

Tapomoy Bhattacharjee

Assistant Professor, National Centre for Biological Sciences, Tata Institute of Fundamental Research

Contact Information

Work Address:
National Centre for Biological Sciences
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Professional Appointment

Assistant Professor
National Centre for Biological Sciences
Tata Institute of Fundamental Research

July 2021 – Present

Affiliated Faculty
The Center for the Physics of Biological Function
Princeton University

April 2022 – Present

Education

Postdoc
Andlinger Center for Energy and the Environment
Princeton University
Advisor: Prof. Sujit S. Datta

June 2018 – June 2021

Ph.D.
Mechanical Engineering
University of Florida
Thesis: *Cells in microgels: 3D printed microtissues and single-cell migration*
Advisor: Prof. Thomas E. Angelini

July 2014 – May 2018

Master of Science
Mechanical Engineering
University of Florida

July 2014 – May 2015

Master of Science (Thesis)
Chemical Engineering
University of Florida
Thesis: *Activity measurements of enzymes conjugated to superparamagnetic iron oxide nanoparticles under an alternating magnetic field.*
Advisor: Prof. Carlos Rinaldi

Aug. 2012 – May 2014

Bachelor of Engineering
Chemical Engineering
Jadavpur University

Sep. 2008 – June 2012

Publications

Total citations ~ 3400; *h* index = 25, Source: [Google Scholar](https://scholar.google.com/citations?user=...);

† indicates equal contribution * indicates Tapomoy as corresponding author

1. M Sreepadmanabh, N Hariharan, D Palakodeti, T Bhattacharjee*, An oxo-mechanical coupling determines cell state, **bioRxiv**, 2026
2. S Das, M Sreepadmanabh, D Parashar, T Bhattacharjee*, S Dutta*, Biophysical Design Space for Cellular Self-assembly and Dynamics, **under Review**, 2026
3. M Sreepadmanabh†*, Mridul Gautam†, Sunil Laxman, and Tapomoy Bhattacharjee*, 3D confinement physically constrains cell cycle progression in budding yeast, **under Review**, 2026

