Shravan Pradeep

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EDUCATION & TRAINING

09/2021-Present	**University of Pennsylvania**, Philadelphia, PA || Postdoctoral Researcher Earth and Environmental Sciences, Mechanical Engineering and Applied Mechanics
08/2016-08/2021	**North Carolina State University**, Raleigh, NC Ph.D. in Chemical Engineering || *Minor*: Materials Science & Engineering
08/2013-05/2015	**Birla Institute of Technology and Science (BITS) Pilani**, Pilani Campus, India M.S. in Chemical Engineering
07/2008-05/2012	**Amrita Vishwa Vidyapeetham University**, Coimbatore, India B.S. in Chemical Engineering || First Class with Distinction

RESEARCH INTERESTS

Nano- and micro-structured soft materials, dense suspension mechanics, structure-property relationships, materials "geomimicry", architectured material memory, human-earth interface, and additive manufacturing.

PROFESSIONAL EXPERIENCE

Research Experience:

09/2021-Present	**Postdoctoral Research Associate, University of Pennsylvania**, Philadelphia, PA *Mentor(s)*: Prof. Douglas J. Jerolmack & Prof. Paulo E. Arratia *Research Focus*: Dynamics and rheophysics of soft earth materials
01/2017-08/2021	**Graduate Research Assistant, North Carolina State University**, Raleigh, NC *Advisor*: Prof. Lilian C. Hsiao *Dissertation*: Flow mechanics in dense suspensions of smooth and rough colloids
07/2015-05/2016	**Research Assistant, Indian Institute of Technology Delhi**, New Delhi, India *Advisor(s)*: Prof. Shalini Gupta & Prof. Ravikrishnan Elangovan *Project*: Immunomagnetic capture chip development for optical detection of bacteria
01/2014-05/2015	**Research Assistant, Birla Institute of Technology & Science**, Pilani, India *Advisor:* Sonal Mazumder, PhD (*Current Position:* Regulatory Scientist, US FDA) *Thesis:* Quantum dots for photocatalytic degradation of biological pollutants
01/2012-05/2012	**Research Assistant, Amrita School of Engineering**, Coimbatore, India *Advisor*: Prof. Kanakasabai Panchanathan *Project*: Titania nanoparticles-embedded polyvinyl alcohol-based membranes
Summer 2011	**Summer Research Intern, Research & Development Establishment (Eng.)**, Pune, India *Advisor:* Anoop Anand, PhD (Composite Research Center) *Project:* Graphene in advanced structural composites

Industry Experience:

07/2012-06/2013	**Management Trainee, Mangalore Chemicals & Fertilizers Ltd.**, Mangalore, India Production Engineering, Ammonia Plant
Summer 2010	**Summer In-Plant Trainee (Co-Op), Exide Industries**, Hosur, India Industrial Battery Division

AWARDS & HONORS

2023	**Victor K. LaMer Award** (Finalist), ACS Colloids & Surface Science Division
2023	**Poster Award** (Honorable Mention), APS Forum for Early Career Scientists
2022	**Postdoctoral Poster Award** (Third Place), Society of Rheology 93rd Annual Meeting
2022	**Diverse Leaders for the Future**, Future Faculty Workshop, University of Delaware
2022	**James K. Ferrell Outstanding Ph.D. Graduate Award**, NCSU
2021	**Langmuir Graduate Student Award** (Honorable Mention), ACS Colloids & Surface Science Division
2019	**Travel Assistance Award**, Graduate Student Association, NCSU
2019	**Conference Travel Award**, College of Engineering, NCSU
2016-2017	**Provost's University Graduate Fellowship**, College of Engineering, NCSU
2015	**Department 1st Rank**, Chemical Engineering Department, BITS Pilani
2015	**Poster Award** (Second Place), Indian Institute of Chemical Engineers, Pilani Chapter
2012	**University 3rd Rank**, Amrita Vishwa Vidyapeetham University
2009-2011	**School of Engineering Merit Awards**, Amrita Vishwa Vidyapeetham
2008-2012	**Prime Minister's Merit Scholarship**, Ministry of Defence, Government of India

JOURNAL PUBLICATIONS

†indicates equal contribution || Total Publications: 13 || First-Author: 7 || **Google Scholar**

