser writing of multimetal bifunctional catalysts for overall water splitting." *ACS Applied Energy Materials* **2023**, *6*, 3756-3768.

37. N. E. Sturniolo, K. Hirsch, C. H. Meredith, B. Beshires, S. Khanna, M. S. Rayes, M. Gallegos, S. McGee, B. Kaehr, **L. D. Zarzar***, "Iridescence from total internal reflection at 3D microscale interfaces: mechanistic insights and spectral analysis." *Advanced Materials* **2023**, *35*, 2210665.

36. M. A. Vratsanos, W. Xue, N. D. Rosenmann, **L. D. Zarzar**, N. C. Gianneschi*, "Ouzo effect examined at the nanoscale via direct observation of droplet nucleation and morphology." *ACS Central Science* **2023**, *9,* 457–465.

35. A. C. Castonguay†, R. Kailasham†, C. M. Wentworth, C. H. Meredith, A. S. Khair*, **L. D. Zarzar***, "Gravitational settling of active droplets." *Physical Review E* **2023**, *107*, 024608.

34. J. Zhao†, N. Yi†, X. Ding, S. Liu, J. Zhu, A. Castonguay, Y. Gao, **L. D. Zarzar**, H. Cheng*, "In situ laser-assisted synthesis and patterning of graphene foam composites as a flexible gas sensing platform." *Chemical Engineering Journal*, **2023**, *456*, 140956.

33. S. Birrer†, S. Cheon†, **L. D. Zarzar***, "We the droplets: a constitutional approach to active emulsions." *Current Opinion in Colloid and Interface Science* **2022***, 61,* 101623.

32. C. M. Wentworth, A. C. Castonguay, P. G. Moerman, C. H. Meredith, R. V. Balaj, S. Cheon, **L. D. Zarzar***, "Tuning attractive and repulsive interactions between solubilizing oil droplets." *Angewandte Chemie* **2022**, *61*, e202204510.

31. A. C. Castonguay†, N. Yi†, J. Zhao, H. Li, Y. Gao, B. Li, **L. D. Zarzar***, H. Cheng*, "Direct laser writing of microscale metal oxide gas sensors from liquid precursors." *ACS Applied Materials and Interfaces* **2022**, *14*, 28163–28173.

30. N. Nova, **L. D. Zarzar***, "Direct laser writing of graphitic carbon from liquid precursors." *Chemistry of Materials* **2022,** *34*, 4602–4612.

29. C. H. Meredith, A. C. Castonguay, Y. Chiu, A. M. Brooks, P. Torab, P. Wong, A. Sen, D. Velegol, **L. D. Zarzar***, "Chemical design of self-propelled Janus droplets." *Matter* **2022**, *5*, 616-633.

28. S. Cheon, L. Silva, A. Khair, **L. D. Zarzar***, "Interfacially-adsorbed particles enhance the self-propulsion of oil droplets in aqueous surfactant." *Soft Matter* **2021**, *17*, 6742 - 6750.

27. S. McGee†, Y. Lei†, J. Goff, C. Wilkinson, N. Nova, C. M. Kindle, F. Zhang, K. Fujisawa, E. Dimitrov, S. Sinnott, I. Dabo, M. Terrones*, **L. D. Zarzar***, "Single-step direct laser writing of multimetal oxygen evolution catalysts from liquid precursors." *ACS Nano* **2021**, *15*, 9796–9807.

26. C. H. Meredith†, P. G. Moerman†, J. Groenewold, Y. Chiu, W. K. Kegel, A. van Blaaderen, **L. D. Zarzar***, "Predator-prey interactions between droplets driven by non-reciprocal oil exchange." *Nature Chemistry* **2020**, *12*, 1136–1142.

25. R. V. Balaj, **L. D. Zarzar***,"Reconfigurable complex droplets: design, properties, and applications." *Chemical Physics Reviews* **2020**, *1*, 281–286.

24. S. Klein, J. Sosa, A. Castonguay, W. Flores, **L. D. Zarzar***, Y. Liu*, "Green synthesis of Zr-based metal-organic framework hydrogel composites and their enhanced adsorptive properties." *Inorganic Chemistry Frontiers* **2020**, *7*, 4813–4821.

23. A. Goodling, S. Nagelberg, M. Kolle, **L. D. Zarzar***, "Tunable and responsive structural color from polymeric microstructured surfaces enabled by interference of totally internally reflected light." *ACS Materials Letters* **2020**, *2*, 754–763.

22. S. Cheon, L. Silva, R. Ditzler, **L. D. Zarzar***, "Particle stabilization of oil – fluorocarbon interfaces and effects on multiphase oil-in-water complex emulsion morphology and reconfigurability." *Langmuir* **2020**, *36*, 7083–7090.

21. G. Choi, R. Nouri, **L. D. Zarzar**, W. Guan*, "Microfluidic deformability activated cell sorting (DACS)." *Microsystems & Nanoengineering* **2020**, *6,* 1–9.

