Mahima Srivastava

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Education

Chemical Engineering, Ph.D.
University of Maryland College Park — Aug 2021 – May 2026 (Expected)
GPA: 4.0/4.0
Chemical Engineering, B. Tech.
Indian Institute of Technology Kanpur — Jul 2015 – Jun 2019

Professional Summary

Ph.D. candidate with expertise in biologics formulation, surfactant-protein interactions, and polymer-based material design. Experienced in translating technical briefs into scalable products through cross-functional collaboration, specification development, stability evaluation, and regulatory-conscious documentation. Proven track record in DOE, SOP development, patent strategy, and process optimization from concept to commercialization readiness.

Product Development and Technical Leadership

- Led end-to-end formulation design, optimization, and validation of structured fluids and polymer-based systems.
- Developed product performance standards and rheological specifications to meet defined use requirements.
- Conducted analytical testing and stability assessments to ensure reproducibility and quality compliance.
- Supported scale-up and pilot production through process optimization and cross-functional coordination.
- Contributed to intellectual property strategy and technical documentation for commercialization.

Skills

- **Formulation and Product Development:** Formulations, polymer gels, surfactants, biologics (mAb, ADC), structured fluids, liposomes, emulsions, vesicles, lipid nanoparticles, stability testing, performance benchmarking, ASTM standards, specification development, regulatory documentation
- **Characterization:** Rheology, UV-Vis, DLS/NTA, Zeta Potential, HPLC-MS, DSC, TGA, FTIR, DMA, SEM-EDX, XRD, Tensiometry, Lyophilization, Flow Cytometry
- **Technical Tools:** Python, MATLAB, JMP, C++, Java, ANSYS, Chromeleon CDS, ImageJ, Origin, GraphPad, ChemDraw, Microsoft Office, Technical Writing (SOPs/Reports), ELN systems

U.S. Patent and Invention Disclosure

- **Mahima Srivastava**, Hema Choudhary, Srinivasa R. Raghavan, and Ronald N. Goodman
  Plastic products that can be rapidly degraded on-command. U.S. Provisional Patent App. No. 63/679,017 (2025)
- **Mahima Srivastava**, Sai Nikhil Subraveti, Sairam Ganesh, and Srinivasa R. Raghavan
  Soft Materials that absorb impact. U.S. Patent App. No. 18/640,988 (2024)

Work and Collaboration Experience

- **Industrial Research Collaborator,** University of Maryland College Park — Oct 2025 – Present
  Led formulation development and optimization of biopolymer-based hemostatic products in collaboration with Medcura, Inc. ensuring performance, safety, stability and quality standards were met for translational use. Established rheological specifications (G', injectability thresholds) and validated performance through standardized testing to meet catheter-delivery requirements.
- **Technical Advisor – Patent Commercialization** — June 2025 – Present
  Collaborated with business development teams to assess market opportunities, and scale-up considerations and supported knowledge transfer of formulation insights to external partners through structured documentation.
- **Programming Analyst,** Citicorp Services Pvt. India. Ltd., Pune, India — Aug 2019 – Aug 2021
  Built and deployed Docker-containerized Java and Python applications on Kubernetes, creating a scalable and reproducible pipeline for automated data analysis.

Research Experience

Doctoral Research Candidate, University of Maryland — Jan 2022 – Present

- **Zero-Order Drug Delivery:** Developed controlled-release polymer formulations with defined performance specifications; conducted stability, diffusion, and analytical validation (HPLC, UV-Vis) to ensure reproducibility and quality benchmarks.
- **Imaging Biomarker for PDAC:** Designed avidin-biotin-functionalized liposomal MRI contrast agents carrying biotinylated anti-CA-19-9 antibodies and gadolinium; used SEC to separate antibody-conjugated liposomes from free antibodies.
- **Tissue Mimic:** Performed comprehensive rheological and mechanical characterization of animal tissues in small and large deformation regimes; developed hydrogels with tunable viscoelastic properties to mimic native tissues.
- **Intranasal Delivery of Naloxone**: Formulated CO_2-triggered surfactant gel-to-sol transition system using economic and biocompatible molecules; demonstrated reversibility and 10-million-fold viscosity changes in $t < 2$ minutes.
- **Stimuli-Triggered Organogel Degradation:** Developed DBS organogels that can be degraded with a stimuli, with programmable lifetimes (minutes-days); used NMR and MS to explain acid-catalyzed degradation mechanisms.
- **Impact-Absorbing Materials:** Developed eco-friendly strong gels capable of absorbing impact forces for protective applications in fragile material packaging; varied design parameters (G', tan δ, hysteresis area) to maximize energy dissipation; developed birefringent hydrogels to function as visual impact-sensors.
- **On-Demand Degradable Plastics**: Synthesized novel degradable polymer materials meeting ASTM mechanical standards; optimized crystallization and processing parameters to enable bench-to-pilot scale transition while maintaining product specifications and performance consistency.

Undergraduate Research Assistant, IIT Kanpur Jul 2018 – Jun 2019
- **Granular Flows Modeling**: Performed simulations for viscoplastic fluid models in COMSOL and discrete element method (DEM) simulations for 2D, steady-state, granular flow dynamics on inclined surfaces, achieving strong correlation between continuum and particle-based models.

Undergraduate Research Assistant, IIT Bombay Dec 2016 – Jan 2017
- **Identifying Binding Pockets of Sialic-Acid Binding Proteins**: Designed the algorithm to read protein data from RCSB database and identify the probable binding sites of sugar, in Python; verified the classification using SCOP.

