

PROF. LAUREL A. KROO, PH.D.

DEPARTMENT OF POLYMER SCIENCE AND ENGINEERING
UNIVERSITY OF MASSACHUSETTS, AMHERST

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Kroo Group Laboratories:

Conte B23: Optics and Mini-Fab
Conte B422: Rheology and Surface Science
Conte B421: High Pressure and Sequestration
Conte B465: Chemistry and Synthesis

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ACADEMIC POSITIONS

UNIVERSITY OF MASSACHUSETTS AMHERST

September 2025 - Present

Assistant Professor of Polymer Science and Engineering

Full-time Principal Investigator (Tenure Track)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

September 2022 - March 2025

Postdoctoral Associate in the Department of Mechanical Engineering

Non-Newtonian Fluids Laboratory

Research Advisor: Professor Gareth H. McKinley, F.R.S., Ph.D.



EDUCATION

STANFORD UNIVERSITY

2017 - 2022

Doctor of Philosophy (Ph.D.) in Mechanical Engineering

Doctoral Thesis titled *Adaptive and Sensory Machines: Active Foam and Swimming Rheometers*

Graduate Research Fellow of the National Science Foundation (NSF GRFP)

Primary Thesis Advisor: Professor Manu Prakash, Ph.D.

Research Co-Advisor: Professor Eric S.G. Shaqfeh, Ph.D.

STANFORD UNIVERSITY

2014-2017

Masters of Science in Mechanical Engineering (Degree granted in 2017; standalone program from PhD)

Coursework in precision engineering, soft materials, fluid mechanics, optics and applied mathematics.

FRANKLIN W. OLIN COLLEGE OF ENGINEERING

2010-2014

Bachelors of Science in Mechanical Engineering

Coursework in Fluid Transport, Mechanics, Robotics and Computational Modeling.



- ★ **2026 Outstanding Poster Award, International Union of Theoretical and Applied Mechanics (IUTAM)** awarded to Kroo Group member Zhaofeng Peng at the International IUTAM Symposium on Diversity-Driven Innovations in Complex Fluids for Advanced Manufacturing, Peking University, Beijing.
- ★ **Nominated by Prof. Russell for international UKPPG/DPOLY Polymer Lecture Exchange** nominated by Prof. Thomas P. Russell; one of five finalists in the United States in the group's first academic year.
- ★ **Co-awarded UMass Amherst internal grant re: Strategic Partnerships to Advance Research and Creative activity (SPARC)** as a Principal Investigator/senior personnel, for co-authoring an IRG on "Directed, Hierarchical Assembly of Pluripotent Materials using Stretching Flows." 75,000 USD.
- ★ **Elected a Full Member of the Sigma Xi Scientific Research Honor Society** by nomination of the academic community in 2025.
- ★ **2024 Society of Rheology Award: Top 3 best lecture in the Future of Rheology young investigator competition** on Transient and Periodic Exponential Shear Flows
- ★ **2023 Finalist for the Rowland Fellowship at Harvard University** (10 finalists selected internationally).
- ★ **2023 UC Berkeley Rising Star in Mechanical Engineering** (Selected as a 2023 participant/awardee in the Mechanical Engineering Department).
- ★ **2022 Caltech Young Investigator** (Selected as the one 2022 awardee for the Mechanical and Civil Engineering Department).
- 2023 University of Pennsylvania MRSEC Travel Grant** for the Aspen Center of Physics Winter Conference on Active Matter
- 2021 Division of Fluid Dynamics Travel Grant** from the American Physical Society
- 2021 Stanford BioX Travel Grant** from the Stanford Biophysics Program
- 2019 Stanford Diversifying Academia, Recruiting Excellence (DARE) Fellowship Alternate Award**
- ★ **2016 National Science Foundation GRFP Fellowship Awardee** (Tenured 2016 - Aug 2019)
- 2015 National Science Foundation GRFP Fellowship Honorable Mention**
- ★ **2014 Hertz Foundation Finalist** (50 chosen total in the USA out of about 1000 applicants involving multiple in-person interviews)
- APS Travel Grant for Division of Fluid Dynamics** Conference in November, 2013 (Merit-Based, 5 awarded in total for all undergraduates)