4. S Thomas†, M Sreepadmanabh †, Abhirami P, Tapomoy Bhattacharjee*, and Amey Redkar*, A transparent soil-like 3D matrix for studying plant-fungal interactions **under Review, 2026**
5. Nikita Bagade, M Sreepadmanabh, Gokulnath G, and Tapomoy Bhattacharjee* - Nutrient profile and activity alter physical confinement-driven growth patterns, **Soft matter, 2026**
6. Saheli Dey†, M Sreepadmanabh†, Sayan Kundu, Ashitha B Arun, Sandhya P Koushika, Shashi Thutupalli, Duncan Hewitt, Tapomoy Bhattacharjee*, Physical confinement regulates transition in nematode motility, **PRX Life 2025**
7. M Sreepadmanabh, Meenakshi Ganesh, Jimpi Langthasa, Ramray Bhat, and Tapomoy Bhattacharjee* - Distinct chemical cues reprogram cellular and multicellular phenotypes in ovarian cancer spheroids, **Small 2025**
8. Sayanta Goswami, Souravi Mukherjee, Nahid Ahmed, M Sreepadmanabh, Tapomoy Bhattacharjee, Ramray Bhat, Deepak Saini, and Ambarish Ghosh*, Frequency Chirped Actuation of Chiral Magnetic Microbots for Viscometry Mapping in Heterogeneous Media: From Model Fluids to Living Cells; **ACS Nano 2025**
9. M Sreepadmanabh, M. Ganesh, P. Sanjenbam, C. Kurzthaler, D. Agashe, T. Bhattacharjee*, Cell shape affects bacterial colony growth under physical confinement. **Nature communications, 2024**
10. N. K. Babu, M Sreepadmanabh, S. Dutta*, T. Bhattacharjee*, Interplay of geometry and mechanics in epithelial wound healing. **Physical Review E, 2024**
11. M Sreepadmanabh†, Ashitha B. Arun†, T. Bhattacharjee*, Design approaches for 3d cell culture and 3D bioprinting platforms. **Biophysics reviews, 2024**
12. L. Theeyancheri, S. Chaki, T. Bhattacharjee*, R. Chakrabarti* Dynamic clustering of active rings. **Physical Review Research 2024.**
13. Y. M. Psarellis, S. Lee, T. Bhattacharjee, S. S. Datta, J. M. Bello-Rivas, I. G. Kevrekidis, Data-driven Discovery of Chemotactic Migration of Bacteria via Machine Learning. **BMC Bioinformatics 2024** ([arxiv](#))
14. L. Theeyancheri, S. Chaki, T. Bhattacharjee*, R. Chakrabarti* Active dynamics of linear chains and rings in porous media. **The Journal of Chemical Physics 2023.**
15. M Sreepadmanabh, M. Ganesh, R. Bhat, T. Bhattacharjee*, Jammed microgel growth medium prepared by flash-solidification of agarose for 3D cell culture and 3D bioprinting. **Biomedical Materials 2023** ([biorxiv](#))
16. A. Martínez-Calvo†, T. Bhattacharjee†, R. K. Bay, H. N. Luu, A. M. Hancock, N. S. Wingreen, S. S. Datta ,Morphological instability and roughening of growing 3D bacterial colonies. **PNAS 2022**
17. S. Duraivel†, V. Subramaniam†, S. Chisolm, G. M. Scheutz, B. Sumerlin, T. Bhattacharjee, T. E. Angelini, Leveraging Liquid-Liquid Phase Separation in Embedded 3D Bioprinting. **Biophysics Review 2022**
18. L. Theeyancheri, S. Chaki, T. Bhattacharjee*, R. Chakrabarti* Migration of active rings in porous media. **Physical Review E 2022.**
19. J. A. Ott, S. Chiu, D. B. Amchin, T. Bhattacharjee, S. S. Datta, A biophysical threshold for biofilm formation. **e-Life 2022.**
20. D. B. Amchin, J. A. Ott, T. Bhattacharjee, S. S. Datta, Influence of confinement on the spreading of bacterial populations. **PLOS Computational Biology, 2022.**
21. T. Bhattacharjee†, D. B. Amchin† ; R. Alert† ; J. A. Ott; S. S. Datta, Chemotactic smoothing of collective migration. **e-Life 2022.**

