Aditya Singla

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Education

Ph.D., Mechanical Engineering 2021-Present
Purdue University, West Lafayette, IN, USA GPA: 4.00/4.00
Advisor: Prof. Partha P. Mukherjee
Research Areas: Energy storage technologies; sodium metal batteries; solid-state batteries

M.Tech., Mechanical Engineering 2020-21
Indian Institute of Technology (IIT), Delhi, India GPA: 10.00/10.00
Master's Thesis: Modeling of droplet flow through a constricted microchannel

B.Tech., Mechanical Engineering 2016-20
Indian Institute of Technology (IIT), Delhi, India GPA: 9.00/10.00

Journal Publications (* denotes equal contribution)

[1] C.-A. Lo, **A. Singla**, V. R. Kankanallu, D. Yen, B. S. Vishnugopi, E. Gann, L. Wiegart, P. P. Mukherjee, C. Jaye, P. Wasik, and Y.-C. K. Chen-Wiegart, "Chemical and Structural Insights into Solid Electrolyte Interphase Evolution for Sodium Metal Electrodes," *ACS Energy Letters* (2026).

[2] S. Banerjee, B. S. Vishnugopi, **A. Singla**, K.G. Naik, and P. P. Mukherjee, "Void Formation and Evolution Dynamics for Lithium Metal and Solid Electrolyte Interfaces," *ACS Applied Materials & Interfaces*, 18 (5), 7981–7991 (2026).

[3] S. Sarkar, B. S. Vishnugopi*, **A. Singla***, P. Ranganathan, Y. Wang, J. Watt, R. Carter, C. T. Love, D. Mitlin, and P. P. Mukherjee, "Mechanistic Insight into Solid Electrolyte Interphase Interactions for Sodium Metal Electrodes," *ACS Applied Energy Materials*, 9 (3), 1715-1725 (2026).

[4] **A. Singla**, K. G. Naik, B. S. Vishnugopi, and P. P. Mukherjee, "Chemo-Mechanics Interplay Dictates Interface Instability and Asymmetry in Plating and Stripping of Sodium Metal Electrodes," *Advanced Functional Materials*, 35 (13), 2418033 (2025).

[5] S. G. Yoon, B. S. Vishnugopi, D. L. Nelson, A. X. B. Yong, Y. Wang, S. E. Sandoval, T. A. Thomas, K. A. Cavallaro, P. Shevchenko, E. P. Alsaç, C. Wang, **A. Singla**, J. R. Greer, E. Ertekin, P. P. Mukherjee, and M. T. McDowell, "Interface Morphogenesis with a Deformable Secondary Phase in Solid-State Lithium Batteries," *Science*, 388 (6751), 1062–1068 (2025).

[6] D. Chatterjee, **A. Singla**, D. Chatterjee, B. S. Vishnugopi, and P. P. Mukherjee, "Thermal Modulation of Electrodeposition Stability in Sodium Metal Electrodes," *Advanced Science*, 13 (2), e15275 (2025).

[7] D. Chatterjee, **A. Singla**, B. S. Vishnugopi, and P. P. Mukherjee, "Surface Energy-Driven Electrodeposition Stability in Sodium Metal Electrodes," *Journal of Physics: Energy*, 7, 045029 (2025).

[8] R. Raj, Y. Wang, D. Yen, **A. Singla**, J. Diao, H. Hao, V. R. Kankanallu, B. S. Vishnugopi, M. Ge, J. Watt, G. Henkelman, Y.-C. K. Chen-Wiegart, P. P. Mukherjee, and D. Mitlin, "Ternary Potassium-Bismuth-Telluride Intermetallic Support Promotes Electrochemical Stability in Potassium Metal Anodes," *Angewandte Chemie*, 64 (32), e202502213 (2025).

[9] **A. Singla**, K. G. Naik, B. S. Vishnugopi, and P. P. Mukherjee, "Heterogeneous Solid Electrolyte Interphase Interactions Dictate Interface Instability in Sodium Metal Electrodes," *Advanced Science*, 11 (36), 2404887 (2024).

