

PANKAJ ROHILLA

Drug Delivery | Medical Devices | Biological Fluid Dynamics

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➤ EDUCATION

Ph.D. , Chemical Engineering, Texas Tech University	<i>Aug 2017- Aug 2022</i>
M.Tech , Chemical Engineering, Indian Institute of Technology Kharagpur	<i>Aug 2014- May 2016</i>
B.Tech , Chemical Engineering, Kurukshetra University	<i>Aug 2009- May 2013</i>

➤ EMPLOYMENT

Eckert Postdoc Fellow, Chemical and Biomolecular Engineering, **Georgia Tech** *Aug 2022-Present*
Adviser: [Saad Bhamla](#) and [Mark Prausnitz](#)

- Low-cost hardware for intradermal delivery of nucleic acid therapeutics and vaccines.
- Human tolerance of electroporation in human subjects.
- Studied in vivo protein and gene expression, humoral immune response, serum biomarkers, reticulocyte counts, and hematocrit levels for Erythropoietin encoding mRNA and SARS-CoV-2 antigens.
- Fluid ejection in nature and interfacial fluid dynamics in water-walking insects to inform bioinspired designs for applications in drug delivery and additive manufacturing.

Graduate Research Assistant, Chemical Engineering, **Texas Tech University** *Aug 2017- May 2022*
Adviser: [Jeremy Marston](#)

- Optimized drug delivery efficiency of spring-powered needle-free jet injectors to nearly 100% by analyzing and leveraging the underlying injection hydrodynamics.
- Developed and assessed the feasibility of novel intradermal drug delivery methods, including tattooing, laser-induced jetting, and spark-induced jetting.
- Studied how eye medication droplets spread on an eye replica to reduce drug wastage.
- Studied fluid driven cracking in hydrogels for applications in drug delivery and hydraulic fracturing.

Project Officer, Chemical Engineering, **IIT Madras** *Dec 2016- Jun 2017*
Advisers: [MG Basavaraj](#), [S Thampi](#), and [M Manivannan](#)

- Detection of critical micelle concentration via spreading oil drops on surfactant solutions.

Junior Research Fellow, Chemical Engineering, **IIT Bombay** *Jun 2016- Dec 2016*
Adviser: [Jyoti Seth](#)

- Stochastic modeling of particle aggregation using Stokesian Dynamics.

Graduate Assistant, Chemical Engineering, **IIT Kharagpur** *Mar 2015- June 2016*
Adviser: [Somenath Ganguly](#)

- Charge transport in carbon electrodes for supercapacitors.

➤ AWARDS AND HONORS

Top 20 Scientific Contributions , <i>Controlled Release Society Meeting</i> , Bologna, Italy	<i>2024</i>
Robert M. Nerem Travel Award , Georgia Tech	<i>2023</i>
Eckert Postdoctoral Fellowship Award , Georgia Tech (ChBE)	<i>2022</i>

Horn Distinguished Professors Graduate Achievement Award , Texas Tech University	2022
Best Poster Award , Annual Chemical Engineering Research Fair, Texas Tech University	2022
APS March FGSA Travel Award , Texas Tech University	2022
Poster Award Winner , AIChE Fall Meeting (FP & BE Division)	2021
Study Abroad Competitive Scholarship (SACS) , Texas Tech University	Fall 2021
Graduate School Travel Award , Texas Tech University	Fall 2019, 2021
Best Judge, 3 minute presentation , Society of Plastics Engineers, Texas Tech	Spring 2021
Mark Demark Scholarship , Texas Tech University	Spring 2021
NSF I-Corps (Regional) , Texas Tech University	Fall 2020
Graduate Student Research Support Award , Texas Tech University	Spring 2020
MHRD Scholarship , Indian Institute of Technology, Kharagpur	2014-2016




PATENTS


1. Azizoglu, E., **Rohilla, P.**, Bhamla, S., and Prausnitz, M. S. "Multiple pulse generator", **U.S. Provisional Patent Application No. 63/398,123**, filed July 3, 2025.

