Ranit Mukherjee

+1 (540) 676 6404
rmukherj@umn.edu
ranit-mukherjee.github.io

Education

2016–2021 **PhD, Engineering Mechanics**, *Virginia Tech*, Virginia, USA
- Advisor: Prof. Jonathan B. Boreyko
- Thesis title: Exploiting Interfacial Phenomena to Expel Matter from its Substrate

2010–2014 **B.Eng., Mechanical Engineering**, *Jadavpur University*, Kolkata, India

Professional Experience

2021-current **Postdoctoral Research Associate**, *University of Minnesota, Minneapolis*, Minnesota, USA, With Prof. Sungyon Lee

2014-2016 **Process Engineer**, *Thermax Limited*, Pune, Maharashtra, India
- Optimizing the preliminary design of Fired Heaters as per client specification and API 560 guidelines.

Teaching Interest Area

Fluid Mechanics, Heat Transfer, Thermodynamics

Research Interest Area

Experimental Soft Matter, Thermo-Physical Phenomena, Biophysics

Teaching Assistantship

Spring 2017 **ESM 2304, Introduction to Dynamics**, *Virginia Tech*, Blacksburg, Virginia
Instructor: Prof. Scott Hendricks and Dr. Jared Gregg

Fall 2016, Fall 2020 **ESM 2104, Introduction to Statics**, *Virginia Tech*, Blacksburg, Virginia
Instructor: Prof. Scott Hendricks, Dr. Sneha Davison

Research Experience

University of Minnesota- Twin Cities, Minneapolis, USA

2021–current **Particle-Fluid Interactions**
- Granular material assembly and stability on a fluid-fluid interface
- Particle-induced viscous fingering

Virginia Tech, Blacksburg, Virginia

2016–2021 **Interfacial and Phase-Change-Induced Phenomena**
- Effect of surface orientation on jumping-droplet condensation
- Pathogen transport among plants by jumping droplet condensation
- Spore agglomeration on wheat awns via condensation-evaporation cycles
- Design of a novel bridging-droplet thermal diode
- Jumping of frost near water droplets

Publications

Journal Publications

2023 B. C. Druecke, **R. Mukherjee**, X. Cheng, S. Lee, "**Collapse of a granular raft: transition from single particle falling to collective creasing**", Phys. Rev. Fluids, 8, 2023 DOI:10.1103/PhysRevFluids.8.024003

2022 G. J. Iliff[*,†], **R. Mukherjee**[†], H. A. Gruszewski, D. G. Schmale III, S. Jung, and J. B. Boreyko, "**Phase-change-mediated transport and agglomeration of fungal spores on wheat awns**", J. R. Soc. Interface, 19, 2022 DOI:10.1098/rsif.2021.0872

2021 **R. Mukherjee**, S.F. Ahmadi, H. Zhang, R. Qiao, and J. B. Boreyko, "**Electrostatic Jumping of Frost**", ACS Nano, 15, 2021 DOI:10.1021/acsnano.0c09153

2021 **R. Mukherjee**, H. A. Gruszewski, L. T. Bilyeu*, D. G. Schmale III, and J. B. Boreyko, "**Synergistic dispersal of plant pathogen spores by jumping-droplet condensation and wind**", Proc. Natl. Acad. Sci. U.S.A., 118, 2021 DOI:10.1073/pnas.2106938118

2021 H. Zhang, J. D. Poorter, **R. Mukherjee**, J. B. Boreyko, and R. Qiao, "**Thermoelectrics in ice slabs: charge dynamics and thermovoltages**", Phys. Chem. Chem. Phys., 23, 2021 DOI:10.1039/D1CP02304G

2020 M. Edalatpour, K. R. Murphy, **R. Mukherjee**, and J. B. Boreyko, "**Bridging-droplet thermal diodes**", Advanced Functional Materials, 30, 2020 DOI:10.1002/adfm.202004451

2019 **R. Mukherjee**, A. S. Berrier*, K. R. Murphy, J. R. Vieitez*, and J. B. Boreyko, "**How surface orientation affects jumping-droplet condensation**", Joule, 3, 2019 DOI:10.1016/j.joule.2019.03.004

2018 **R. Mukherjee**, M. Habibi, Z. T. Rashed*, O. Berbert, X. Shi, and J. B. Boreyko, "**Oil-Impregnated Hydrocarbon-Based Polymer Films**", Scientific Reports, 8, 2018 DOI:10.1038/s41598-018-29823-7