[10] **A. Singla***, M. Bakhshi*, and B. Ray, "Droplet Dynamics in a Constricted Microchannel," *Chemical Engineering Science*, 300, 120352 (2024).

[11] P. Liu, H. Hao, **A. Singla**, B. S. Vishnugopi, J. Watt, P. P. Mukherjee, and D. Mitlin, "Alumina–Stabilized SEI and CEI in Potassium Metal Batteries," *Angewandte Chemie* , 63 (31), e202402214 (2024).

[12] C.-A. Lo, Y. Wang, V. R. Kankanallu, **A. Singla**, D. Yen, X. Zheng, K. G. Naik, B. S. Vishnugopi, C. Campbell, V. Raj, C. Zhao, L. Ma, J. Bai, F. Yang, R. Li, M. Ge, J. Watt, P. P. Mukherjee, D. Mitlin, and Y.-C. K. Chen-Wiegart, "Interdependence of Support Wettability-Electrodeposition Rate-Sodium Metal Anode and SEI Microstructure," *Angewandte Chemie*, 64 (8), e202412550 (2024).

[13] **A. Singla** and B. Ray, "Effects of Surface Topography on Low Reynolds Number Droplet/Bubble Flow through Constricted Passage," *Physics of Fluids*, 33 (1), 011301 (2021).

Outreach/Perspective Articles:

[14] D. Chatterjee*, P. Mitra*, **A. Singla***, S. Banerjee*, A. S. J. Alujjage*, and P. P. Mukherjee, "MoChA: Modeling, Characterization and Analytics in Electrochemical Energy Systems," *ACS Energy Letters*, 10(7), 3430–3436 (2025). **(Energy Focus)**

Preprints:

[15] **A. Singla**, B. S. Vishnugopi, K. G. Naik, and P. P. Mukherjee, "Morphogenic Electrochemical Solid-State Interfaces," ChemRxiv (2026). https://chemrxiv.org/doi/full/10.26434/chemrxiv.15000162/v1

Manuscripts under review:

[16] **A. Singla**, D. Chatterjee, B. S. Vishnugopi, R. E. Carter, C. T. Love, and P. P. Mukherjee, "Role of Thermal Gradient in Interface Stability of Sodium Metal Electrodes" (2025).

[17] P. Liu, Hongchang Hao, **A. Singla**, B. S. Vishnugopi, N. Wu, A. Dolocan, J. Watt, P. P. Mukherjee, and D. Mitlin, "Mixed Lithium - Potassium Artificial Solid Electrolyte Interphase Enables Electrochemical Stability of Potassium Metal in Carbonate Electrolyte" (2025).

In preparation:

- **A. Singla** and P. P. Mukherjee, "Reaction-Diffusion-Pressure Interactions in Liquid Alloy Anodes using Thin-Film Theory" (2026).
- **A. Singla**, B.S. Vishnugopi, and P. P. Mukherjee, "Morphological Evolution of Lithium Metal Electrodes during Stripping" (2026).
- D. Chatterjee*, **A. Singla***, and P. P. Mukherjee, "Interface Morphogenesis in Alloy Interlayers" (2026).

Conference Presentations († denotes presenting author)

[1] **[Invited] A. Singla**†, "Morphogenesis in Solid-State Batteries: Electro-Chemo-Mechanical Pathways to Interface Stability," The Batteries Gordon Research Seminar (GRS), Ventura, CA, USA (2026). [Talk]

[2] **A. Singla**†, B. S. Vishnugopi, and P. P. Mukherjee, "Mechanics-Coupled Reaction Kinetics and Interface Instability in Solid-State Batteries," 248$^{\text{th}}$ ECS Meeting, Chicago, IL, USA (2025). [Poster]