Publications

- **Srivastava, M,** Molkara, R., & Raghavan, S.R.
  Ultra-Shear-Thinning Hemostatic Gel Injectable Through a Catheter. *Manuscript ready.*
- **Srivastava, M.**, Choudhary, H., Varisco, D., Hsu, M., Chen, P.Y., Goodman, R. N., & Raghavan, S.R.
  Plastic Products that Can be Rapidly Degraded On-Demand. *Submitted*
- **Srivastava, M,** Nader, M., Varisco, D., & Raghavan, S.R.
  Zero-order Drug Delivery Enabled by Polymeric Skin Around a Hydrogel. *Submitted.*
- Colton, A., Halli, R.N., Ma, M.R., Nori, T., Muller, L.K., **Srivastava, M**., et. al. Geometric Determinants of Sinterless, Low-Temperature-Processed 3D-Nanoprinted Glass. *Microsystems & Nanoengineering, 11(1), p.145.*
- Borden L. K., Nader, M.; Burni, F., Grasso, S., Ortega, I., **Srivastava, M**., et. al.
  Switchable Adhesion of Hydrogels to Plant and Animal Tissues. *Advanced Science, 2411942.*

Leadership & Teaching

Instrumentation Training & Lab Safety Jan 2022 – Present
- Trained new members on core laboratory instruments (Rheometer, SEM, DLS, UV-vis, Tensiometer, Lyophilizer).
- Developed SOPs to ensure consistent operation, troubleshooting and data quality.
- Trained lab members on waste management and PPE for 4+ years and maintained compliance with institutional EHS.

Research Mentor Jan 2022 – Present
- Supervised five undergraduates in our lab group and helped 3 of them to secure financial aid through UMD ASPIRE program.
- Received formal training on being a mentor and mentored a high school student as a part of Center for the Improvement of Mentored Experience in Research (CIMER).

Graduate Teaching Assistant Aug 2022 – May 2023
- Provided instructional support and led discussions and tutoring sessions for Bionanotechnology and Process Dynamics and Controls.

Conference Presentations

- **Srivastava, M.**, Nader, M., Varisco, D., & Raghavan, S.R.

Can hydrogels Mimic the Rheology of Animal Tissues?
Pacifichem 2025, Honolulu, HI

- **Srivastava, M.**, Choudhary, H., Varisco, D., Hsu, M., & Raghavan, S.R.
  Bioplastics that Can be Degraded On-Command within Minutes.
  Pacifichem 2025, Honolulu, HI
- **Srivastava, M.**, & Raghavan, S.R.
  Designing Gels That Mimic the Rheology of Animal Tissues.
  2025 AIChE Annual Meeting, Boston, MA
- **Srivastava, M.**, Choudhary, H., Varisco, D., Hsu, M., & Raghavan, S.R.
  On-Demand Degradation of Bioplastics into Soil-Enriching Compost.
  2025 AIChE Annual Meeting, Boston, MA
- **Srivastava, M.**, Nader, M., Varisco, D., & Raghavan, S.R.
  Are Animal Tissues Elastic or Viscoelastic? *(Invited Poster)*
  Annual Burgers Symposium 2025, University of Maryland, MD
- **Srivastava, M.**, Nader, M., Varisco, D., & Raghavan, S.R.
  Viscoelasticity of Animal Tissues and Hydrogels. *(Poster)*
  Biomedical Engineering Society Meeting (BMES) 2024, Baltimore, MD
- **Srivastava, M.**, & Raghavan, S.R.
  How Viscoelastic are Tissues? Insights into Tissue Rheology and on Gels That Can Mimic the Same.
  Society of Rheology Meeting 2024, Austin, TX
- **Srivastava, M.**, Choudhary, H., Philip, I. M., & Raghavan, S.R.
  Can Plastics be degraded in Minutes? Yes, on-demand. *(Poster)*
  ACS Spring Meeting 2024, New Orleans, LA
- **Srivastava, M.**, & Raghavan, S.R.
  Using CO_2 to Modulate Self-Assembly and Rheology: Viscosity Change in Surfactant Fluids Induced by CO_2.
  International Congress on Rheology 2023, Athens, Greece
- **Srivastava, M.**, Ganesh, S., Subraveti, S. N., Nguyen, D., & Raghavan, S.R.
  Designing Gels to Absorb Impact—How a Thin Gel Can Protect an Egg from Breaking.
  MRS Spring Meeting 2023, San Francisco, CA
- **Srivastava, M.**, Zhou, C., & Raghavan, S.R.
  Using CO_2 to modulate self-assembly: Viscosity increase or decrease in surfactant fluids induced by CO_2.
  MRS Spring Meeting 2023, San Francisco, CA

Awards and Honors

- Laboratory Safety Culture Spotlight Award – *University of Maryland College Park 2026*
- MPower Early Scholars Grant – *University of Maryland College Park 2025*
- Kulkarni Foundation Summer Research Fellowship – *University of Maryland College Park 2025*
- "Start a SUD Startup" Challenge Winner – *National Institute on Drug Abuse (NIDA) 2023*
- Goldhaber Travel Award Recipient – *University of Maryland College Park 2023*
- Outstanding Teaching Assistant – *University of Maryland 2023*
- Vibha Gold Medal – *Indian Institute of Technology Kanpur 2019*