

Shravan Pradeep

Postdoctoral Researcher, Penn Soft Earth Dynamics & Complex Fluids Labs, University of Pennsylvania
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EDUCATION & TRAINING

- 09/2021-Present **University of Pennsylvania**, Philadelphia, PA
Postdoctoral Research Associate, Earth & Environmental Sciences
- 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.E. in Chemical Engineering
- 07/2008-05/2012 **Amrita Vishwa Vidyapeetham**, Coimbatore, India
B.Tech. in Chemical Engineering || First Class with Distinction

RESEARCH INTERESTS

Nano- and micro-structured soft materials, dense suspension mechanics, structure-flow relationships, materials “geomimicry”, earth material memory, human-earth interactions, 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: Flow dissipation mechanics in model 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

2022	Postdoctoral Poster Award (Third Place), Society of Rheology 93 rd Annual Meeting
2022	Diverse Leaders for the Future , Future Faculty Workshop, University of Delaware
2022	James K. Ferrell Outstanding Ph.D. Graduate Award , NC State
2021	Langmuir Graduate Student Oral Presenter (Phase I Awardee), American Chemical Society
2019	Travel Assistance Award , Graduate Student Association, NC State
2019	Conference Travel Award , College of Engineering, NC State
2016-2017	Provost's University Graduate Fellowship , College of Engineering, NC State
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
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 (2022). [\[Paper\]](#)
 - 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). [\[Paper\]](#)
 - *Research Highlights*: Physics of disaster: How mudslides move. [NSF News](#) || [Penn News](#)
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). [\[Paper\]](#)
 - *Research Highlights*: New images lead to better prediction in shear thickening. [Phys.org](#)
 - Highlighted in [NC State University News Releases](#)
8. Jie Zhu, Weiwang Qiu, Hua Han, Chengjian Yao, Chun Wang, Dequn Wu, Shravan Pradeep, and Zijian Dai, "Water stable UiO-66-NH₂ 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 Fe³⁺ and Mn²⁺ 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: Fe³⁺ and Mn²⁺) quantum dots for fluorescent labelling of sulphate reducing bacteria", *Bulletin of Materials Science*, 39:405-413 (2016). [[Paper](#)]

PROFESSIONAL SERVICES

Conference Chair/Co-Chair:

- Society of Rheology Annual Meeting
 - Session: Colloids and Suspensions 2022
- American Physical Society March Meeting
 - Session: Rheology, Flow & Instabilities of Soft Materials 2022
 - Session: Interfaces and Mixing & Kandanoff Prize Talk 2022

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

Climate, Diversity, Equity & Inclusion Committee Member , Penn Arts & Sciences, 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, NC State	2021-2022
Captain - Graduate Recruitment Event , Chemical & Biomolecular Engineering, NC State	2019
Student Organizer , Future Leaders in Chemical Engineering, NC State	2018-2019
Vice-President , Chemical & Biomolecular Engineering Graduate Student Association, NC State	2017-2018
Department Ambassador (Chemical & Biomolecular), Office of International Services, NC State	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*).

SUPERVISING & MENTORING EXPERIENCE

University of Pennsylvania

Graduate Student: John Ruck (*Earth & Environmental Science*; 2021 - present)

Undergraduate Students: Eric Sigg (*Mechanical Engineering & Applied Mechanics*; 2022 - present), Philip Choi (*Earth & Environmental Science*; 2021 - 2022)

NC State University

Undergraduate Students (*Chemical Engineering*): Alan Wessel (2020 - 2021), Sara Wozniak (2019 - 2020), Christine Dang (2019 - 2020), Colin Donaldson (2018 - 2019), Alexander Kramer (2017 - 2019)

TEACHING EXPERIENCE

Guest Lecturer, Department of Mechanical Engineering & Applied Mechanics, UPenn

- MEAM 2020 Introduction to Thermo-Fluids Engineering Fall 2022
- MEAM 225 Engineering in the Environment (+ **Course Developer**) Spring 2022

Teaching and Communication Certificate, The Graduate School, NC State Spring 2021

Teaching Assistant, Department of Chemical & Biomolecular Engineering Department, NC State

- 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

SCIENTIFIC PRESENTATIONS

*Upcoming presentations are marked in gray.

Invited Presentations

1. “Distance to jamming dictate colloidal shear thickening”, *The Plot Thickens*, Shear Thickening Seminar Series, Virtual (2021).
2. “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 Fe³⁺ 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).
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 Subbulakshmi, Vignesh Karupannan, Gokul Venugopal, Raji Nair, “Effect of TiO₂ nanofillers on properties of PVA/Sulfopthalic acid membranes”, *Symposium on Sustainable Technology Development in Polymer*, Pilani, India (2016).
11. Shravan Pradeep, Sai Raghuram, Sonal Mazumder, “Synthesis and characterization of Fe³⁺ and Mn²⁺ doped ZnS nanocrystals”, *Workshop on Analytical Instruments for Chemical & Environmental Engineers*, Pilani, India (2015). **(Poster Award - Second Place)**
12. 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).