20. R. V. Balaj, S. Cho, P. Singh, **L. D. Zarzar***, "Polyelectrolyte hydrogel capsules as stabilizers for reconfigurable complex emulsions." *Polymer Chemistry* **2020***, 11*, 281–286. *Invited as part of the themed Emerging Investigators Issue 2020.*

19. C. Kindle, A. Castonguay, S. McGee, J. A. Tomko, P. E. Hopkins, **L. D. Zarzar***, "Direct laser writing from aqueous precursors for nano to microscale topographical control, integration, and synthesis of nanocrystalline mixed metal oxides." *ACS Applied Nano Materials* **2019***, 2,* 2581–2586.

18. A. E. Goodling†, S. Nagelberg†, B. Kaehr, C. H. Meredith, S. Cheon, A. P. Saunders, M. Kolle, **L. D. Zarzar***, "Colouration by total internal reflection and interference at microscale concave interfaces." *Nature* **2019**, *566*, 523–527.

17. **L. D. Zarzar**, J. A. Kalow, X. He, J. J. Walish, T. M. Swager, "Optical visualization and quantification of enzyme activity using dynamic droplet lenses." *Proceedings of the National Academy of Sciences* **2017**, *114*, 3821–3825.

16. A. Sutton, T. Shirman, J. V. I. Timonen, G. T. England, P. Kim, M. Kolle, T. Ferrante, **L. D. Zarzar**, E. Strong, J. Aizenberg, "Photothermally triggered actuation of hybrid materials as a new platform for in vitro cell manipulation." *Nature Communications* **2017**, *8*, 14700.

15. S. Nagelberg, **L. D. Zarzar**, N. Nicolas, K. Subramanian, J. A. Kalow, V. Sresht, D. Blankschtein, G. Barbastathis, M. Kreysing, T. M. Swager, M. Kolle, "Reconfigurable and responsive droplet-based compound micro-lenses." *Nature Communications* **2017**, *8,* 14673.

14. Y. He, S. Savagatrup, **L. D. Zarzar**, T. M. Swager, "Interfacial polymerization on dynamic complex colloids: creating stabilized Janus droplets." *ACS Applied Materials & Interfaces* **2017**, *9*, 7804–7811.

13. **L. D. Zarzar***, B. S. Swartzentruber, B. F. Donovan, P. E. Hopkins, B. Kaehr*, "Using laser-induced thermal voxels to pattern diverse materials at the solid–liquid interface." *ACS Applied Materials & Interfaces* **2016**, *8*, 21134–21139.

12. **L. D. Zarzar**, V. Sresht, E. M. Sletten, J. A. Kalow, D. Blankschtein, T. M. Swager, "Dynamically reconfigurable complex emulsions via tunable interfacial tensions." *Nature* **2015**, *518*, 520–524.

11. B. Hashmi, **L. D. Zarzar**, T. Mammoto, A. Mammoto, A. Jiang, J. Aizenberg, D. E. Ingber, "Developmentally-inspired shrink-wrap polymers for mechanical induction of tissue differentiation." *Advanced Materials* **2014**, *26*, 3253–3257.

10. **L. D. Zarzar**, J. Aizenberg, "Stimuli-responsive chemo-mechanical actuation: a hybrid materials approach." *Accounts of Chemical Research* **2014**, *47*, 530–539.

9. X. He, R. Friedlander, **L. D. Zarzar**, J. Aizenberg, "Chemo-mechanically regulated oscillation of an enzymatic reaction." *Chemistry of Materials* **2013**, *25*, 521–523.

8. **L. D. Zarzar**, Q. Liu, X. He, Y. Hu, Z. Suo, J. Aizenberg, "Multifunctional actuation systems responding to chemical gradients." *Soft Matter* **2012**, *8*, 8289–8293.

7. X. He, M. Aizenberg, O. Kuksenok, **L. D. Zarzar**, A. Shastri, A. Balazs, J. Aizenberg, "Synthetic homeostatic materials with chemo-mechano-chemical self-regulation." *Nature* **2012**, *487*, 214-218.

6. **L. D. Zarzar**, B. S. Swartzentruber, J. Harper, D. Dunphy, C. J. Brinker, J. Aizenberg, B. Kaehr, "Multiphoton lithography of nanocrystalline platinum and palladium for site-specific catalysis in 3D microenvironments." *Journal of the American Chemical Society* **2012**, *134*, 4007–4010.

5. P. Kim, A. K Epstein, M. Khan, **L. D. Zarzar**, D. J. Lipomi, G. M. Whitesides, J. Aizenberg, "Structural transformation by electrodeposition on patterned substrates (STEPS): a new versatile nanofabrication method." *Nano Letters* **2012**, *12*, 527–533.

4. **L. D. Zarzar**, P. Kim, M. Kolle, C. J. Brinker, J. Aizenberg, B. Kaehr, "Direct writing and actuation of 3D-patterned hydrogel pads on micropillar supports." *Angewandte Chemie International Edition* **2011**, *50*, 9356–9360.