2026

1. Stepan, Carla G., Hayden Marquard, **Laurel Kroo**, Thomas P. Russell, and Todd Emrick. "Polymer Surfactants at the Mesoscale: Packaging Liquid Droplets with Ultrathin Sheets and Filaments." *Journal of the American Chemical Society* 148.36 (2026): 38976–38983. DOI: 10.1021/jacs.6c11589.
2. Middleton, Clara, **Laurel Kroo**, and Todd Emrick. "Modulating Viscoelasticity and Live Cell Response with Fibrillar Peptide Polymers." *ACS Central Science* 12.7 (2026): 878–880. First Reactions. DOI: 10.1021/acscentsci.6c00960.
3. **Kroo, Laurel**, George Herring, and Sai Srivatsa Kumar Ganugapati. "Full-field Imaging of Complex Fluids in a Cone-and-Plate Geometry on a Separated-Motor-Transducer Rheometer." U.S. Provisional Patent Application No. 64/102,361. June 30, 2026.
4. Z. Peng[†], L. Warwaruk[†], T. Livesay, B.M. Yavitt, R.H. Ewoldt, G.H. McKinley, and **L.A. Kroo**. "PocketCaBER and PocketDoS: Low-cost open-source tools for teaching and learning advanced topics in fluid mechanics." arXiv preprint arXiv:2608.16943 (2026). DOI: 10.48550/arXiv.2608.16943. [†]*Equal contribution*.
5. Moriam, Kaniz, Crystal E. Owens, **Laurel Kroo**, William Ghann, Jamal Uddin, Leena Pitkänen, Michael Hummel, and Gareth H. McKinley. "Enhancing the Spinnability of Cellulose-Based Textile Waste by Doping with High Molecular Weight Bacterial Cellulose." *Biomacromolecules* 27.4 (2026): 2612–2628. DOI: 10.1021/acs.biomac.5c02370.

2025

- ★ 6. **Kroo, Laurel A.** et al. "A unifying perspective on measuring transient planar extensional viscosity from exponential shear." arXiv preprint arXiv:2506.16667 (2025). DOI: 10.48550/arXiv.2506.16667.
- ★ 7. **Kroo, Laurel A.**, et al. "Measuring Cyclic Tensile Properties of Fluids with Composite Harmonic Exponential Waveforms (CHEW)." arXiv preprint arXiv:2506.16747 (2025). DOI: 10.48550/arXiv.2506.16747.

2024 AND EARLIER

8. **Kroo, Laurel A.**, Patrick Underhill, Marissa F. Rizzi, Reed A. Nicholson and Gareth H. McKinley. "Measuring Transient Extensional Properties in Complex Microstructured Fluids using a Composite Harmonic Exponential Waveform (CHEW)." *Proceedings of the XIXth International Congress on Rheology, Athens, Greece* (31 July 2023), p. 19.
- ★ 9. **Kroo, Laurel A.**, Matthew Storm Bull, and Manu Prakash. "Active foam: the adaptive mechanics of 2D air-liquid foam under cyclic inflation." *Soft Matter* 19.14 (2023): 2539–2553. DOI: 10.1039/D3SM00019B.
- ★ 10. **Kroo, Laurel A.**, et al. "A freely suspended robotic swimmer propelled by viscoelastic normal stresses." *Journal of Fluid Mechanics* 944 (2022): A20. DOI: 10.1017/jfm.2022.485.

- ★ 11. **Kroo, Laurel A.**, et al. "Modified full-face snorkel masks as reusable personal protective equipment for hospital personnel." *PLOS ONE* 16.1 (2021): e0244422. DOI: 10.1371/journal.pone.0244422.
- 12. Zhong, Grace, **Laurel A. Kroo**, and Manu Prakash. "Thermotaxis in an apolar, non-neuronal animal." *Journal of the Royal Society Interface*. In Press. DOI: 10.1098/rsif.2023.0279.
- ★ 13. Bull, Matthew S., **Laurel A. Kroo**, and Manu Prakash. "Excitable mechanics embodied in a walking cilium." arXiv preprint arXiv:2107.02930 (2021).
- 14. Shaqfeh, Eric S.G., Manu Prakash, **Laurel A. Kroo**, and Jeremy P. Binagia. "A multi-mode mechanical swimmer that acts as a rheometer." Patent WO2023015033A1. February 9, 2023.
- 15. R. Fabian Pease, Matthew Storm Bull, **Laurel A. Kroo**, and Manu Prakash. "A Simple and Inexpensive Permanent Magnet Electron Lens." EIPBN Conference Proceedings. May 30, 2017.
- 16. Prakash, Manu, James S. Cybulski, and **Laurel A. Kroo**. "Optical Lens Fabrication." Patent 9810892B2. March 10, 2014.
- 17. **Laurel A. Kroo** and Ilan M. Kroo. "Efficient low-cost wind energy using passive circulation control." Patent Application US20110206531A1. August 25, 2011.
- 18. **L.A. Kroo**, et al. American Physical Society, Division of Fluid Dynamics, Gallery of Fluid Motion: "Self-propulsion of a freely-suspended, rotationally-symmetric swimmer enabled by viscoelastic normal stresses." *Submitted to the American Physical Society*. Online publication November 20, 2021. DOI: <https://doi.org/10.1103/APS.DFD.2021.GFM.V0065>. Video publication.
- 19. **L.A. Kroo** and Manu Prakash. American Physical Society, Division of Fluid Dynamics, Gallery of Fluid Motion: "Mechanics of Active Foam: Local Energy Injection in an Addressable 2D Foam." DOI: <https://doi.org/10.1103/APS.DFD.2018.GFM.V0080>. Video publication.