22. C. Kurzthaler†, S. Mandal†, T. Bhattacharjee, H. Lowen, S. S. Datta, H. A. Stone. A geometric criterion for the optimal spreading of active polymers in porous media. **Nature communications**, 2021.
23. T. E. Angelini, W. G. Sawyer, K. G. Rowe, T. Bhattacharjee, A. Fernandez-Nieves, Y. Chang, S. M. Marquez. High speed 3D printing system for wound and tissue replacement. **US Patent 11,007,705** 2021.
24. T. Bhattacharjee†, D. B. Amchin†, J. A. Ott, F. Kratz, S. S. Datta. Chemotactic Migration of Bacteria in Porous Media. **Biophysical Journal** 2021.
25. L. J. Perez, T. Bhattacharjee, S. S. Datta, R. Parashar, N. L. Sund. Impact of confined geometries on hopping and trapping of motile bacteria in porous media. **Physical Review E** 2021, 103, 012611.
26. T. Bhattacharjee; S. S. Datta. Confinement and activity regulate bacterial motion in porous media. **Soft Matter** 2019.
27. C. Morley†, S. Ellison†, T. Bhattacharjee, K. Schulze, C. O'Bryan, K. Smith, C. Kabb, S. Niemi, G. Moore, C. Flores, D. Tran, B. Sumerlin, W. Sawyer, D. Mitchell, and T. E. Angelini. Quantitative characterization of 3D bioprinted structural elements under cell generated forces. **Nature communications** 2019, 10, 3029.
28. T. Bhattacharjee; S. S. Datta. Bacterial hopping and trapping in porous media. **Nature Communications** 2019.
29. C. S. O'Bryan, T. Bhattacharjee, S. L. Marshall, W. G. Sawyer, and T. E. Angelini. . Commercially available microgels for 3D bioprinting. **Bioprinting** 2018, 11, e00037.
30. T. Bhattacharjee and, T. E. Angelini. 3D T cell motility in jammed microgels. **Journal of Physics D: Applied Physics** 2018.
31. E. O. McGhee, A. A. Pitenis, J. M. Urueña, K. D. Schulze, A. J. McGhee, C. S. O'Bryan, T. Bhattacharjee, T. E. Angelini, and W. G. Sawyer. In Situ Measurements of Contact Dynamics in Speed-dependent Hydrogel Friction. **Biotribology** 2018, 13, 23-29.
32. T. Bhattacharjee, C. P. Kabb, C. S. O'Bryan, J. M. Urueña, B. S. Sumerlin, W. G. Sawyer, and T. E. Angelini.. Polyelectrolyte scaling laws for microgel yielding near jamming. **Soft Matter** 2018.
33. C. S. O'Bryan, T. Bhattacharjee, S. R. Niemi, S. Balachandar, N. Baldwin, S. V. Ellison, C. Taylor, W. G. Sawyer, and T. E. Angelini. Three-dimensional printing with sacrificial materials for soft matter manufacturing. **MRS bulletin** 2017, 42, 571-577.
34. D. M. Garcia, K. D. Schulze, C. S. O'Bryan, T. Bhattacharjee, W. G. Sawyer, and T. E. Angelini. Eliminating the surface location from soft matter contact mechanics measurements. **Tribology-Materials, Surfaces & Interfaces** 2017, 11, 187-192.
35. A. A. Pitenis, J. M. Urueña, T. Hormel, T. Bhattacharjee, S. L. Marshall, S. M. Hart, K. D. Schulze, T. E. Angelini, and W. G. Sawyer. Corneal cell friction: survival, lubricity, tear films, and mucin production over extended duration in vitro studies. **Biotribology** 2017, 11, 77-83.
36. T. T. Hormel, T. Bhattacharjee, A. A. Pitenis, J. M. Urueña, W. G. Sawyer, and T. E. Angelini. A confocal fluorescence microscopy method for measuring mucous layer growth on living corneal epithelia. **Biotribology** 2017, 11, 73-76.
37. K. D. Schulze, S. M. Zehnder, J. M. Urueña, T. Bhattacharjee, W. G. Sawyer, and T. E. Angelini. Elastic modulus and hydraulic permeability of MDCK monolayers. **Journal of Biomechanics** 2017, 53, 210-213.

38. C. S. O'Bryan, T. Bhattacharjee, S. Hart, C. P. Kabb, K. D. Schulze, I. R. Chilakala, B. S. Sumerlin, W. G. Sawyer, and T. E. Angelini. Self-assembled micro-organogels for 3D printing silicone structures. **Science Advances** **2017**, 3 e1602800.
39. A. A. Pitenis, J. M. Urueña, R. M. Nixon, T. Bhattacharjee, B. A. Krick, A. C. Dunn, T. E. Angelini, and W. G. Sawyer. Lubricity from Entangled Polymer Networks on Hydrogels. **Journal of Tribology** **2016**, 138, 042102.
40. Y. Jin, A. Compaan, T. Bhattacharjee and Y. Huang. Granular gel support-enabled extrusion of three-dimensional alginate and cellular structures. **Biofabrication** **2016**, 8 025016.
41. T. Bhattacharjee, C. J. Gil, S. L. Marshall, J. M. Urueña, C. S. O'Bryan, M. Carstens, B. Keselowsky, G. Palmer, S. Ghivizzani, P. Gibbs, W. G. Sawyer, and T. E. Angelini. Liquid-like solids support cells in 3D. **ACS Biomaterials Science and Engineering** **2016**, 2 1787-1795.
42. T. Bhattacharjee, S. M. Zehnder, K. G. Rowe, S. Jain, R. M. Nixon, W. G. Sawyer, and T. E. Angelini. Writing in the granular gel media. **Science Advances** **2015**, e1500655, 1-6.