3. P. Kim, **L. D. Zarzar**, X. He, A. Grinthal, J. Aizenberg, "Hydrogel-actuated integrated responsive systems (HAIRS): moving towards adaptive materials." *Current Opinion in Solid State & Materials Science* **2011**, *15*, 236–245.

2. **L. D. Zarzar**, P. Kim, J. Aizenberg, "Bio-inspired design of submerged hydrogel-actuated polymer microstructures operating in response to pH." *Advanced Materials* **2011**, *23*, 1442–1446.

1. P. Kim, **L. D. Zarzar**, X. Zhao, A. Sidorenko, J. Aizenberg, "Microbristle in gels: toward all-polymer reconfigurable hybrid surfaces." *Soft Matter* **2010**, *6*, 750–755.

Other Publications

2. "35 challenges in materials science being tackled by PIs under 35(ish) in 2021." *Matter* **2021**, *4*, 3804-3810.

1. Nicholas A. Kotov, Luis M. Liz-Marzán, Zhihong Nie, Martin M. Thuo, **Lauren D. Zarzar**, "The Endless and turbulent frontier of academic entrepreneurship." *ACS Nano* **2021**, *15*, 16947–16952.

Patents

10. C. Meredith, K. Hirsch, N. Sturniolo, L. Zarzar, "Manipulation of optical interference from reflective microstructures via evanescent field absorption." Filed 2022, Provisional Patent Application No. 63/434,823.

9. C. Meredith, N. Sturniolo, L. D. Zarzar, "Articles and methods for generating tunable coloration and interference upon reflection of incident electromagnetic radiation." PCT/US2022/053864.

8. C. Meredith, A. Goodling, L. D. Zarzar, "Substrates that exhibit interference patterns upon the reflection of incident electromagnetic radiation and methods of making and using thereof." Filed 2021, U.S. Patent Application No. 17/926,399.

7. H. Cheng, L. D. Zarzar, "Stretchable, ultrasensitive, room temperature NO_2 sensor based on reduced graphene oxide/molybdenum disulfide composite and laser-induced in situ growth of diverse metals oxides for high-resolution planar gas sensors." Filed 2019, U.S. Provisional Patent.

6. L. D. Zarzar, M. Kolle, A. Goodling, S. Nagelberg, "Articles and methods for generation of tunable coloration". Filed 2019, U.S. Patent Application No. 16/543,254, International Application No. PCT/US2019/046910.

5. T. M. Swager, L. D. Zarzar, S. N. Nagelberg, M. Kolle, "Tunable microlenses and related methods." Filed 2017, U.S. Patent Application No. 15/887,863 and International Patent Application No. PCT/US2018/016605.

4. B. J. Kaehr, L. D. Zarzar, "Methods for additive manufacturing in precursors." Filed 2016, U.S. Patent Application No. 15/217,606.

3. T. M. Swager, E. D. Blankschtein, L. D. Zarzar, V. Sresht, E. M. Sletten, J. A. Kalow, "Compositions and methods for arranging colloid phases." Filed 2015, US Patent Application No. 1/929,131 and International Patent Application No. PCT/US2015/058286.

2. T. M. Swager, E. D. Blankschtein, L. D. Zarzar, V. Sresht, E. M. Sletten, J. A. Kalow, "Compositions and methods for forming emulsions." Filed 2015, US Patent Application No. 14/929,117 and International Patent Application No. PCT/US2015/058268.

1. J. Aizenberg, P. Kim, T. Shirman, A. Sutton, L. D. Zarzar, "Environmentally responsive microstructured hybrid actuator assemblies for use in mechanical stimulation of cells." Filed 2013, US Patent Application No. 14/094152.

Teaching

Instructor, The Pennsylvania State University, University Park, PA

- CHEM 110: Chemical Principles — Fall 2017, 2019
- MATSE 202: Introduction to Polymer Materials — Spring 2017-2019
- MATSE 597: Responsive Materials — Fall 2018
- CHEM 497/480: Chemistry and Properties of Polymers — Spring 2020-2023
- CHEM 597: Responsive Materials — Fall 2022, 2023
- CHEM 500: Seminar in Chemistry (2 lectures /yr on creativity) — Spring 2022-2023

Teaching Fellow, Harvard University, Cambridge, MA

- Science of the Physical Universe 27: Science and Cooking – from Haute Cuisine to Soft Matter Science 2012
- Applied Physics 235: Chemistry in Materials Science and Engineering 2010, 2012
- Physical Sciences 1: Chemical Bonding, Energy, and Reactivity: An Introduction to the Physical Sciences 2009, 2011

Teaching Assistant, University of Pennsylvania, Philadelphia, PA

- CHEM 223: Advanced Physical Chemistry Lab 2008
- CHEM 054: General Chemistry Lab 2007

Conference Proceedings

Ashley P. Saunders, Lauren D. Zarzar. "Structural coloration from total internal reflection at microscale concave surfaces and use for sensing in complex droplets." *SPIE Photonics West, Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XIII*, **2020**, 11292, 112920X.