1. Ranjiangshang Ran, **Shravan Pradeep**, Sebastien Kosgodagan Acharige, Brendan C Blackwell, Christoph Kammer, Douglas J. Jerolmack, and Paulo E. Arratia, "Understanding the rheology of kaolinite clay suspensions using Bayesian inference", ***Journal of Rheology***, 67:241-252 (2023). [Paper]
   - Designated as the Editor's Featured Article
2. Bryan O. Torres Maldonado, Ranjiangshang Ran, K. L. Galloway, Quentin Brosseau, **Shravan Pradeep**, and Paulo E. Arratia, "Phase-separation during sedimentation of dilute bacterial suspensions", ***Physics of Fluids***, 34: 113305 (2022). [Paper]
3. Robert Kostynick†, Hadis Matinpour †, **Shravan Pradeep**†, Thomas Dunne, Sarah Haber, Alban Sauret, Eckart Meiburg, Paulo E Arratia, and Douglas J Jerolmack, "Rheology of debris flows controlled by the distance from jamming", ***Proceedings of the National Academy of Sciences***, 119:44 (2022). [Paper]
   - *Highlights*: Physics of disaster: How mudslides move. NSF News || Penn News || AAAS EurekAlert!
4. **Shravan Pradeep**, Alan Wessel, and Lilian C Hsiao, "Hydrodynamic origin for the suspension viscoelasticity in rough colloids", ***Journal of Rheology***, 66: 895 (2022). [Paper]
   - Designated as the Editor's Featured Article
5. **Shravan Pradeep**, Paulo E. Arratia, "To biofilm or not to biofilm", ***eLife***, 80891 (2022). [Paper]
6. Zijian Dai, **Shravan Pradeep**, Jie Zhu, Wenyi Xie, Heather F Barton, Yang Si, Bin Ding, Jianyoung Yu, and Gregory Parsons,"Freestanding metal organic framework-based microfiltration membranes fabricated *via* pseudomorphic replication toward liquid- and gas hazards abatement", ***Advanced Materials Interfaces***, 2101178 (2021). [Paper]
7. **Shravan Pradeep**, Mohammad Nabizadeh, Alan R Jacob, Safa Jamali, and Lilian C Hsiao, "Jamming distance dictates colloidal shear thickening", ***Physical Review Letters***, 127: 158002 (2021). [Paper]
   - *Highlights*: New images lead to better prediction in shear thickening. Phys.Org || NC State News
8. Jie Zhu, Weiwang Qiu, Hua Han, Chengjian Yao, Chun Wang, Dequn Wu, Shravan Pradeep, and Zijian Dai, "Water stable UiO-66-NH_2 metal organic frameworks armed poly(vinyl) alcohol nanofibrous wound dressing with anti-infective therapy", ***Journal of Colloid and Interface Science***, 603: 243-251 (2021). [Paper]
9. **Shravan Pradeep**, Lilian C Hsiao,"Contact criterion in suspensions of smooth and rough colloids", ***Soft Matter***, 16:4980-4989 (2020). [Paper]

10. Lilian C Hsiao, **Shravan Pradeep**, "Experimental synthesis and characterization of frictional particles for colloidal and granular rheology", ***Current Opinion in Colloid and Interface Science***, 43:94-112 (2019). [Paper]

11. **Shravan Pradeep**, Sai Raghuram, and Sonal Mazumder, "Rapid synthesis of pure and doped ZnS quantum dots for photocatalytic degradation of biological dye pollutants", ***Materials Focus***, 6:657-667 (2017). [Paper]

12. **Shravan Pradeep**†, Sai Raghuram†, Mahua Ghosh Chaudhury, and Sonal Mazumder, "Synthesis and characterization of Fe^{3+} and Mn^{2+} doped ZnS quantum dots for photocatalytic application: Effect of mercaptoethanol and chitosan as capping agent", ***Journal of Nanoscience and Nanotechnology***, 17:1125-1132 (2017). [Paper]

13. Sai Raghuram, **Shravan Pradeep**, Subhra Dash, Rajdeep Chowdhury, and Sonal Mazumder, "Chitosan encapsulated ZnS:M (M: Fe^{3+} and Mn^{2+}) quantum dots for fluorescent labelling of sulphate reducing bacteria", ***Bulletin of Materials Science***, 39:405-413 (2016). [Paper]

PROFESSIONAL (& DEI) SERVICES

Conference Chair/Co-Chair:

- American Physical Society March Meeting
  - *Session*: Functionality through Nonlinearity in Metamaterials 2023
  - *Session*: Rheology, Flow & Instabilities of Soft Materials 2022
  - *Session*: Interfaces and Mixing & Kandanoff Prize Talk 2022
- Society of Rheology Annual Meeting
  - *Session*: Colloids and Suspensions 2022

Proposal Reviewer: NASA MUREP Space Technology Artemis Research (M-STAR)

Journal Referee: Nature Communications, Physical Review Letters, Journal of Colloid and Interface Science, Physics of Fluids

