

Shravan Pradeep

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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 <i>Minor</i> : 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

Colloids and granular materials, dense suspension rheology, structure-flow relationships, passive-active matter interactions, suspension memory, soft matter hydrodynamics, granular jamming, and additive manufacturing.

PROFESSIONAL EXPERIENCE

Research Experience:

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

PROPOSAL EXPERIENCE

NSF-DMR: "Structure and Dynamics of Creep Deformation in Disordered Materials" *Under Review*

PI(s): Prof. Paulo E. Arratia and Prof. Douglas J. Jerolmack (University of Pennsylvania)

Contribution: Idea generation, preliminary data collection, DEI efforts, and writing specific sections.

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
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).

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
- CHE F322 Chemical Engineering Lab II

Fall 2013-14
Spring 2014-15

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)

SCIENTIFIC PRESENTATIONS

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**, 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).
2. **Shravan Pradeep**, Eckart Meiburg, Paulo Arratia, Douglas Jerolmack, "Rheological flow curves for model earth suspension mixtures", *Society of Rheology Annual Meeting*, Chicago, IL (2022).
3. **Shravan Pradeep**, Robert Kostynick, Thomas Dunne, Paulo Arratia, Douglas Jerolmack, "Constraint-based approach towards debris flow rheology", *APS March Meeting*, Chicago, IL (2022).
4. **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).
5. **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).
6. **Shravan Pradeep**, Alan Wessel, Lilian Hsiao, "Elasticity in dense suspensions of geometrically frustrated colloids", *APS March Meeting*, Virtual (2021).
7. **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
8. **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).
9. **Shravan Pradeep**, Engineering flow mechanics in surface-anisotropic colloidal suspensions, *Schoenborn Graduate Research Symposium*, Raleigh, NC (2020).
10. **Shravan Pradeep**, Alan Jacob, Lilian Hsiao, "Distance to jamming defines shear thickening strength in colloids", *AIChE Annual Meeting*, Virtual (2020).

11. **Shravan Pradeep**, Lilian Hsiao, “Dynamics and contact microstructure of rough colloids”, *APS March Meeting*, March 2-8, Denver, CO (2020).
12. **Shravan Pradeep**, Lilian Hsiao, “Contact numbers and radial distributions in suspensions of smooth and rough colloids”, *APS March Meeting*, Boston, MA (2019).
13. **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**, 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).
2. **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
3. **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).
4. **Shravan Pradeep**, Lilian Hsiao, “Towards designing flow mechanics in dense suspensions”, *Triangle Soft Matter Workshop*, Virtual (2021).
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 Fe³⁺ and Mn²⁺ 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 Hummers Method”, *National Conference on Nano-and Functional Materials*, Pilani, India (2014).