PUBLICATIONS

Google Scholar 

* indicates equal contribution.

18. Ortega, V.M., Yee, T., **Rohilla, P.**, Seleb, B.R., Belair, J., and Bhamla, M. S. "Flamingos use L-shaped beak and morphing feet to induce vortical traps for prey capture", **PNAS**, 122 (21), e2503495122 (2025).
: [ScienceDaily](#) | [SciTechDaily](#) | [Greek Reporter](#)
17. **Rohilla, P.***, Choi, D.*, Wallace, H., Yung, K., Deora, J., Lele, A. and Bhamla, M. S. "Mastering the Manu – How humans create large splashes", **Royal Society - Interface Focus**, 15: 20240056 (2025).
: [The Conversation](#) | [WSJ](#) | [ScienceNews](#) | [New Scientist](#) | [USA Today](#) | [CBC Radio](#) | [Newsweek](#)
16. Lawal, I. *, **Rohilla, P.***, Rodriguez, E., Pham, P. and Marston, J. O. "Delivery of viscous drops and jets to eyeball replicas", **International Journal of Pharmaceutics**, 674 (125400), (2025).
15. **Rohilla, P.*** O'Neil, J. *, Jimenez, V. O., Choi, D., and Bhamla, M. S., "Interfacial vortex recapture enhances thrust in tiny water skaters", **bioRxiv** (2025).
14. Lu, C*, **Rohilla, P.***, Felner, E. I., Byagathvalli, G., Azizoglu, E., Bhamla,, M. S. and Prausnitz, M R. "Tolerability of a piezoelectric microneedle electroporator in human subjects", **Bioengineering and Translational Medicine**, 9 (4), e10662 (2024).
13. O'Neil, J., Yung, K. L., Difini, G., **Rohilla, P.**, and Bhamla, M. S. "Limb loss and specialized leg dynamics in tiny water-walking insects", **Integrative and Comparative Biology**, 64 (3), 1034-1043 (2024)
12. Challita, E. J., **Rohilla, P.**, and Bhamla, M. Saad. "Fluid ejections in nature", **Annual Review of Chemical and Biomolecular Engineering**, 15 (2024).
: [ARS Technica](#)
11. **Rohilla, P.**, and Marston, J. O. "Focused high-speed liquid jets induced via low-voltage sparks in capillary tubes", **Experiments in Fluids**, 64 (5), 90 (2023).
10. **Rohilla, P.**, Khusnatdinov, E., and Marston, J. O. "Effect of air pockets in drug delivery via jet injections", **International Journal of Pharmaceutics**, 602, 120547 (2021).

9. Lawal, I., **Rohilla, P.**, and Marston, J. O. "Visualization of drug delivery via tattooing: effect of needle reciprocating frequency and fluid properties", *Journal of Visualization*, 1-9 (2022).
8. Shahriar, M.* , Rewanwar, A.* , **Rohilla, P.*** , and Marston, J. O. "Understanding the effect of counterpressure buildup during syringe injections", *International Journal of Pharmaceutics*, 602, 120530 (2021).
7. **Rohilla, P.**, and Marston, J. O. "Feasibility of laser induced jets in needle-free jet injections", *International Journal of Pharmaceutics*, 589, 119714 (2020).
 *New Scientist*
6. **Rohilla, P.**, Lawal, I., Blanc, A.L., O'Brien, V., Weeks, C., Tran, W., Rane, Y.S., Khusnatdinov, E., and Marston, J.O. "Loading effects on the performance of needle-free jet injections in different skin models", *Journal of Drug Delivery Science and Technology*, 60, 102043 (2020).
5. Deodhar, S., **Rohilla, P.**, Manivannan, M., Thampi, S.P., and Basavaraj, M.G. "Robust method to determine critical micelle concentration via spreading oil drops on surfactant solutions", *Langmuir*, 36 (28): 8100-8110 (2020).
4. **Rohilla, P.**, Rane, Y.S., Lawal, I., Blanc, A.L., Davis, J., Thomas, J.B., Weeks, C., Tran, W., Fisher, P., Broderick, K.E., Simmons, J.A. and Marston J.O., "Characterization of jets for impulsively-started needle-free jet injectors: Influence of fluid properties", *Journal of Drug Delivery Science and Technology*, 53, 101167 (2019).
3. **Rohilla, P.** and Marston, J. O. "In-vitro studies of jet injections", *International Journal of Pharmaceutics*, 568, 118503 (2019).
2. **Pankaj**, Chavhan, M.P. and Ganguly, S., "Charge transport in activated carbon electrodes: the behaviour of three electrolytes vis-à-vis their specific conductance", *Ionics*, 23, 2037 (2017).
1. Chavhan, M.P., **Pankaj** and Ganguly, S. "Charge transport in carbon electrodes made by electrospray of precursor sol and subsequent carbonization in situ", *Journal of Solid State Electrochemistry*, 22, 7 : 2149-2157 (2018).