CONFERENCE PRESENTATIONS AND RESEARCH SEMINARS

[★] = Invited or Highly Selective

2026

- ★ (1) **Invited Speaker, International IUTAM Symposium on Diversity-Driven Innovations in Complex Fluids for Advanced Manufacturing.** "Swimming Polymers." **Peking University**, Beijing. August 16–19, 2026.
- (2) Poster presentation. L.A. Kroo. "Flow-Programmed Materials: Building Molecular Architecture via Stretching Flow Sequences." Polymer Physics Gordon Research Conference, Mount Holyoke College, South Hadley, Massachusetts. July 26–31, 2026.
- ★ (3) **Invited SoFLivMat Seminar, Yale University.** "Flow programming of polymeric liquids." New Haven, Connecticut. July 21, 2026.
- (4) Oral presentation. Yoon Je (Andy) Choi and **L.A. Kroo**. "A Purcell-swimming robot in Newtonian and non-Newtonian fluids: beyond velocity-maximization objectives." U.S. National Congress of Theoretical

and Applied Mechanics (USNCTAM), Pasadena, California. June 21–25, 2026.

- ★ **(5) Invited lecture, UMass Amherst Soft Matter Physics Summer School.** “Flow Programming of Polymeric Liquids.” Amherst, Massachusetts. June 10, 2026.
- ★ **(6) Invited keynote, Polymer Science 60th Reunion, UMass Amherst.** “Flow Programming of Polymers.” Amherst, Massachusetts. May 21, 2026.
- (7)** Oral presentation. L.A. Kroo. “Flow Programming of Viscoelastic Colloidal Suspensions.” 2026 American Physical Society Global Physics Summit, Denver, Colorado and online. March 15–20, 2026.
- (8)** Poster presentation. L.A. Kroo. “Flow-Programmed Materials: Building Molecular Architecture via Stretching Flow Sequences.” Colloidal, Macromolecular and Polyelectrolyte Solutions Gordon Research Conference, Ventura, California. February 1–6, 2026 (presentation February 4).

2025

- (9)** Research seminar in ENG 110. L.A. Kroo. “Complex Fluids and Rheology of Adaptive Matter.” University of Massachusetts Amherst, Amherst, Massachusetts. December 9, 2025.
- (10)** Faculty group presentation, Department of Physics, University of Massachusetts Amherst. L.A. Kroo. “Various Intriguing Problems in Complex Fluids and Rheology of Adaptive Matter.” Amherst, Massachusetts. October 14, 2025.
- ★ **(11)** Oral presentation. Laurel Kroo (speaker), Rishabh More, Tri Tuladhar, and Gareth McKinley. “Printability and Rheology of Colloidal Inks under High-Frequency Pulsed Strain Histories.” Society of Rheology Annual Meeting, Santa Fe, New Mexico. October 21, 2025 (meeting October 19–23).
- ★ **(12) Invited talk.** “A unifying perspective on measuring transient planar extensional viscosity from exponential shear.” CECAM workshop on “Structure, Stress, Strain & Stretching Flows,” Monash University Prato Centre, Prato, Italy. June 18–20, 2025.
- ★ **(13) Keynote address.** 103rd New England Complex Fluids Workshop, University of Massachusetts Amherst, Amherst, Massachusetts. June 6, 2025.