Submittted

2024 M. Edalatpour, **R. Mukherjee**, and J. B. Boreyko, "**Bridging-Droplet Thermal Diodes: Modeling and Optimization**"(*in revision*, International Journal of Heat and Mass Transfer)

2024 **R. Mukherjee**, Z. Chen, X. Cheng, and S. Lee, "**Microscopic contact line dynamics dictate the emergent behaviors of particle rafts**"

In Preparation

2024 Y. Lolla, **R. Mukherjee**, and J. B. Boreyko, "**Drop Impact on a Lubricant-Infused Fiber**"

2024 B. C. Druecke, A. Hooshanginejad, **R. Mukherjee**, P. Poureslami, J. Brown and S. Lee, "**Particle-scale fingering from a draining suspension**"

Patent

2023 **US Patent: 20230251045A1, Status Pending**, *2023/08/10*, "**Planar Bridging-droplet thermal diodes**, Inventors: J. B. Boreyko, M. Edalatpour, K. R. Murphy, **R. Mukherjee**

(* denotes undergraduate or incoming graduate researcher, † denotes equal contribution)

Conference Presentations

2024 **"Collapse of a granular raft: particle-scale features on a continuum model"**, *APS March Meeting 2024*, Minneapolis, MN, March 3–8 (Oral)

2023 **"Understanding the collapse of a granular raft"**, *SES Annual Technical Meeting 2023*, Minneapolis, MN, Oct 8–10 (Oral)

2023 **"The collapse of a granular raft under bi-axial compression"**, *APS March Meeting 2023*, Las Vegas, NV, March 5–10 (Oral)

2022 **"On the collapse of a granular raft in a funnel"**, *Granular Matter Gordon Research Conference*, Stonehill College, MA, USA, June 27–July 1, 2022 (Poster)

2021 **"Student Keynote Award Presentation: Jumping Ice"**, *Inaugural micro Flow and Interfacial Phenomena Conference*, Virtual, June 7–9, 2021 (Oral)

2019 **"Jumping Frost"**, *72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Seattle, WA, November 23–26, 2019 (Oral)

2019 **"How Surface Orientation Affects Jumping-Droplet Condensation"**, *Gordon Research Conference on Micro and Nanoscale Phase Change Heat Transfer*, Lucca, Italy, February 3–8, 2019 (Poster)

2018 **"Oil-infused Polyethylene Films"**, *MII Technical Conference and Review*, Virginia Tech, Blacksburg, April 16–18, 2018 (Poster)

2018 **"Effect of Surface Orientation on Jumping-droplet Condensation"**, *16th International Heat Transfer Conference (IHTC-16)*, Beijing, China, August 10–15, 2018 (Poster)

2017 **"Oil-infused Polyethylene Films"**, *70th Annual Meeting of the American Physical Society Division of Fluid Dynamics*, Denver, CO, November 19–21, 2017 (Oral)

Participation in Outreach Programs

2024 **Squishy Science Sunday**, *This was an outreach event organized to introduce concepts of soft matter physics to a general audience*, APS March Meeting, Minneapolis, Minnesota

2017–2020 **Virginia Tech Science Festival**, *Yearly expo-style, family-friendly events to engage with graduate scientists. Festival guests take part in hands-on activities and demonstrations at about 100 different exhibits*, Blacksburg, Virginia

2017–19 **C-Tech^2 Summer Camp**, *Yearly summer camp activity aimed at rising junior and senior high school girls. The purpose is to provide access to information for a successful STEM career. Organized by the Center for the Enhancement of Engineering Diversity (CEED)*, Blacksburg, Virginia

2017, 2018 **Kids Tech University (KTU)**, *An educational outreach program to inspire children between ages 9–12 years in STEM education*, Blacksburg, Virginia

References

1 **Jonathan B. Boreyko**, *Associate Professor*,
Department of Mechanical Engineering, Virginia Tech, Blacksburg, Virginia 24061, USA,
email: boreyko@vt.edu
Phone: (540) 231-0469

2 **Sungyon Lee**, *Associate Professor*,
Department of Mechanical Engineering, University of Minnesota-Twin Cities, Minneapolis, MN 55455, USA,
email: sungyon@umn.edu
Phone: (612) 625-2315

3 **Xiang Cheng**, *Professor*,
Department of Chemical Engineering and Materials Science, University of Minnesota-Twin Cities, Minneapolis, MN 55455, USA,
email: xcheng@umn.edu
Phone: (612) 624-6165