WORK IN PROGRESS

* indicates equal contribution.

5. **Rohilla, P.***, Azizoglu, E*, Lele, A., Park, S., Prausnitz, M., and Bhamla, S. "Low-cost, handheld electroporators for simplified nucleic acid delivery in skin", *Bioengineering and Translational Medicine*, *Under review* (2025).
4. **Rohilla, P.**, Bhamla, M.S., and Prausnitz, M.R., "An ultra-low-cost electroporator for mRNA delivery", *In progress* (2025).
3. Challita, E., Harrison, J., **Rohilla, P.**, and Bhamla, M. S., "Viscoelastic jets from ultrasmall nozzles in termites", *In Preparation*, (2025).
2. **Rohilla, P.**, Lawal, I., Williams, N., and Marston, J. O., "Early-time dynamics of fluid driven cracks", *In submission* (2025).
1. **Rohilla, P.**, Williams, N., and Marston, J.O., "Fluid driven cracking in multilayered hydrogels with high-speed liquid jets", *In submission* (2025).

➤ FUNDING

Total Funds Raised: > \$ 210,000

1. Eckert Postdoctoral Fellowship Award: \$110,000

Won the competitive fellowship to obtain funding for 2 years towards monthly salary and travel funds.

2. Georgia Research Alliance Grants - Phase I & II (PIs: Saad Bhamla & Mark R. Prausnitz): >\$100,000

Drafted grant proposal and reports.

➤ PRESENTATIONS

Invited

4. Keynote Lecture - 4th International Conference on Future Technologies in Manufacturing, Automation, Design & Energy (NIT Trichy, India), *Fluid ejections in nature* (Dec 2024)
3. University of Alabama (Tuscaloosa, AL), Chemical and Biological Engineering *Addressing global health challenges using high-speed liquid jets and ultra-low-cost tools* (Jan 2024)
2. Georgia Institute of Technology (Atlanta, US), Quantitative Biosciences, *Principles of locomotion - Water walkers* (Nov 2023)
1. Karolinska Institutet (Stockholm, Sweden), April 2023. *Ultra-low-cost electroporator for intradermal delivery of nucleic acids.* (Apr 2023)