2024 AND EARLIER

- ★ **(14) Invited talk.** 95th Annual Meeting of the Society of Rheology, Austin, Texas. October 13–17, 2024. Selected as a top-three talk in the “Future of Rheology” session.
- ★ **(15)** Presenter and demo-day organizer. Summer School on Soft Matter and Food Science, L’Institut d’Etudes Scientifiques (IES), Cargèse, Corsica, France. July 23–August 2, 2024.
- ★ **(16)** Department of Mechanical Engineering virtual seminar, Columbia University, New York, New York. March 5, 2024.

- ★ **(17)** Department of Mechanical Engineering seminar, University of Colorado Boulder, Boulder, Colorado. February 29, 2024.
- ★ **(18)** Department of Polymer Science and Engineering seminar, University of Massachusetts Amherst, Amherst, Massachusetts. February 26, 2024.
- ★ **(19)** Invited talk, Gordon Research Seminar on Colloidal, Macromolecular and Polyelectrolyte Solutions, Ventura, California. February 11, 2024.
- ★ **(20)** Mechanical Engineering Department seminar, University of Michigan, Ann Arbor, Michigan. February 5, 2024.
- ★ **(21)** Department of Chemical Engineering research seminar, Stanford University, Stanford, California. January 30, 2024.
- ★ **(22) Invited department seminar. L.A. Kroo.** "Mechanical Sensing in Viscoelastic Fluids: Novel methods to probe extensional thickening and normal stresses." Department of Chemical and Biological Engineering, Rensselaer Polytechnic Institute, Troy, New York. December 6, 2023.
- ★ **(23) Invited seminar.** Future of Rheology Seminar Series, Society of Rheology, virtual. November 28, 2023.
- ★ **(24)** Oral presentation. L.A. Kroo, Patrick Underhill, Marissa F. Rizzi, Reed A. Nicholson, and Gareth H. McKinley. "Measuring Transient Extensional Properties in Complex Microstructured Fluids using a Composite Harmonic Exponential Waveform (CHEW)." XIXth International Congress on Rheology, Athens, Greece. July 31, 2023 (congress July 29–August 4). Abstract selected for the highly selective session "Advances in rheometrical and rheophysical methods."
- ★ **(25)** Oral presentation at the International Symposium on Food Rheology and Structure (ISFRS), Wageningen University, Wageningen, Netherlands. June 11–15, 2023. Abstract selected for the session "Rheology and Structure Methods."
- ★ **(26)** Oral presentation (invited lightning talk) and contributed poster at the Aspen Center for Physics Winter Conference, "Active Matter in Complex Environments," Aspen, Colorado. January 2023. Highly selective.
- (27)** Poster presentation at the Princeton Center for Theoretical Science workshop "Physics of Morphing Matter," Princeton, New Jersey. December 12–14, 2022.
- (28)** Soundbite oral presentation. "Adaptive and Sensory Machines: From Active Foam to Swimming Rheometers." 92nd New England Complex Fluids Conference. In-person, hosted by Brandeis University. September 23, 2022.
- ★ **(29) Invited Department Seminar (Young Investigator Lectureship).** "Adaptive and Sensory Machines: From Active Foam to Swimming Rheometers." Department of Mechanical and Civil Engineering, California Institute of Technology, Pasadena, California. May 5, 2022.
- (30)** "Adaptive and Sensory Machines." Department of Mechanical Engineering thesis defense, Stanford

University, Stanford, California. April 25, 2022.