L. D. Zarzar, P. Kim, M. Kolle, C. J. Brinker, J. Aizenberg, B. Kaehr. "Multiphoton writing of 3D pH and temperature-responsive hydrogels integrated with high-aspect-ratio polymer microbristles." *American Chemical Society Division of Polymeric Materials: Science and Engineering* **2011**, *105*, 25.

L. D. Zarzar, J. Aizenberg, B. Kaehr. "Hydrogel micro-muscles with user-defined 3D shapes." *American Chemical Society Division of Polymeric Materials: Science and Engineering* **2011**, *104*, 150.

P. Kim, L. D. Zarzar, M. Khan, M. Aizenberg, J. Aizenberg. "Environmentally responsive active optics based on hydrogel-actuated deformable mirror arrays." *Proceedings of SPIE* **2011**, 792705-792705-7.

L. D. Zarzar, P. Kim, J. Aizenberg. "Patterned, oscillating, pH-responsive actuation of polymeric microstructures in fluid." *American Chemical Society Division of Polymeric Materials: Science and Engineering* **2010**, *103*, 69.

P. Kim, L. D. Zarzar, A. K. Epstein, J. Aizenberg. "Biomimetic, hierarchical, multidimensional patterning of conductive polymers on high-aspect-ratio microstructures." *American Chemical Society Division of Polymeric Materials: Science and Engineering* **2010**, *103*, 58.

Presentations

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L. D. Zarzar, "Collective behaviors of active oil droplets." MARSS (International Conference on Manipulation, Automation, and Robotics at Small Scales). NYU Abu Dhabi, UAE October 2023.

L D. Zarzar, "Chemically programmable active oil droplets." Department of Materials Science and Engineering, UC Berkeley, Berkeley, CA, September 2023.

L. D. Zarzar, "Iridescent structural color from total internal reflection in polymer microstructures." ACS National Meeting, San Francisco, CA, August 2023.

L. D. Zarzar, "Chemically-fueled motion and organization of droplets." GRC on Artificial Molecular Switches and Motors, Colby-Sawyer College, New London, NH, June 2023.

A. C. Castonguay, R. Kailasham, C. M. Wentworth, C. H. Meredith, A. S. Khair, and L. D. Zarzar, "Gravitational settling of active droplets." *ACS Colloid and Surface Science Symposium,* NC State University, June 2023.

L. D. Zarzar, "Chemically programmable active oil droplets." Soft Matter Seminar Series (virtual), May 2023.

L. D. Zarzar, "Chemotactic droplet interactions and organization fueled by micelle-mediated transport." GRC on Self-Assembly and Supramolecular Chemistry, Les Diablerets, Switzerland, May 2023.

L. D. Zarzar, "The life and death of active droplets." Overbeek Seminar, Departments of Chemistry, Chemical Engineering and Applied Physics, Eindhoven Univeristy of Technology, Eindhoven, Netherlands, April 2023.

L. D. Zarzar, "The life and death of active droplets." Department of Chemistry, Radboud University, Nijmegen, Netherlands, April 2023.

L. D. Zarzar, "Chemically programmable active behaviors of oil droplets." Autonomous Matter Symposium, AMOLF, Amsterdam, Netherlands, April 2023.

L. D. Zarzar, "Nonequilbrium partitioning of surfactants into oil droplets." ACS National Meeting, Indianapolis, IN, March 2023.

L. D. Zarzar, "Dynamic partitioning of surfactants into non-equilibrium emulsion droplets." Dow, Technical Community Organization Seminar, Collegeville, PA, Feburary 2023.

L. D. Zarzar, "Chemically programmable active behaviors of oil droplets." Convergence Center for Living Multifunctional Material Systems (LiMC2) e-seminar series, February 2023.

L. D. Zarzar, "Chemically programmable active behaviors of oil droplets." UCSB, Soft Matter Lunch Seminar Series, Santa Barbara, CA,

February 2023.

L. D. Zarzar, "The Life and death of active droplets." GRC on Complex Active and Adaptive Materials Systems, Ventura, CA, January 2023.

L. D. Zarzar, "Self-propulsion of oil droplets stabilized by surfactants andnanoparticles." PPC17, Brisbane, Australia, December 2022.

L. D. Zarzar, "Chemically programmable active behaviors of oil droplets," PPC17, Brisbane, Australia, December 2022.

L. D. Zarzar, "Chemically programmable active oil droplets." Department of Chemistry Syracuse University, Syracuse, NY, November 2022.

L. D. Zarzar, "Color from colorless materials." Department of Chemistry, Millersville University, Millersville, PA, November 2022.

L. D. Zarzar, "Chemically programmable active oil droplets: mechanisms and dynamics." Department of Chemical Engineering, Carnegie Mellon University, Pittsburgh, PA, October 2022.

