

PANKAJ ROHILLA, Ph.D.

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📍 EDUCATION

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

📍 EMPLOYMENT

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

- *Development of low-cost hardware (electroporator) for intracellular delivery of mRNA and studying in vivo protein expression, cell viability immune response, and for vaccines and therapeutics.*
- *Evaluated the tolerability of the low-cost electroporator in human subjects.*
- *Interfacial locomotion of water-walking insects*
- *Viscoelastic jetting in tiny biological systems*
- *Fluid dynamics of flamingo feeding*
- *Fluid dynamics of recreational water sports*

Graduate Research Assistant, Chemical Engineering, **Texas Tech University** *2017- 2022*

Adviser: [Dr. Jeremy Marston](#)

- *Optimized the performance of needle-free jet injectors by understanding the hydrodynamics of jet injections*
- *Understanding the spreading dynamics of eye drops on front-of-the-eye.*
- *Studying the intradermal drug delivery via tattooing.*
- *Short-time dynamics of fluid-driven cracking.*

Project Officer, Chemical Engineering, **IIT Madras** *Dec 2016- Jun 2017*

Advisors: [Dr. M.G. Basavaraj](#), [Dr. S. Thampi](#), and [Dr. 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: [Dr. Jyoti Seth](#)

- *Stochastic modeling of particle aggregation using Stokesian Dynamics*

Graduate Assistant, Chemical Engineering, **IIT Kharagpur** *Mar 2015- Jun 2016*

Adviser: [Dr. Somenath Ganguly](#)

- *Charge transport in carbon electrodes for supercapacitors*

📍 AWARDS AND HONORS

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

📌 PUBLICATIONS

Google Scholar

* indicates equal contribution.

16. Rohilla, P.* O'Neil, J.* , Jimenez, V. O., Choi, D., and Bhamla, M. S., Interfacial vortex recapture enhances thrust in tiny water skaters, **PNAS**, *In Revisions*, [bioRxiv](#) (2024).
15. Rohilla, P.* , Choi, D.* , Wallace, H., Yung, K., Deora, J., Lele, A. and Bhamla, M. S. Fluid dynamics of manu jumping: creating large splashes in water recreational sports, **Invited, RSC Interface Focus**, [bioRxiv](#), (2024).
Media: [New Scientist](#)
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, Johnathan, 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, Ellio J., Rohilla, P., and Bhamla, M. Saad. **Fluid ejections in nature**, **Annual Review of Chemical and Biomolecular Engineering**. 15 (2024).
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).
Media: [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. Ortega, V.M. Tien, **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**, *Under Review*.
4. Challita, E., Harrison, J., **Rohilla, P.**, and Bhamla, M. S. Viscoelastic jets from ultrasmall nozzles in termites. (*In Preparation*).
3. **Rohilla, P.**, Lawal, I., Williams, N., and Marston, J. O. Early-time dynamics of fluid driven cracks, *In submission*
2. **Rohilla, P.**, Williams, N., and Marston, J. O. Fluid driven cracking in multilayered hydrogels with high-speed liquid jets, *In submission*
1. Lawal, Idera, **Rohilla, P.**, Rodriguez, E., Pham, P. and Marston, J. O. Droplet spreading on eye-like substrates, *In submission*

🔗 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

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 Interactiona 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

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 **26** high school ^{α} , undergraduate ^{β} and graduate students ^{γ} in summer and semester-long research projects.
- ^{\dagger} Co-authors in peer-reviewed publications.
- ^{\ddagger} Won the President's Undergraduate Research Award (Georgia Tech) and the Undergraduate Research Award (Texas Tech) in my mentorship.

26. Sion Park ^{β, \ddagger}	Georgia Tech	<i>Fall 2024- Present</i>
25. Jace Holmes ^{β}	Georgia Tech	<i>Fall 2024- Present</i>
24. Sarah Bender ^{β}	Georgia Tech	<i>Fall 2024- Present</i>
23. Avaneesh Choragudi ^{α}	Lambert High School	<i>Fall 2024- Present</i>
22. Vedant Mehta ^{α}	Lambert High School	<i>Fall 2024- Present</i>
21. Atharva Lele ^{β, \ddagger}	Georgia Tech	<i>Fall 2023- Present</i>
20. Annika Joshi ^{α}	Johns Creek High School	<i>Fall 2023- Summer 2024</i>
19. Johnathan O'Neil ^{\dagger}	Georgia Tech	<i>2022-2024</i>
18. Holden Walker ^{β, \dagger, \ddagger}	Georgia Tech	<i>Fall 2022-Spring 2023</i>
17. Nihanth Pinakka ^{β}	Georgia Tech	<i>2022-2023</i>
16. Breanna Carruth ^{β}	Texas Tech University	<i>2021-2022</i>
15. Eliana Rodriguez ^{β}	Texas Tech University	<i>Spring 2022</i>
14. Elina Khusnatdinov ^{β}	Texas Tech University	<i>2021- 2022</i>
13. Emil Khusnatdinov ^{β, \dagger}	Texas Tech University	<i>2020- 2022</i>
12. Noah Williams ^{β}	Texas Tech University	<i>2020- 2022</i>
11. Md. Shahriar ^{\dagger}	Texas Tech University	<i>2019- 2020</i>
10. Ankit Rewanwar ^{\dagger}	Texas Tech University	<i>2019- 2020</i>
9. Cormak Weeks ^{β, \dagger, \ddagger}	Texas Tech University	<i>2019- 2022</i>
8. Whitney Tran ^{β, \dagger}	Texas Tech University	<i>2019- 2022</i>
7. Veronica O'Brien ^{α, \dagger}	Margaret Talkington School	<i>Summer 2019</i>
6. Pedro Mallet	Fed. Flum. University, Brazil	<i>Summer 2019</i>

5. Andrew Le-Blanc ^{β,\dagger}	Texas Tech University	<i>Spring 2019</i>
4. Justin Davis ^{β,\dagger}	Texas Tech University	<i>2019</i>
3. Idera Lawal ^{\dagger}	Texas Tech University	<i>2018-2019</i>
2. James B. Thomas ^{β,\dagger}	Texas Tech University	<i>2018</i>
1. Haley Slook ^{β}	Texas Tech University	<i>Fall 2018</i>

◆ 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)

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)
- The Society of Integrative and Comparative Biology (SICB)
- Society of Plastic Engineers (SPE)

◆ REFERENCES

Saad Bhamla , Assoc. Professor, Georgia Institute of Technology	saadb@chbe.gatech.edu
Mark R. Prausnitz , Professor, Georgia Institute of Technology	prausnitz@gatech.edu
Jeremy O. Marston , Assoc. Professor, Texas Tech University	jeremy.marston@ttu.edu