- (31) L. Kroo (speaker), J. Binagia, M. Prakash, and E.S.G. Shaqfeh. American Physical Society Division of Fluid Dynamics Annual Meeting, Phoenix, Arizona. November 2021.
- ★ (32) **25-minute invited talk.** L. Kroo (speaker) et al. "Modified Full-Face Snorkel Masks as Reusable Personal Protective Equipment for Hospital Personnel." 7th Stanford Global Health Research Convening, virtual. January 28, 2021.
- (33) Oral presentation. Laurel Kroo. "Modified Full-Face Snorkel Masks as Reusable Personal Protective Equipment for Hospital Personnel." American Physical Society Division of Fluid Dynamics Annual Meeting, virtual (Chicago time). November 24, 2020.
- ★ (34) Kroo, Laurel (speaker), Matthew Bull, and Manu Prakash. "The Structural Adaptation of Two-Dimensional Air-Liquid Foam to Cyclic Inflation and Deflation." EUFOAM 2020 virtual meeting, hosted from Wales, United Kingdom. July 2020. EUFOAM is widely recognized as the leading conference in the world on the physics of foams and bubbles; all sessions are plenary (no parallel sessions) and participation is competitive.
- (35) Kroo, Laurel (speaker), Matthew Bull, and Manu Prakash. "Active Foam: Connecting Structure, Dynamics and Control." American Physical Society March Meeting, session "The Physics of Foams," scheduled for Denver, Colorado, March 2–6, 2020.
- (36) Kroo, Laurel (speaker), Matthew Bull, and Manu Prakash. "Active Foam: Connecting Structure, Dynamics and Control." American Physical Society Division of Fluid Dynamics Annual Meeting, Seattle, Washington. November 23, 2019.
- ★ (37) Kroo, Laurel (poster presenter), Matthew Bull, and Manu Prakash. Soft Condensed Matter Gordon Research Conference and Gordon Research Seminar. August 2019.
- (38) Kroo, Laurel (presenter), Matthew Bull, and Manu Prakash. Invited poster, Biohub Inter-lab Confab, San Francisco, California. May 2019.
- (39) Kroo, Laurel (speaker), Matthew Bull, and Manu Prakash. "Mechanics of Active Foam: Local Energy Injection in Addressable 2D Foam." American Physical Society March Meeting, Boston, Massachusetts. March 8, 2019. Abstract X63.00012.
- ★ (40) Kroo, Laurel (speaker), Matthew Bull, and Manu Prakash. Invited talk, Complex Systems Gordon Research Seminar. January 2019.
- ★ (41) Kroo, Laurel (presenter), Matthew Bull, and Manu Prakash. Poster, Complex Systems Gordon Research Conference. January 2019.
- (42) Kroo, Laurel (speaker), and Manu Prakash. "Mechanics of Active Foam: Local Energy Injection in an Addressable 2D Foam." American Physical Society Division of Fluid Dynamics Annual Meeting, Atlanta, Georgia. November 19, 2018. Abstract L08.00009.

- ★ **(43)** Kroo, Laurel (speaker) et al. Foldscope invited keynote, Global Shapers “Less is More, Doing Science the Frugal Way” conference, Rome, Italy. October 4, 2014.
- ★ **(44)** Kroo, Laurel (presenter) et al. “Printed Aspherical Micro Lenses.” Invited poster, 2014 Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN) Conference, Washington, DC.
- ★ **(45)** Kroo, Laurel (presenter) et al. Foldscope invited poster, TEDMED 2014, San Francisco, California. September 2014.
- (46)** Kroo, Laurel (speaker) et al. “Aperture-Embedded Polymer Microlenses for Ultra-Low-Cost Microscopy Platforms (Foldscope).” 2013 American Physical Society Division of Fluid Dynamics Annual Meeting. Abstract L34.00002.



STUDENT CONFERENCE PRESENTATIONS

[★] = Invited or Highly Selective

2026

- (1) Accepted oral presentation. Clara Middleton** (presenter), Zhaofeng Peng, Todd Emrick, and Laurel Kroo. “Onset of Coil-Stretch in Disperse Polymer Solutions.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.
- (2) Accepted oral presentation. Sai Srivatsa Kumar Ganugapati** (presenter), George Herring, and Laurel Kroo. “Full-field Imaging of Complex Fluids in a Cone-and-Plate Geometry on a Separated-Motor-Transducer Rheometer.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.
- (3) Accepted oral presentation. Yoon-Je Choi** and Laurel Kroo. “Examining the low-Reynolds undulatory swimmer in Newtonian and non-Newtonian fluid: beyond velocity-maximization objectives.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.
- (4) Accepted oral presentation. Zhaofeng Peng**, Parker Cole, and Laurel Kroo. “Macroscopic Arrested Network Self-Assembly in Liquid-Liquid-Phase-Separating Polymeric Fluids.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.
- (5) Accepted poster presentation. Sara Watson** (presenter) and Laurel Kroo. “Impact of hydrostatic pressure on microstructure and dynamics of dispersed materials.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.
- (6) Accepted poster presentation. Parker Cole** (presenter), Zhaofeng Peng, and Laurel Kroo. “Influence of formulation on the structure of Rayleigh-Taylor Instabilities in Evaporating Polymer Solutions.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.
- (7) Accepted poster presentation. Zhaofeng Peng** (presenter), Lucas Warwaruk, Thomas Livesay, Benjamin M. Yavitt, Randy H. Ewoldt, Gareth H. McKinley, and Laurel Kroo. “PocketCaBER and PocketDoS: Low-cost open-source tools for teaching and learning advanced topics in fluid mechanics.” 2026 Society of Rheology Annual Meeting, Boston, Massachusetts. October 25–29, 2026.