L. D. Zarzar, "Chemically programmable active oil droplets: mechanisms and dynamics." Department of Chemistry, Princeton University, September 2022.

L. D. Zarzar, "Active behaviors of oil droplets stabilized by surfactants and particles." ACS Colloid and Surface Science Symposium, Colorado School of Mines, Golden, CO, July 2022.

L. D. Zarzar, "Chemical tunability of droplet motility: interfacial transport mechanisms and dynamics." Gordon Research Seminar on Biointerface Science, Barga, Italy, June 2022. (Keynote)

L. D. Zarzar, "Bioinspired, dynamic and collective behaviors of emulsions." Gordon Research Conference on Bioinspired Materials, Les Diablerets, Switzerland, June 2022.

L. D. Zarzar, "Active droplets that swim, interact, and organize." Eindhoven University of Technology, Eindhoven, Netherlands, May 2022.

L. D. Zarzar, "Chemically programmable active behaviors of oil droplets." AMOLF, Amsterdam, Netherlands, May 2022.

L. D. Zarzar, "Harnessing microstructures for tunable structural color." Photonics and Electromagnetics Research Symposium (PIERS), April 2022.

L. D. Zarzar, "Active droplets that swim, chase, and organize." ACS National Meeting, PMSE Young Investigator Awards Symposium, San Diego, CA, March 2022.

L. D. Zarzar, "Predator-prey interactions between droplets driven by non-reciprocal oil exchange." APS March Meeting, Chicago, IL, March 2022.

L. D. Zarzar, "Color from colorless materials". Department of Chemistry, Muhlenberg College, Allentown, PA, March 2022.

L. D. Zarzar, "Harnessing microstructures for tunable interference color." TMS Annual Meeting, Anaheim, CA, March 2022.

L. D. Zarzar, "Active droplets that swim, chase, and organize." Department of Chemistry, Purdue University, West Lafayette, IN, February 2022. (student invited speaker)

L. D. Zarzar, "Active droplets that swim, chase, and organize." Department of Chemical Engineering, University of Waterloo, February 2022.

L. D. Zarzar, "Harnessing microstructures for tunable structural color." Materials Research Society National Meeting, Boston, MA, December 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." 30th Dutch Soft Matter Meeting, November 2021. (Keynote)

L. D. Zarzar, "Chemical design of active droplets that swim, chase, and interact." Dow's Discussion Group on Interface Science, October 2021.

L. D. Zarzar, "Bioinspired chemical design of active droplets that swim, chase, and interact." Department of Bioengineering, Northwestern University, Evanston, IL, October 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." Department of Chemistry, Brandeis University, Waltham, MA, October 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." Department of Chemistry, Wesleyan University, Middletown, CT, October 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." Department of Chemical and Biological Engineering, University of Colorado Boulder, Boulder, CO, September 2021.

L. D. Zarzar, "Active Janus droplets: cooperativity of chemistry and structure." Out-of-Equilibrium Systems, Emergence, and Life workshop (Lorentz Center), September 2021.

L. D. Zarzar, "Chemical design of motile Janus droplets." Active Coacervates Workshop, August 2021.

L. D. Zarzar, "Chemical design of swimming Janus oil droplets in water." Systems Chemistry, July 2021.

L. D. Zarzar, "Tunable structural coloration by total internal reflection and interference at microscale concave interfaces." Flat Optics: Components to Systems Conference, part of the OSA Optical Design and Fabrication Congress, July 2021.

L. D. Zarzar, "Color from colorless materials." Penn State NSF REU program, June 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." Cornell High Energy Synchrotron Source Soft Matter Far From Equilibrium Workshop, June 2021.

L. D. Zarzar, "Color from colorless materials." US National Chemistry Olympiad Team seminar, June 2021.

L. D. Zarzar, "Structural coloration from microstructured surfaces." iCANX, April 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." ACS National Meeting, April 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." ChemSystemsMeet, March 2021.

L. D. Zarzar, "Tunable structural coloration by cascading total internal reflection and interference at microscale interfaces." Pittcon Conference and Expo, March 2021.

L. D. Zarzar, "Active droplets that swim, chase, and organize." Department of Chemistry, Cornell University, February 2021.

L. D. Zarzar, "Responsive structural color from droplets and use in chemical sensing." Materials Day 2020, Penn State University, November 2020.

L. D. Zarzar, "Predator-prey interactions between droplets driven by nonreciprocal oil exchange." US Army Soldier Center, October 2020.

L. D. Zarzar, "Predator-prey interactions between droplets driven by nonreciprocal oil exchange." Caltech, September 2020.

L. D. Zarzar. "Predator-prey interactions between droplets driven by nonreciprocal oil exchange." Systems Chemistry: Life-like emergent behavior in complex molecules and ensembles, May 2020.