Awards

2026: - EMBO Young Investigator
 2026: - Emerging Investigator in Soft Matter by Royal Society of Chemistry
 2025: - Merck Young Scientist Award for Scientific Excellence in Biological Sciences
 2021: - Revson Senior Fellowship for Biomedical Sciences (not accepted due to conflict with job offer)
 2020: - Outstanding Poster Award, Forum on Biomedical Engineering, Carnegie Mellon University
 2019: - Award for Outstanding Doctoral Thesis Research in Biological Physics, American Physical Society
 2018: - ExxonMobil Best Poster Award, Andlinger Center Annual Meeting, Princeton University
 2018-2020: - Distinguished Postdoctoral Fellowship, Andlinger Center for Energy and the Environment, Princeton University
 2018: - American Physical Society Travel Award (GSOFT division)
 2017: - Outstanding International Student Award, University of Florida
 2016: - ACS Editors' Choice award for 'Liquid-like Solids Support Cells in 3D'
 2016: - Attributes of a Gator Engineer Award for Creativity, University of Florida
 2016: - Best Oral Presentation, Annual Symposium, Institute for Cell & Tissue Science and Engineering, University of Florida
 2015: - University of Florida Technology Innovator Award
 2008-2012: - National Merit Scholarship Award, Govt. of India

Services

Session Chair: APS March Meeting, Las Vegas, 2023
 APS March Meeting, Virtual, 2021
 APS March Meeting, Denver, Colorado, 2020
 APS March Meeting, Boston, Massachusetts, 2019
 Princeton Research Day, Princeton University, 2019

Moderator: Soft Matter for All (virtual symposium celebrating diversity and creativity)
 DBIO Monthly Happy Hour, American Physical Society

Reviewer: Nature communications, PRX Life, Biofabrication; Biomedical Physics & Engineering Express; 3D Printing and Additive Manufacturing; Soft Matter; Communications Physics; ACS Applied Materials & Interfaces

Member: Student Affairs Committee, DSOF, American Physical Society, 2019-2021

Early Career Member: American Physical Society, 2018 – 2023
Member: American Physical Society, 2023-present
Student Member: American Physical Society, 2014 – 2018
Society of Tribologists and Lubrication Engineers, 2016 – 2017
Indian Institute of Chemical Engineers, 2009 – 2012

Thesis committee member:

- Shalini Dey (Prof. Mithun Choudhury's group, IIT Bombay)
- Inder Raj Singh (Dr. Aswin Sai Narain Seshasayee group, NCBS)
- Suresh B (Dr. Shashi Thutupalli group, NCBS)
- Kalpaja Acharya (Dr. Ranabir Das group, NCBS)

Conferences Organized

Activities at NCBS

- Workshop committee (Past member)
- Local purchase committee (Chair)
- Microfluidics committee (Past member)
- Stores committee (Past member)
- Biosafety committee (member)

Teaching

1st Indian Mechanobiology Meeting, Bangalore 2025
Soft Matter Young Investigators' Meet 2022, Mysore, India
National Centre For Biological Sciences Annual Talks 2023, Bangalore, India
School on Active Matter in Complex Environment, ICTS, 2023, Bangalore India

At NCBS:

Biophysics and Biochemistry, August semester, 2022 (2 credits)
Biostatistics, January semester, 2023 (4 credits)
Biophysics and Biochemistry, August semester, 2023 (2 credits)
Biostatistics, January semester, 2024 (4 credits)
Quantitative Experimental Research Methods and Analysis, January, 2024 (6 credits)
Biostatistics, January semester, 2025 (4 credits)
Quantitative Experimental Research Methods and Analysis, January, 2025 (6 credits)
Biostatistics, January semester, 2026 (4 credits)

Before NCBS:

- *Advanced Thermodynamics* (Graduate, Chemical Engineering, Princeton University)
- *Soft matter mechanics: fundamentals and applications* (Graduate, Chemical Engineering, Princeton University)
- *Squishy Engineering* (Undergraduate, Chemical Engineering, Princeton University)
- *The Physics of Life Summer School* (discussion leader), Center for the Physics of Biological Function, Princeton University, 2020
- *Manufacturing Processes Seminar* (Undergraduate, Metallurgical Engineering and Materials Science, IIT Bombay)

Mentoring

At NCBS:

Ph.D. Students: **M Sreepadmanabh**, 2022-present

- Future Investigator Award, American Physical Society, 2026
- Division of soft matter travel award, American Physical Society, 2026