- (8) **Poster presentation. Zhaofeng Peng** (presenter), Lucas Warwaruk, Thomas Livesay, Benjamin M. Yavitt, Randy H. Ewoldt, Gareth H. McKinley, and Laurel Kroo. "PocketCaBER and PocketDoS: Low-cost open-source tools for teaching and learning advanced topics in fluid mechanics." International IUTAM Symposium on Diversity-Driven Innovations in Complex Fluids for Advanced Manufacturing, **Peking University**, Beijing. August 16–19, 2026. *Best Poster Award (Zhaofeng Peng)*.
- ★ (9) **Invited lightning talk. Zhaofeng Peng** and Laurel Kroo. "3D-Printed Frugal Science Tools for Capillary-Driven Extensional Rheometry." Inaugural UMass Amherst College of Natural Sciences (CNS) Graduate Student Research Symposium, Amherst, Massachusetts. March 26, 2026. *One of 9 selected abstracts from the entire College and the only first-year student selected.*
- (10) Poster presentation. **Yoon-Je Choi** and Laurel Kroo. "Linking the gap between Purcell swimming robot and Taylor's inextensible sheet model: beyond velocity-maximization objectives." 2026 UMass Amherst College of Natural Sciences (CNS) Graduate Student Research Symposium, Amherst, Massachusetts. March 26, 2026.



DOCTORAL STUDENTS

Andy (Yoon-Je) Choi, 2025-Present

Clara Middleton, 2025-Present (co-advised with Emerick Group)

Sai Srivatsa Kumar Ganugapati, 2025-Present

Sara Watson, 2025-Present

Zhaofeng Peng, 2025-Present



UNDERGRADUATE STUDENTS

Hagen Lu (Jan 2026–May 2026)

Parker Cole (2026-Present)

Annelise (Annie) Busch (Summer 2026 REU ASCENDS student)

Rajdeep Saha (Summer 2026 REU student)



TEACHING EXPERIENCE

PSE 704: Advanced Polymer Engineering

Spring 2026

Instructor of Record, Polymer Science and Engineering

University of Massachusetts, Amherst

Course instructor for the Rheology section of a PhD-level course on advanced polymer engineering. Topics covered included: constitutive modeling, linear and non-linear viscoelasticity, shear-thinning, rod-climbing, extensional thickening, rheometry, yield stress and thixotropy.

PSE 604: Polymer Engineering

Fall 2025

Instructor of Record, Polymer Science and Engineering

University of Massachusetts, Amherst

Course instructor the fluid mechanics section of a PhD-level course on polymer engineering. Topics covered included: Kinematics, flow types, invariants, conservation of momentum and conservation of mass, simple flow problems and approximation methods, potential flow, transient flow problems (similarity solutions and other integration methods for PDEs), polymer processing, control volumes, surface tension, capillarity and diffusion.

PSE 596: Undergraduate Polymer Research

Spring 2026

Instructor of Record, Polymer Science and Engineering

University of Massachusetts, Amherst

Course instructor for an undergrad research program; multiple students enrolled and working 1-1 with instructor on research projects (some in collaboration with graduate students; others independent study projects by the individual undergraduate student).

PSE 791A: Graduate Research Group Seminar*Instructor of Record, Polymer Science and Engineering*

Fall, Spring

University of Massachusetts, Amherst

Course instructor for weekly research seminar programme in Complex Fluids and Rheology of Adaptive Matter.

How to Build (Almost) Anything Bootcamp*Instructor, combined PhD and undergraduate PSE summer school*

Summer 2026

University of Massachusetts, Amherst

Week-long bootcamp for approximately 10 students in a combined PhD and undergraduate summer school in PSE at UMass. The five days included one day in the machine shop; one day on analog and digital circuits and sensor systems; one day on optics; one day on rheology; and one day on microfluidics.

Soft Matter Laboratory Instructor*Summer school on soft matter and food science at L'institut des Etudes Scientifiques (IES) Cargese, Corsica, France*

July-Aug 2024

Graduate-Level course Instructor for 7 labs/demos over multiple days at this Soft Matter summer school in Corsica, France over the course of a 2 week period.

Macromolecular Hydrodynamics (2.341)*Graduate-Level Course Guest Instructor at MIT*

March 2023

Cambridge, MA

2.341 is an upper-level course with an emphasis on nonlinear constitutive modelling of complex fluids. I taught a guest lecture on low-Reynolds number transport in viscoelastic fluids.