L. D. Zarzar, A. Goodling, S. Nagelberg, B. Kaehr, C. Meredith, S. Cheon, A. Saunders, M. Kolle. "Structural coloration by cascading total internal reflection and interference at microscale concave interfaces." SPIE Photonics West, San Francisco, CA, February 2020.

L. D. Zarzar, "Structural coloration by cascading total internal reflection and interference at microscale concave interfaces," Next Generation Smart Materials Conference, Savannah, GA, December 2019.

L. D. Zarzar, "Structural coloration by cascading total internal reflection and interference at microscale concave interfaces," Messiah College, Mechanicsburg, PA, November 2019.

L. D. Zarzar, "Structural coloration by cascading total internal reflection and interference at microscale concave interfaces," Johns Hopkins University, Baltimore, MD, October 2019.

L. D. Zarzar, "Structural coloration by cascading total internal reflection and interference at microscale concave interfaces." Youngstown State University, Youngstown, OH, October 2019.

L. D. Zarzar "ChromaTIR: color shifting coatings." Invent Penn State Venture and IP Conference Tech Tournament, Penn State University, University Park, PA, October 2019. (pitch competition)

L. D. Zarzar, "Tunable and responsive structural coloration by cascading total internal reflection and interference at microscale concave interfaces." UMass Amherst, Amherst, MA, September 2019.

L. D. Zarzar, "Microstructured interfaces for generation of structural coloration via total internal reflection." PPG, Allison Park, PA, September 2019.

L. D. Zarzar, C. Meredith, P. Moerman, Y.-J. Chiu, J. Groenewold, W. Kegel, A. van Blaaderen, “Chemotactic droplet interactions.” ACS National Meeting, San Diego, CA, August 2019.

L. D. Zarzar, "Simple materials, reimagined." ACS National Meeting, Talented 12 Symposium, San Diego, CA, August 2019.

L. D. Zarzar, "Structural color from total internal reflection and interference in microscale concave geometries." Penn State University Research Experiences for Undergraduates program, University Park, PA, July 2019.

L. D. Zarzar, "Direct laser writing of inorganic materials: femtoliter scale synthesis and patterning at the solid–liquid interface." Air Force Research Laboratory, Wright-Patterson Air Force Base, OH, July 2019.

L. D. Zarzar, "Structural coloration by cascading total internal reflection and interference at microscale concave interfaces." ACS Colloid and Surface Science Symposium, Unilever Award Lecture, Atlanta, GA, June 2019.

L. D. Zarzar, A. Goodling, S. Nagelberg, B. Kaehr, C. Meredith, S. Cheon, A. Saunders, M. Kolle,"Structural coloration by cascading total internal reflection and interference at microscale concave interfaces." 3M Science and Engineering Faculty Day, Minneapolis, MN, June 2019. (poster)

L. D. Zarzar, "Manipulation of interfacial processes, reactions, and feedback within reconfigurable multiphase fluids." Army ECASE Symposium Adelphi, MD, April 2019.

L. D. Zarzar, “Interdisciplinary science in the academic job market”. American Chemical Society National Meeting, Orlando, FL, April 2019.

L. D. Zarzar, A. Goodling, S. Nagelberg, B. Kaehr, C. Meredith, S. Cheon, A. Saunders, M. Kolle, “Microstructured interfaces for generation of structural coloration via total internal reflection.” UCLA, Los Angeles, CA, February 2019.

L. D. Zarzar, A. Goodling, S. Nagelberg, M. Kolle, “Dynamic structural color in reconfigurable complex droplets.” Soft Matter, Structures, and Devices Seminar Series, MIT, Cambridge, MA, August 2018.

L. D. Zarzar, “Stimuli-responsive, reconfigurable emulsions.” St. Francis University, Loretto, PA, March 23, 2018.

L. D. Zarzar, J. Aizenberg, “Chemistry in motion: hydrogel actuators and catalytic microsystems.” Massachusetts College of Art and Design, Boston, MA, February 2014.

L. D. Zarzar, J. Aizenberg, “Stimuli-responsive chemo-mechanical actuation: a hybrid materials approach.” Columbia University, New York, NY, September 2012.

----------**Contributed**----------

N. Sturniolo, K. Hirsch, C. Meredith, M. Rayes, M. Gallegos, B. Kaehr, L. D. Zarzar, "Iridescent structural color from total internal reflection interference." Center for Integrated Nanotechnologies (CINT) Annual User Meeting, Santa Fe, NM, September 2023. (Poster, won first place prize)

A. Castonguay R. Kailasham, C. Wentworth, C. Meredith, A. Khair, L. D. Zarzar, "Gravitational settling of active droplets." ACS Colloid and Surface Science Symposium, NC State, Raleigh, NC, June 2023. (Oral)

A. Castonguay R. Kailasham, C. Wentworth, C. Meredith, A. Khair, L. D. Zarzar, "Gravitational settling of active droplets." APS March Meeting, Las Vegas, Nevada, March 2023. (Oral)