Contributed

23. Microneedles Conference, Brisbane, Australia, 2025, *A piezoelectric low-cost electroporator for mRNA delivery* (Oral)
22. Global Physics Summit, Anaheim, CA, 2025, *Fluid ejection via micron-scale soft nozzles enables Marangoni propulsion in tiny water skaters* (Oral)
21. The Society for Integrative and Comparative Biology - Annual Meeting, Atlanta, GA, 2025, *Mastering the manu: how humans create large splashes.* (Oral)
20. American Institute of Chemical Engineers - Annual Fall Meeting, San Diego, CA, 2024. *Epatch: An Ultra-Low-Cost Handheld Electroporator for Intradermal Delivery of mRNA.* (Oral)
19. American Institute of Chemical Engineers - Annual Fall Meeting, San Diego, CA, 2024. *Vortical Interactions in nature.* (Oral)
18. American Physical Society - March Meeting, Minneapolis, MN, 2024, *Vortical interactions in nature.* (Oral)
17. American Physical Society - March Meeting, Minneapolis, MN, 2024, *Vortex interactions in Water-walking insects.* (Poster)
16. The Society for Integrative and Comparative Biology - Annual Meeting, Seattle, WA, 2023, *Small yet fast water-walkers: vortex interactions during water locomotion in Microvelia.* (Oral)
15. American Physical Society - Division of Fluid Dynamics Meeting, Washington DC, 2023. *Studying vortex interactions in water walking insects using physical and computational fluid dynamics.* (Oral)
14. American Institute of Chemical Engineers - Annual Fall Meeting, Orlando, FL, 2023. *Electroporation-Mediated Delivery of mRNA in the Skin Using a Low-Cost Handheld Electroporator.* (Oral)

13. American Physical Society - March Meeting, Las Vegas, NV, 2023. *Impact of vortex recapture in water-walking Microvelia using a physical model and computational fluid dynamics.* (Oral)
12. The Society for Integrative and Comparative Biology - Annual Meeting, Austin, TX, 2023, *Physical and computational models of vortex recapture during Microvelia's walking on water.* (Oral)
11. American Physical Society - March Meeting, Chicago, IL, 2022, *Spark-induced drops and jets.* (Oral)
10. CHEGSA Symposium - Tech University, Lubbock, TX, 2022, *Optimizing needle-free jet injections for intradermal drug delivery.* (Poster). **First Prize.**
9. Graduate School Symposium - Tech University, Lubbock, TX, 2022, *Optimizing needle-free jet injections for intradermal drug delivery.* (Poster)
8. American Physical Society - Division of Fluid Dynamics Meeting, Phoenix, AR, 2022. *Early-time dynamics of fluid-driven cracks.* (Oral)
7. American Institute of Chemical Engineers - Annual Fall Meeting, Boston, MA, 2021. *Optimizing needle-free jet injections for intradermal drug delivery.* (Poster). **Best Poster Award.**
6. American Institute of Chemical Engineers - Annual Fall Meeting, Boston, MA, 2021. *Early-time dynamics of fluid-driven cracks.* (Oral)
5. Graduate School Symposium - Texas Tech University, Lubbock, TX, 2021, *Laser-induced jets for drug delivery.* (Poster)
4. American Physical Society - Division of Fluid Dynamics Meeting, Seattle, WA, 2019. *Effect of applied load and jet dispersion on efficiency of needle-free injections.* (Oral)
3. American Physical Society - Division of Fluid Dynamics Meeting, Atlanta, GA, 2018. *In-vitro studies of jet injection dynamics.* (Oral)
2. International Conference on Material Science and Engineering, Kottayam, India, 2016. *Impedance Spectroscopy Studies for Supercapacitors based on different electrolytes.* (Poster).
1. Annual Session of Indian Institute of Chemical Engineers, IIT Guwahati, India, 2015. *Modeling of Electric Double layer Capacitors.* (Poster).

► TEACHING EXPERIENCE

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| 3. Advanced Chemical Engineering Techniques, CHE 5310 (Teaching Assistant) | Fall 2018 |
| 2. Engineering Materials Science, CHE 3330 - (Teaching Assistant) | Spring 2018 |
| 1. Chemical Engineering Thermodynamics II, CHE 3322 - (Teaching Assistant) | Fall 2017 |

► MENTORSHIP

- Individually supervised 24 high school^α, undergraduate^β and graduate students^γ in summer and semester-long research projects.
- [†]Co-authors in peer-reviewed publications.
- [‡]Won the President's Undergraduate Research Award (Georgia Tech) or the Undergraduate Research Award (Texas Tech) in my mentorship.