- Sun Pharma Science Scholar Fellowship in Biomedical Sciences, 2026
- Selected to present his work at the Soft Condensed Matter Physics Gordon Research Seminar, 2025
- Division of Biological Physics travel award, American Physical Society, 2025
- Best poster award, NCBS Annual Talks, 2025
- Prof. Obaid Siddiqi Prize for Best Paper published from Bangalore Life Science Cluster, 2024
- FIP Distinguished Student Program award, 2024 by American Physical Society
- Best poster award, NCBS Annual Talks, 2024
- Best poster award, Complex Fluids (CompFlu), 2023
- Best poster award, NCBS Annual Talks, 2023
- Best poster award, Physics of Cells and Tissues, IISc, 2023
- Transcontinental Youth Travel Fund Fellowship by The International Union of Biochemistry and Molecular Biology at the University of Glasgow
- Travel award to attend Active Matter at Surfaces and in Complex environments

Nandhu Krishna Babu, 2023-present

- Infosys Travel Award to Attend American Physical Society Global Physics Summit, 2025

Astha Mukhopadhyay, 2024-present

Anushka Chowdhury, 2025-present

Joanrose John Kattikaren, 2025-present

Postdoc: **Dr. Ashis Mishra, 2025-present**

Dr. Subhodip Chatterjee, 2024-2026 (Currently postdoc at IIT D)

MS Thesis: **Meenakshi Ganesh, IISER Mohali, 2023-2024**
Joanrose John Kattikaren, IISER Pune, 2024-2025

Project Associates: Saheli Dey, 2021-2022 (Ph.D. student at U Gottingen)
 Nandhu Krishna Babu, 2022-2023
 Mridul Gautam, 2024-2025 (MS Student at mannheim)
 Gokulnath Ganesan, 2024 (Ph.D. Student at MIT Chemical Eng.)
 Nikita Bagade (2024-present)
 Rujula Jagadeesh (2025-present)
 Noah Pinheiro (2025-present)

Interns: Kiruthika Kumar , IIT M, 2021-2022 (Ph.D. student at EPFL)
 Avishek Sunamudi, IISER Kolkata, 2022
 Meenakshi Ganesh, IISER Mohali, 2022
 Sanchit Korde, IISER Berhampur, 2024 (MS student at Janelia)
 Sayan Kundu, NISER Bhubaneswar, 2024-2025
 Aarohi Bankar, IISER Bhopal, 2024

Saketh J, IISER Bhopal, 2024
Kusumita G, IISER Bhopal, 2024

Before NCBS:

Ph.D. Students:

Dr. Cameron Morley, Mechanical Engineering, University of Florida, 2016-2018
Dr. Tori Ellison, Material Science and Engineering, University of Florida, 2016-2018
Jenna Ott, Chemical and Biological Engineering, Princeton University, 2018-2021
Aaron Bourque, Lewis-Sigler Institute, Princeton University, 2020
Sebastian Gonzalez La Corte, Lewis-Sigler Institute, Princeton University, 2020-2021

Undergraduate Students:

Carmen Gil, Chemical Engineering, University of Florida, 2015-2016
Kim Lu, Chemical and Biological Engineering, Princeton University, 2019
Emmanuel Mintah, Chemical and Biological Engineering, Princeton University, 2019
Glenda Chen, Chemical and Biological Engineering, Princeton University, 2019-2020

Highschool Students:

Suhani Jain, intern in Mechanical Engineering, University of Florida, 2014
Nicholas Baldwin, intern in Mechanical Engineering, University of Florida, 2015
Sidhika Balachandar, intern in Mechanical Engineering, University of Florida, 2015