L. D. Zarzar, "Coloration by total internal reflection and interference at microscale interfaces." ACS National Meeting, San Diego, CA, March 2022. (Oral)

L. D. Zarzar, "Chemical design of motile Janus drops." APS March Meeting, Chicago, IL, March 2022. (Oral)

L. D. Zarzar, C. Meredith, A. Castonguay, Y-J. Chiu, A. Brooks, P. Moerman, P. Torab, P. K. Wong, A. Sen, D. Velegol, "Chemical design of self-propelled Janus droplets". American Chemical Society National Meeting, Atlanta, GA, August 2021. (Oral)

L. D. Zarzar, C. Meredith, P. Moerman, Y.-J. Chiu, J. Groenewold, W. Kegel, A. van Blaaderen, “Chemotactic droplet interactions.” ACS Colloid and Surface Science Symposium, Atlanta, GA, June 2019. (Oral)

L. D. Zarzar, C. Meredith, P. Moerman, Y.-J. Chiu, J. Groenewold, W. Kegel, A. van Blaaderen, “Chemotactic droplet interactions.” American Chemical Society National Meeting, Orlando, FL, April 2019. (Oral)

L. D. Zarzar, A. Goodling, S. Nagelberg, B. Kaehr, C. Meredith, S. Cheon, A. Saunders, M. Kolle, “Structural coloration by cascading total internal reflection and interference at microscale concave interfaces.” American Chemical Society National Meeting, Orlando, FL, April 2019. (Oral)

L. D. Zarzar, A. Goodling, S. Nagelberg, B. Kaehr, C. Meredith, S. Cheon, A. Saunders, M. Kolle, “Structural coloration by cascading total internal reflection and interference at microscale concave interfaces.” GRC Complex Active and Adaptive Materials Systems, Ventura, CA, January 2019. (Poster)

L. D. Zarzar, A. Goodling, S. Nagelberg, M. Kolle, “Dynamic structural color in reconfigurable complex droplets.” American Chemical Society National Meeting, Boston, MA, August 2018. (Oral)

L. D. Zarzar “Complex emulsions as dynamic soft materials.” ACS Mid Atlantic Regional Meeting, Bethlehem, PA, June 2018. (Oral)

L. D. Zarzar, B. Kaehr, B. S. Swartzentruber, B. F. Donovan, P. E. Hopkins, “Using laser-induced thermal voxels to pattern diverse inorganic materials at the solid–iquid interface.” Materials Research Society Fall National Meeting, Boston, MA, December 2017. (Oral)

L. D. Zarzar, J. Kalow, X. He, J. Walish, T. Swager, “Optical visualization and quantification of enzyme activity using dynamic droplet lenses.” American Chemical Society National Meeting, San Francisco, CA, April 2017. (Oral)

L. D. Zarzar, V. Sresht, E. Sletten, J. Kalow, D. Blankschtein, T. Swager, “Dynamically reconfigurable complex droplets via tunable interfacial tensions.” American Chemical Society National Meeting, Boston, MA, August 2015. (Oral)

L. D. Zarzar, J. Aizenberg, T. Swager, “Dynamic materials: putting chemistry into motion.” American Chemical Society National Meeting, Boston, MA, August 2015. (Poster)

L. D. Zarzar, V. Sresht, E. Sletten, J. Kalow, D. Blankschtein, T. Swager, “Dynamically reconfigurable complex droplets via tunable interfacial tensions.” Chemsitry Student Seminar Series, Massachusetts Institute of Technology, Cambridge, MA, April 2015. (Oral)

L. D. Zarzar, N. Schade, A. Marblestone, "Programming matter: smart surfaces, molecular machines, and invisibility cloaks." Science in the News, Harvard University, Cambridge, MA, April 2012. (Oral)

L. D. Zarzar, X. He, Q. Liu, P. Kim, Z. Suo, J. Aizenberg, "Patterned and controllable pH-responsive actuation of polymer microstructures." American Chemical Society National Meeting, San Diego, CA, March 2012. (Poster)

L. D. Zarzar, P. Kim, M. Kolle, C. J. Brinker, J. Aizenberg, B. Kaehr, "Multiphoton writing of 3D pH and temperature-responsive hydrogels integrated with high-aspect-ratio polymer microbristles." American Chemical Society National Meeting, Denver, CO, August 2011. (Invited oral presentation) *Won the AkzoNobel Student Award in Applied Polymer Science*

L. D. Zarzar, P. Kim, J. Aizenberg. "pH-Responsive actuation of polymeric microstructures in fluid." Materials Research Society Fall Meeting, Boston, MA. December 2010. (Oral)

L. D. Zarzar, P. Kim, J. Aizenberg, "Responsive actuation of polymer microstructures in fluid upon pH change." Polydays, Berlin, Germany, October 2010. (Poster)

L. D. Zarzar, P. Kim, J. Aizenberg. "Patterned, oscillating, pH-responsive actuation of polymeric microstructures in fluid." American Chemical Society National Meeting, Boston, MA. August 2010. (Oral)