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| 24. Sion Park ^{β,‡} | Georgia Tech | Fall 2024- Present |
| 23. Jace Holmes ^β | Georgia Tech | Fall 2024 |
| 22. Sarah Bender ^β | Georgia Tech | Fall 2024- Present |

21. Atharva Lele ^{β,\ddagger}	Georgia Tech	Fall 2023- Present
20. Annika Joshi ^{α}	Johns Creek High School	Fall 2023- Summer 2024
19. Johnathan O'Neil ^{\dagger}	Georgia Tech	2022-2024
18. Holden Walker ^{β,\dagger,\ddagger}	Georgia Tech	Fall 2022-Spring 2023
17. Nihanth Pinakka ^{β}	Georgia Tech	2022-2023
16. Breanna Carruth ^{β}	Texas Tech University	2021-2022
15. Eliana Rodriguez ^{β}	Texas Tech University	Spring 2022
14. Elina Khusnatdinov ^{β}	Texas Tech University	2021- 2022
13. Emil Khusnatdinov ^{β,\dagger}	Texas Tech University	2020- 2022
12. Noah Williams ^{β}	Texas Tech University	2020- 2022
11. Md. Shahriar ^{\dagger}	Texas Tech University	2019- 2020
10. Ankit Rewanwar ^{\dagger}	Texas Tech University	2019- 2020
9. Cormak Weeks ^{β,\dagger,\ddagger}	Texas Tech University	2019- 2022
8. Whitney Tran ^{β,\dagger}	Texas Tech University	2019- 2022
7. Veronica O'Brien ^{α,\dagger}	Margaret Talkington School	Summer 2019
6. Pedro Mallet	Fed. Flum. University, Brazil	Summer 2019
5. Andrew Le-Blanc ^{β,\dagger}	Texas Tech University	Spring 2019
4. Justin Davis ^{β,\dagger}	Texas Tech University	2019
3. Idera Lawal ^{\dagger}	Texas Tech University	2018-2019
2. James B. Thomas ^{β,\dagger}	Texas Tech University	2018
1. Haley Slook ^{β}	Texas Tech University	Fall 2018

SERVICE

SESSION CHAIR of the following:

- American Physical Society March Meeting (2023)
- American Physical Society - Division of Fluid Dynamics Meeting (2023)
- Society of Integrative and Comparative Biology Annual Meeting (2024, 2025)

LEADERSHIP in the following positions:

- Vice-President, Chemical Engg. Graduate Student Association, Texas Tech (2018-2019)
- Graduate Student Rep., Chemical Engg. Student Advisory Council, Texas Tech (2018-2019)

REVIEWER in the following peer-reviewed journals:

- Bioengineering and Translational Medicine
- Journal of Drug Delivery Science and Technology
- Journal of Heat and Mass Transfer
- Scientific Reports
- Royal Society Proceedings B
- HardwareX.

VOLUNTEER in the following outreach activities:

- Zoo Biomechanics Day, Atlanta (2023, 2024)
- Atlanta Science Festival (2024)
- Workshops in Peru (Rural and Local Girls' Primary Schools, Porto Maldonado and Lima) (2022)
- Annual Science Fair, Lubbock, TX (2019)

PROFESSIONAL MEMBERSHIPS

MEMBER of the following societies:

American Institute of Chemical Engineers (AIChE) | American Physical Society (APS) | Controlled Release Society (CRS) | The Society of Integrative and Comparative Biology (SICB) | Society of Plastic Engineers

➤ REFERENCES

Saad Bhamla, Assoc. Professor, Georgia Institute of Technology

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Mark R. Prausnitz, Professor, Georgia Institute of Technology

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Jeremy O. Marston, Assoc. Professor, Texas Tech University

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