Primary Comm. Member - Climate, Diversity, Equity & Inclusion Committee (CDEIC), UPenn 2022-Present
Volunteer Staff - Diversity Equity Engagement at Penn in STEM (DEEPenn STEM), UPenn 2022-Present
Student Affairs Committee Member - Division of Soft Matter, American Physical Society 2019-2022
Mentor - Alumni Mentoring Program, Chemical & Biomolecular Engineering, NCSU 2021-2022
Captain - Graduate Recruitment Event, Chemical & Biomolecular Engineering, NCSU 2019
Student Organizer, Future Leaders in Chemical Engineering, NCSU 2018-2019
Vice-President, Chemical & Biomolecular Engineering Graduate Student Association, NCSU 2017-2018
Department Ambassador (Chemical & Biomolecular), Office of International Services, NCSU 2016-2018
Department Representative (Master's Student Body), Chemical Engineering, BITS Pilani 2014-2015
Student Senate Member, Academic Counselling Cell, BITS Pilani 2014-2015

Professional Member: American Institute of Chemical Engineers (*AIChE*), Society of Rheology (*SOR*), American Chemical Society (*ACS*), American Physical Society (*APS*), and American Geophysical Union (*AGU*).

TEACHING EXPERIENCE & CERTIFICATIONS

Teaching Assistant & Guest Lecturer, University of Pennsylvania
Department of Earth & Environmental Sciences | Department of Mechanical Engineering & Applied Mechanics

- EESC 6720 Landslides | Lecture Focus: Subaqueous Granular Matter Failure Modes Spring 2023
- MEAM 2020 Introduction to Thermo-Fluids Engineering Fall 2022
- MEAM 225 Engineering in the Environment Spring 2022

Teaching and Communication Certificate, The Graduate School, NCSU Spring 2021

Teaching Assistant, Department of Chemical & Biomolecular Engineering Department, NCSU

- CHE 713 Chemical Engineering Thermodynamics Fall 2019

- CHE 205 Chemical Process Calculations — Fall 2017
- CHE 312 Transport Processes II — Spring 2017

Teaching Assistant, Chemical Engineering Department, BITS Pilani

- CHE F312 Chemical Engineering Lab I — Fall 2013-14
- CHE F322 Chemical Engineering Lab II — Spring 2014-15

MENTORING EXPERIENCE

University of Pennsylvania

- **Graduate Student**: John Ruck (Environmental Sciences)
- **Undergraduate Students**: Eric Sigg (Mechanical Engineering), Philiph Choi (Environmental Sciences)

North Carolina State University

- **Undergraduate Students**: Alan Wessel, Sara Wozniak, Christine Dang, Colin Donaldson, Alexander Kramer (Chemical Engineering).

SCIENTIFIC PRESENTATIONS

Invited Talks

1. "Material constraints dictate flow mechanics in dense suspensions", Session: Frontiers in Soft Matter, *APS March Meeting*, Las Vegas, NV (2023).
2. "Distance to jamming dictate colloidal shear thickening", *The Plot Thickens*, Shear Thickening Seminar Series, Virtual (2021).
3. "Probing contact microstructure in shear thickening colloidal suspensions", *ACS Colloids and Surface Science Symposium*, Virtual (2021). **(Langmuir Student Oral Award Presentation)**

Oral Presentations

1. Shravan Pradeep, Paulo Arratia, Douglas Jerolmack, "Rheological state diagrams for model earth suspensions under shear flow", *APS March Meeting*, Las Vegas, NV (2023).
2. Shravan Pradeep, Robert Kostynick, Hadis Matinpour, Sarah Haber, Alban Sauret, Eckart Meiburg, Thomas Dunne, Paulo Arratia, Douglas Jerolmack, "Dense suspension rheology approach towards debris flows" *New England Complex Fluids Workshop*, Harvard University, Cambridge, MA (2022).
3. Shravan Pradeep, Eckart Meiburg, Paulo Arratia, Douglas Jerolmack, "Rheological flow curves for model earth suspension mixtures", *Society of Rheology Annual Meeting*, Chicago, IL (2022).
4. Shravan Pradeep, Robert Kostynick, Thomas Dunne, Paulo Arratia, Douglas Jerolmack, "Constraint-based approach towards debris flow rheology", *APS March Meeting*, Chicago, IL (2022).
5. Shravan Pradeep, Alan Wessel, Lilian Hsiao, "Elucidating the effect of surface roughness-induced geometric frustration on linear viscoelasticity in colloids suspensions", *APS March Meeting*, Chicago, IL (2022).
6. Shravan Pradeep, Alan Wessel, Lilian Hsiao, "Effect of geometric frustration on the linear viscoelasticity in dense colloidal suspensions", *Society of Rheology Annual Meeting*, Bangor, ME (2021).
7. Shravan Pradeep, Alan Wessel, Lilian Hsiao, "Elasticity in dense suspensions of geometrically frustrated colloids", *APS March Meeting*, Virtual (2021).
8. Shravan Pradeep, Alan Jacob, Lilian Hsiao, "Distance to jamming dictates onset stress and strength of shear thickening", *International Congress on Rheology*, Virtual (2020). **(Keynote Speaker - Colloids, Suspensions, and Granular Media Session)**