Statistical Mechanics of Macromolecules*Teaching Assistant at Stanford University*

Spring 2017

Stanford, CA

BIOE41 was a 30-seat undergraduate course focused on the statistical mechanics and physics of micro-biological systems.

Principles of Engineering (Mechatronics)*Teaching Assistant at Olin College*

2011 - 2013

Needham, MA

This upper-level undergraduate course was a project-based mechatronics course. I was responsible for holding regular office hours and supporting/debugging systems for 5 teams in interdisciplinary mechanical/electrical hardware projects.

Introduction to Analog Circuits*Teaching Assistant at Olin College*

Fall 2011

Needham, MA

Called "Modelling and Controls" in the course catalog, this course focused on intro to analog circuits. My position required weekly office hours / lectures, grading and support of a section.

Most recent anonymous PSE 704 course reviews

"Overall rating of instructor's teaching?" 4.8/5

PSE 704: Rheology for Advanced Polymer Engineering (graduate level) — Spring 2026

- "Professor Kroo was more organized and confident leading class and she made sure she covered her material in the time we had. She's very passionate about her class content." — Spring 2026 PSE 704 student
- "I really enjoyed that Prof. Kroo started the class with an overview of why this subject is important, and kept coming back to real research applications. It helped me stay interested. Also, the assigned reading chapter was SUPER helpful." — Spring 2026 PSE 704 student
- "the pace was fast." — Spring 2026 PSE 704 student
- "I liked the demos that she had, and I thought that they were helpful to supplement the lectures." — Spring 2026 PSE 704 student

PSE 604: Fluid Mechanics for Polymer Engineering (graduate level) — Fall 2025

- "I believe that what made the biggest difference in my learning process during this class was how interactive and hands-on Dr. Kroo made the lectures. This approach helped me avoid feeling completely lost, as I was able to work with other students while solving real-world problems that connected the material to everyday phenomena. Even with the heavy math in this course, these activities helped me understand the concepts behind the equations and relate them to the world around me." — Fall 2025 PSE 604 student
- "Dr. Kroo was very engaging and cares deeply that we learn and find interest in the material. She was always quick to upload course materials on canvas, was very receptive to questions, and hosted extra office hours for help (with snacks!). I think that she is a great professor." — Fall 2025 PSE 604 student
- "I want to express my gratitude for Dr. Kroo's kindness and her continuous effort to support her students' learning." — Fall 2025 PSE 604 student
- "I thought that the homework problems challenged me to think critically and accurately assessed my understanding of the material. I also enjoyed the interactive elements of the class, as they gave me a real life example of the topics discussed in lecture." — Fall 2025 PSE 604 student
- "Every time I reached out to her with concerns, insecurities, or suggestions for alternative approaches, she did everything she could to help. She never hesitated to answer even my most basic questions, and I always felt safe asking her anything, especially when I struggled to articulate my thoughts clearly. This made an enormous difference in my learning process. She inspires me to become the kind of instructor she is: non-judgmental, patient, open to questions, and genuinely committed to supporting students." — Fall 2025 PSE 604 student

BIO 41: Statistical Mechanics of Macromolecules (undergraduate level) — Spring 2017

- "Helpful and Patient" about fermi problem questions.."
- "[Laurel taught me] how to think about macrostates and microstates, how to think
- "solid understanding of material"
- "Laurel has greatly helped my understanding

of the ideas/topics discussed in this course, specifically those relevant to the problem set questions which in turn fostered my ability to show my thinking."

- "Laurel was the most enthusiastic about our learning/understanding and the one that demonstrated the most how much she cared about our growth by working with the students to translate our concerns and inquiries to Manu. I can tell she was the most devoted towards supporting this course, which I very much appreciate."
- "She helped me think critically about the prob-

lem at hand and reflect on my own answers."

- "I learned about combinatorics and stat mech (from Laurel)"
- "hardworking and reachable"
- "Laurel was well prepared for sections and seemed to handle questions regarding the class, course material, and psets very well"
- "I learned how to improve my approaches to open problems and estimation problems."
- "Happy to set up time to meet outside of class"
- "She was always happy to answer questions"



ACADEMIC SERVICE

Committees, Panels, and Conference Sessions

- Symposium Organizer for the 2026 "Field Responsive Materials" session at the Society of Rheology conference.
- Chair of the technical session "Fluids I," *2026 APS Global Physics Summit (APS March Meeting)*, Denver, Colorado.
- Co-organizer/co-chair of the session "Rheology for Soft Robotics and Use of Field-Responsive Materials," *2025 Society of Rheology Annual Meeting*, Santa Fe, New Mexico.
- Member of the Local Organizing Committee, *2026 Society of Rheology Annual Meeting*, Boston, Massachusetts.
- Participated as a referee in a 2026 National Science Foundation (NSF) Chemical, Bioengineering, Environmental, and Transport Systems (CBET) review panel.
- Discussion leader/group reporter for National Academies workshop on "Materials that Learn". Washington D.C. October 2025.