L. D. Zarzar, P. Kim, X. Zhao, A. Sidorenko, J. Aizenberg. "Hydrogel-actuated high-aspect-ratio polymer nanostructures for reversible pattern generation." Materials Research Society Fall Meeting, Boston, MA. December 2009. (Poster) *Won "Best Poster" award*

Affiliations & Service

Member, American Chemical Society, Materials Research Society, SPIE, AAAS, American Physical Society

Proposal / Fellowship Reviewer, Dutch Research Council (NWO), NSF Graduate Research Fellowship Program. National Defense Science and Engineering Graduate Fellowships, NSF (CMMI, DMR, IIP/TIP), DOE, ARO, ACS Petroleum Research Fund, AAAS, Center for Integrated Nanotechnologies (CINT), Novo Nordisk Foundation, Israel Science Foundation

Journal Reviewer, ACS Applied Materials and Interfaces, ACS Applied Polymer Materials, ACS Sustainable Chemistry and Engineering, ACS Nano, ACS Sensors, Advanced Materials, Advanced Functional Materials, Advanced Optical Materials, Analytical Chemistry, Angewandte Chemie, Biomacromolecules, Cell Reports Physical Science, Chem, Chemical Science, Chemistry of Materials, Chemistry- A European Journal, ChemSystemsChem, Gels, iScience, Journal of Colloid and Interface Science, Journal of Fluid Mechanics, Journal of Molecular Liquids, Journal of Physical Chemistry Letters, Journal of the American Chemical Society, Langmuir, Matter, Nano Letters, Nature, Nature Chemistry, Nature Communications, Nature Physics, PLOS ONE, PNAS, Polymers, Polymer Chemistry, Reaction Chemistry & Engineering, Reactive and Functional Polymers, Science Advances, Science Bulletin, Sensors, Small, Small Methods, Soft Matter, Trends in Chemistry

Session Chair, International Conference on Manipulation, Automation, and Robotics at Small Scales (MARSS), Abu Dhabi, UAE	October 2023
Editorial Board Member, Journal of the American Chemical Society	2023 - present
Senior Editor, Accounts of Materials Research	Aug. 2023 - Dec. 2024
AAAS Committee on Nominations and Leadership Development (NLDC)	March 2023
Panelist, Industry-Academia Dialogue, ACS National Meeting, Indianapolis, IN	2023
Conference co-organizer and discussion leader, SysChem 2023 (virtual)	January 2023
Career Panelist, GRS on Complex Active and Adaptie Material Systems in Ventura, CA	2023
Symposium Co-Organizer, "Active and Adaptive Matter", ACS Colloid and Surface Science Symposium held at NC State	2022 - 2023
Symposium Co-Organizer, symposium in honor of Joanna Aizenberg's receipt of the ACS Award in Colloid and Surface Science at the spring National ACS Meeting in Indianapolis, IN	2022 - present
Next Generation Board Member, Aggregate, a Wiley journal	2022 - 2023
Topic Editor, Accounts of Materials Research	2021 - present
Chromatir Technologies LLC, co-founder	2021 - present
Advisory Board Member, ChemTalk (https://chemistrytalk.org/)	2021 - 2024
Executive leadership of the ACS Colloid and Surface Chemistry Division, 4 year elected position with rotation through vice chair, chair elect, chair, past chair.	2021 - present
ACS Nano Rising Star Board	2017 - present
Director, WISDOM: Women In Science Demonstrating Outstanding Merits. WISDOM is a non-profit dedicated to supporting women and fostering diversity in STEM. https://womenin.science/	2021 - 2022
Symposium Co-Organizer, "Emulsions, Bubbles, and Foams", ACS Colloid and Surface Science Symposium, Colorado School of Mines	2017 - 2021
Newsletter Editor, Division of Colloid and Surface Chemistry, American Chemical Society	August 2021
Session Chair, Basic Research in Colloids, Surfactants, and Interfaces, ACS Fall 2021	2020

Symposium Co-Organizer, "Lessons from Nature—From Biology to Bioinspired Materials", MRS National Meeting & Exposition, Boston, MA — Feb. 2020

Session Leader, SPIE Photonics West, San Francisco, CA — June 2018

Discussion Leader, Gordon Research Conference on Bioinspired Materials, Les Diablerets, Switzerland — June 2018

Technical Session Co-Organizer, "Bubbles, Emulsions, and Foams," ACS Colloid and Surface Science Symposium, University Park, PA — August 2017

Symposium Co-Organizer, "Responsive, Programmable Assembly of Active Colloids for Functional Materials", held at the 254th ACS National Meeting & Exposition, Washington, DC — August 2017

Discussion Leader, Gordon Research Seminar on Soft Condensed Matter Physics, New London, NH — 2009 - 2012

Chemistry Dept. Graduate Student and Post-doc Council, Harvard University, Elected Chair (2010 –2011), Representative (2009 – 2012)