9. Shravan Pradeep, Alan Jacob, Lilian Hsiao, "Universal correlation between jamming distance and shear thickening strength in dense colloidal suspensions", *Annual Meeting of the APS Division of Fluid Dynamics*, Virtual (2020).
10. Shravan Pradeep, "Engineering flow mechanics in surface-anisotropic colloidal suspensions", *Schoenborn Graduate Research Symposium*, Raleigh, NC (2020).
11. Shravan Pradeep, Alan Jacob, Lilian Hsiao, "Distance to jamming defines shear thickening strength in colloids", *AIChE Annual Meeting*, Virtual (2020).
12. Shravan Pradeep, Lilian Hsiao, "Dynamics and contact microstructure of rough colloids", *APS March Meeting*, Denver, CO (2020).
13. Shravan Pradeep, Lilian Hsiao, "Contact numbers and radial distributions in suspensions of smooth and rough colloids", *APS March Meeting*, Boston, MA (2019).
14. Shravan Pradeep, Sai Raghuram, Sonal Mazumder, "Synthesis and characterisation of Fe^{3+} doped ZnS based colloidal quantum dots in aqueous media", *2nd International Conference on Nanotechnology*, Haldia, India (2015).

Poster Presentations

1. Shravan Pradeep, Lilian Hsiao, Paulo Arratia, Douglas Jerolmack, "Jamming distance: physics-informed design parameter for dense suspension rheology", *APS March Meeting*, Las Vegas, NV (2023). **(APS Forum for Early Career Scientists Poster Award - Honorable Mention)**
2. Shravan Pradeep, Robert Kostynick, Hadis Matinpour, Sarah Haber, Alban Sauret, Eckart Meiburg, Thomas Dunne, Paulo Arratia, Douglas Jerolmack, "Jamming distance controls rheology of debris flows", *KITP Conference: Multiphase Flows Atmospheres, Oceans, Earths*, Santa Barbara, CA (2022).
3. Shravan Pradeep, Lilian Hsiao, "Engineering flow mechanics in dense suspensions of surface-anisotropic colloids", *Society of Rheology Annual Meeting*, Chicago, IL (2022). **(Poster Award - Third Place)**
4. Shravan Pradeep, Robert Kostynick, Hadis Matinpour, Sarah Haber, Alban Sauret, Eckart Meiburg, Thomas Dunne, Paulo Arratia, Douglas Jerolmack, "Yield, jam, and flow: Unpacking physics of debris flows", *Gordon Research Seminar: Granular Matter*, Boston, MA (2022).
5. Shravan Pradeep, Lilian Hsiao, "Towards designing flow mechanics in dense suspensions", *Triangle Soft Matter Workshop*, Virtual (2021).
6. Shravan Pradeep, Lilian Hsiao, "Geometric frustration-induced phase behavior in spherically symmetric colloids", *AIChE Annual Meeting*, Virtual (2020).
7. Shravan Pradeep, Yunhu Peng, Lilian Hsiao, "Connecting frictional dissipation to rheology of confined suspensions", *Society of Rheology Annual Meeting*, Raleigh, NC (2020).
8. Shravan Pradeep, Alex Kramer, Lilian Hsiao, "Programmable self-assembly and suspension rheology in light-responsive colloidal systems", *ACS Colloids & Surface Science Symposium*, State College, PA (2018).
9. Shravan Pradeep, Alex Kramer, Lilian Hsiao, "Programmable self-assembly in photoresponsive colloids", *Schoenborn Graduate Research Symposium*, Raleigh, NC (2018).
10. Shravan Pradeep, Sai Raghuram, Sonal Mazumder, "Synthesis and characterization of Fe^{3+} and Mn^{2+} doped ZnS nanocrystals", *Workshop on Analytical Instruments for Chemical & Environmental Engineers*, Pilani, India (2015). **(Poster Award - Second Place)**
11. Shravan Pradeep, A. K. Ashwath, Smita Raghuvanshi, "Synthesis and characterisation of Graphene oxide nanoparticles using Modified Hummer's Method", *National Conference on Nano-and Functional Materials*, Pilani, India (2014).