Referee for top peer-reviewed journals in Polymeric Fluids

March 2023 - Present

Reviewer for:

Cambridge, MA

- Journal of Rheology (JoR), *American Institute of Physics, through AIP Publishing*
- Journal of Fluid Mechanics (JFM), *Cambridge University Press*
- Physical Review Fluids, *American Physical Society*
- Scientific Reports, *Springer Nature*
- Physics of Fluids, *American Institute of Physics Publishing*
- Proceedings of the National Academies of Sciences (PNAS), *National Academy of Sciences*
- Soft Matter, *Royal Society of Chemistry*

MIT Postdoctoral Association

2022 - 2023

Elected Chairwoman of the Committee on Professional Development and member of the DEI Committee Cambridge, MA

Prakash Lab Shop, Stanford University
Machine Shop Manager

2014-2017
Stanford, CA

Microcosmos Website Co-Manager/Co-Developer/Co-Founder, Stanford University
Volunteer Developer

2015-2016
Stanford, CA

INDUSTRY EXPERIENCE

Diffract Technology, Inc.

Member of the Scientific Advisory Board

September 2021 - September 2025
Menlo Park, CA

Harley Davidson Motorcycles

Technical Team Lead, Olin Senior Capstone Team

September 2013 - May 2014
Needham, MA and Milwaukee, WI

Apple Inc.

Mechanical Engineering Intern

May 2012 - Aug 2012
Sunnyvale, CA

Desktop Aeronautics Inc.: Novel Wind Turbine Rotor Design

Environmental Engineering Intern

May 2011 - Aug 2011
Mountain View CA

Zee.Aero (formerly KittyHawk, Wisk): Rotor Design for Acoustics

Mechanical Engineering Intern

May 2010 - Aug 2010
Mountain View CA

National Aeronautics and Space Administration (NASA)

Simulation Intern on Rocket Orion Team

June 2009 - Aug 2009
Ames Research Center, Mountain View CA

RESEARCH IMPACT HIGHLIGHTS (NEWS, PUBLICLY ATTENDED LECTURESHIPS, ETC.)

- During the **annual William R. Schowalter Lecture** in 2021, Professor Eric S.G. Shaqfeh prominently featured my work on torque-free robotic swimming rheometers to the American Institute of Chemical Engineers community. ([Link](#))
- **Washington Post wrote an article on our COVID-19 research response efforts** in 2020. I am the scholar pictured in the associated photographs, developing the technology. Available here: [Link](#)
- **Stanford Medicine's newspaper SCOPE, along with many others internationally** did features on our COVID work in 2020 ([Link](#)). Quote from this article:
"One of the senior PhD students, Laurel Kroo, was in the final stretches of completing her graduate work, and without hesitation, she dropped everything to work on this effort. That's just one example of the dedication my lab and our collaborators have shown to this project." - Prof. Manu Prakash
- **Quanta Magazine 2022 Feature Article:** "This Animal's Behavior Is Mechanically Programmed" ([Link](#)) discusses work that I did with my friend and collaborator, Dr. Matthew Bull, in the Prakash lab on neuronal-like information processing with massively parallelized soft mechanical structures (publication 13 listed, Bull, et al. 2021).
- **The New Yorker:** 2015 article "through the looking glass" ([Link](#)) briefly discusses our work on lens manufacturing (related to publication item no. 16, "Optical Lens Fabrication" patent).
- **Gave an Opening Keynote Address to Maker Faire Europe, to an amphitheatre of approximately 1,100 attendees**, on the topic of the Fifty-Thousand Microscope Project (by invitation of the organizing committee through my advisor, Prof. Manu Prakash). This was on October 2nd, 2014 in the Auditorium Parco Della Musica in Rome, Italy. [Link](#) to my talk. In 2014, we wanted to reach 10,000 users; now in 2023, Foldscope has reached over 1.6 **million** users.