[3] **A. Singla**†, B. S. Vishnugopi, and P. P. Mukherjee, "Chemo-Mechanical and Thermal Interactions in Sodium Metal Electrodes," USNCCM18, Chicago, IL, USA (2025). [Talk]

[4] **[Invited]** P. P. Mukherjee, **A. Singla**†, and B. S. Vishnugopi, "Mechanistic Insights into Interface Instability of Sodium Metal Electrodes," MRS Spring Meeting, Seattle, WA, USA (2025). [Talk]

[5] **A. Singla**†, K. G. Naik, B. S. Vishnugopi, and P. P. Mukherjee, "Mechanistic Analysis of Solid Electrolyte Interphase Interactions in Sodium Metal Electrodes," MRS Fall Meeting, Boston, MA, USA (2024). [Talk]

[6] **A. Singla**†, K. G. Naik, B. S. Vishnugopi, and P. P. Mukherjee, "Role of Mechanics-Driven Kinetic Interactions in Electrodeposition Stability," 242nd ECS Meeting, Atlanta, GA, USA (2022). [Poster]

[7] **A. Singla**† and B. Ray, "Effects of Surface Topography on Droplet/Bubble Flow through a Constricted Passage," 2nd International Conference on Fluids under Confinement, Indian Institute of Technology (IIT) Kharagpur, West Bengal, India (2021). [Best Poster Award]

Scientific Exhibits:

[1] **A. Singla**† and P. P. Mukherjee,"Next-Generation Batteries for Low Cost and Safe Energy Storage," 5th Indiana Science Communication Day, Indianapolis, IN, USA (2024). [Poster]

[2] **A. Singla**, M. Bakhshi, and B. Ray, "Droplet Deformation and Fragmentation in a Constricted Channel," Video featured in *Gallery of Fluid Motion*, 76th Annual Meeting of the APS Division of Fluid Dynamics, Washington, DC, USA (2023).

Teaching

- **Postgraduate (PG) Teaching Assistant**

Intermediate Heat Transfer (MCL347)	Spring 2021
Thermofluid Analysis of Biosystems (MCL442)	Fall 2020

- **Undergraduate (UG) Teaching Assistant**

Engineering Mechanics (APL100)	Spring 2020
Linear Algebra and Differential Equations (MTL101)	Fall 2019

Awards and Achievements

Outstanding Service Scholarship Award by the Purdue University College of Engineering	2025
Love of Learning Award by The Honor Society of Phi Kappa Phi	2024
The Electrochemical Society (ECS) Outstanding Chapter Award for scientific outreach	2022
Perfect Ten Gold Medal, highest distinction among the graduating master's class, IIT Delhi	2021
Man Mohan Suri Project Award for best master's thesis, IIT Delhi	2021
Best Poster Award, 2nd International Conference on Fluids under Confinement	2021
Top 7% Semester Merit Award (Undergraduate), six semesters, IIT Delhi	2017-20
NTU-India Connect Research Award, Nanyang Technological University (NTU), Singapore	2019
Sumant Sinha Sustainability Leadership Award for work on sustainability and climate change	2018
Best Volunteer of the Year Award, National Service Scheme, IIT Delhi	2017

Leadership and Service

President, The Electrochemical Society (ECS) Student Chapter, Purdue University 2024

Vice-President, The Electrochemical Society (ECS) Student Chapter, Purdue University 2022-23

Treasurer, The Electrochemical Society (ECS) Student Chapter, Purdue University 2021-22

Volunteering: STEP N2 STEM; Algebra by 7th Grade; Nanoscience Expo; MATHCOUNTS; Purdue Sustainability Student Council; Boiler Green Initiative 2022-24

Judge, Poster and Oral Presentations, Purdue Undergraduate Research Conference (PURC) 2022

Secretary, National Service Scheme (NSS), Indian Insitute of Technology (IIT), Delhi 2018-19

Executive, National Service Scheme (NSS), Indian Insitute of Technology (IIT), Delhi 2017-18

* Led and volunteered in social service projects focused on education, health and environment