Invited Talks

1. *University of Colorado, Boulder, 2026*
2. *Complex Fluids, IISc, 2025*
3. *Collaborative Academic Research Excellence Conference, IIT Madras, 2025*
4. *Discussion meeting on Biological Physics and Mechanobiology, IISc, 2025*
5. *California Institute of Technology, 2025*
6. *IISc ChemE Symposium, 2025*
7. *Biological Physics / Physical Biology (BPPB) seminar series, 2025*
8. *Engineered Living Materials Webinar, Germany, 2025*
9. *Indian Biophysical Society Annual Meeting, IIT Madras, 2025*
10. *Complex Fluids, IIT Hyderabad, 2024*
11. *Interdisciplinary Research Seminar series, Institute for Biophysical Dynamics, U Chicago, 2024*
12. *inStem Annual Review of Research, 2024*
13. *NCBS annual talks, 2024*
14. *inStem Annual Review of Research, 2023*
15. *67th DAE Solid State Physics Symposium, GITAM University, Vigaz, 2023*
16. *Compflu, Indian Institute of Technology Madras, 2023*
17. *ICAM Annual Meeting, University of California Santa Barbara, 2023*
18. *University of California Merced, Physics Department, 2023*
19. *Princeton University, Chemical Engineering Department (SMATCH talks), 2023*
20. *University of Florida, College of Engineering, 2023*
21. *EMBO Symposium on Physics of Cells and Tissues at IISc Bangalore, 2023*
22. *Soft and Active Matter Seminar, IIT Hyderabad, 2023*

23. *Young Investigators Talks, IIT BHU, 2022*
24. *Soft Matter Young Investigator Meet, Mysore, India, 2022*
25. *CeNSE DBT Nano-biotechnology Alliance (C-DNA) Conference, IISc, India, 2022*
26. *NCBS annual talks, 2022*
27. *Invited talk at MRDG, IISc, 2021*
28. *BPI Minisymposium, IIT Madras, India, 2021*
29. *Complex Fluids, Virtual, India, 2021*
30. *Studying cellular behavior in jammed microgel growth media. APS March Meeting, Virtual, USA, 2021*
31. *Bacterial motility in porous media. Porous Media Tea Time Talks, Heriot-Watt University, UK, 2020*
32. *3D Printing Cellular Communities: Mammalian Cells, Bacteria, And Beyond. National Centre for Biological Sciences, Bangalore, India, 2020*
33. *Bacterial motility in porous media: implications for environmental bioremediation strategies. Andlinger Center for Energy and the Environment, Princeton, NJ, 2020*
34. *3D Printing Cellular Communities: Mammalian Cells, Bacteria, And Beyond. Mechanical Engineering Department, Indian Institute of Science, Bangalore, India, 2020*
35. *Cells in Microgels: 3D printed microtissues and three-dimensional cell migration. APS March Meeting, Denver, Colorado, 2020 (invited)*
36. *Cells in Microgels: 3D printed microtissues and single-cell migration. Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India, 2020*
37. *Bacteria motility in three-dimensional disordered media. NJIT, USA, 2019*
38. *Cells in Gels: probing and controlling bacteria in 3D porous media. PRISM Annual Research Symposium, Princeton University, USA, 2019*
39. *Bacterial hopping and trapping in porous media. Bio-Engineering colloquium, Princeton University, USA, 2019*
40. *Soft Matter Engineering: applications and future. Indian Institute of Technology, Hyderabad, 2017*

Patents

1. S. Datta, and T. Bhattacharjee. *Bacteria in 3D Porous Media*, **US Patent App. 17/608,018.**
2. W. G. Sawyer, T. E. Angelini, S. C. Ghivizzani, T. Bhattacharjee, G. D. Palmer. *Growth media for three-dimensional cell culture*, **US Patent 11,390,835**
3. T. E. Angelini, W. G. Sawyer, K. G. Rowe, T. Bhattacharjee, A. Fernandez-Nieves, Y. Chang, S. M. Marquez. *High speed 3D printing system for wound and tissue replacement*, **US Patent 11,007,705**
4. J. Muse, M. Hughes, C. D. Crane, T. E. Angelini, K. D. Schulze, T. Bhattacharjee, W. G. Sawyer, C. Taylor. *Valve incorporating temporary phase change material*, **US Patent 11,027,483**
5. T. E. Angelini, B. S. Sumerlin, C. S. O'bryan, W. G. Sawyer, T. Bhattacharjee. *Organic microgel system for 3D printing of silicone structures*, **US Patent App. 15/693,389, 2018**

6. B. G. Keselowsky, T. E. Angelini, W. G. Sawyer, T. Bhattacharjee. *Apparatus for culturing and interacting with a three-dimensional cell culture*, **US Patent App. 15/759,587, 2018**