

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, <i>Controlled Release Society Meeting</i> , 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.

15. 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*, (2024).
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).
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.

6. 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, to be submitted.**
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* (Upcoming, 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 [†]	Texas Tech University	2018-2019
2. James B. Thomas ^{β,†}	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)

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