Anupam Mondal

Curriculum Vitae

Assistant Professor
Department of Medical Science and Technology
Indian Institute of Technology Kharagpur

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My Webpage

Current Position

November 2026–Present **Assistant Professor**, Department of Medical Science and Technology, **IIT Kharagpur**, West Bengal – 721302, India.

Postdoctoral Experience

February 2025–October 2026 Artie McFerrin Department of Chemical Engineering, **Texas A&M University**, College Station, Texas, United States. (Supervisor: Prof. Jeetain Mittal)

October 2022–January 2025 Center for Theoretical Biological Physics (CTBP) and Department of Chemistry, **Rice University**, Houston, Texas, United States. (Supervisor: Prof. Anatoly B. Kolomeisky)

PhD Thesis

Title Understanding the Role of Structural and Functional Dynamics of DNA in Protein–DNA Recognition Using Theoretical and Computational Approaches.

Supervisor Prof. Arnab Bhattacherjee

Description This thesis explored how the structural and functional dynamics of the DNA molecule that arises at different levels of hierarchical organisation of the genomic DNA within the crowded nuclear volume affects the ability of DNA binding proteins to locate and bind to the target DNA sites embedded in a large polymeric DNA substrate.

Education

2017–2022 **PhD, Mathematical and Computational Biology**, *Jawaharlal Nehru University*, New Delhi, India.

2015–2016 **Research Assistant**, *Indraprastha Institute of Information Technology Delhi (IIIT-Delhi)*, New Delhi, India.

2011–2013 **M.Sc. in Mathematics**, *Indian Institute of Technology Kanpur (IITK)*, Uttar Pradesh, India [CGPA: 7.5/10].

2008–2011 **B.Sc. in Mathematics**, *University of Calcutta*, Kolkata, India [Percentage: 73.87%].

Research Interests

My current research interests include:

- Pioneer transcription factors and chromatin condensates
- Exchange dynamics of biomolecular condensates
- Biophysics of cell lysis and and the timing of intracellular events
- Ovarian dynamics and menopause timing
- Biophysics of transcriptional bursting and transcription factor binding
- Biophysics of genome organisation and nucleosome dynamics
- Interaction of proteins with single-stranded (ss) and double-stranded (ds) DNA
- Developing mathematical and multi-scale simulation models of various complex systems in order to understand their functioning/dynamics at molecular levels.

Publications

Postdoc Publications

Journal Articles

1. Yuan Yao, Ashish Shyam Tangade, Quentin Livingston, **Anupam Mondal**, Nidhi Parikh, Jeetain Mittal, and Marina Feric. Organization of Core Mitochondrial Replication Components into Multiphasic Condensates (Submitted to ***Cell Reports***).
2. YouJin Lee, Qing Ouyang, Li Ma, Morgan Fleishman, Hasib Aamir Riaz, Michael Schmidt, Jeffrey L. Dupree, **Anupam Mondal**, Priyesh Mohanty, Jeetain Mittal, Oliver Beckstein, David G. Lambright, and Eric M. Morrow. Endosome Maturation is Orchestrated by Inside-out Proton Signaling Through a Na^+/H^+ Exchanger and pH-dependent Rab GTPase Cycling. ***Nature Communications***, 2026, 17, 6208.
3. Yuchen He, George M. Ongwae, **Anupam Mondal**, Joel A. Moses, Jeetain Mittal and Marcos M. Pires. A High-Throughput, Flow Cytometry Approach to Measure Phase Behavior and Exchange in Biomolecular Condensates. ***Nature Communications***, 2026, 17, 1337.
4. Ashish S. Tangade, **Anupam Mondal**, Jiahui Wang, Young C. Kim and Jeetain Mittal. Multiphasic Organization and Differential Dynamics of Proteins Within Protein-DNA Biomolecular Condensates. ***The Journal of Physical Chemistry B***, 2025, 129, 9588−9599.
5. **Anupam Mondal*** and Anatoly B. Kolomeisky*. Why Antiholins? Thermodynamic and Kinetic Arguments to Explain the Robustness of Bacteriophage Cell Lysis. ***The Journal of Physical Chemistry Letters***, 2025, 16, 2920−2926 (Corresponding Author).
6. Zhuoyan Lyu, **Anupam Mondal** and Anatoly B. Kolomeisky. How Transcriptional Bursting and mRNA Production Affect Precise Timing of Cell Lysis Phenomena. ***The Journal of Physical Chemistry B***, 2025, 129, 3807−3813.
7. **Anupam Mondal**, Evelina Tcherniak and Anatoly B. Kolomeisky. Stochastic Analysis of Human Ovarian Aging and Menopause Timing. ***Biophysical Journal***, 2025, 124, 1095−1104.
8. **Anupam Mondal** and Anatoly B. Kolomeisky. Microscopic Origin of the Spatial and Temporal Precision in Biological Systems. ***Biophysical Reports***, 2025, 5, 100197.
9. **Anupam Mondal** and Anatoly B. Kolomeisky. How Transcription Factors Binding Stimulates Transcriptional Bursting. ***The Journal of Physical Chemistry Letters***, 2024, 15, 8781−8789.
10. **Anupam Mondal**, Hamid Teimouri and Anatoly B. Kolomeisky. Molecular Mechanisms of Precise Timing in Cell Lysis. ***Biophysical Journal***, 2024, 123, 3090−3099.
11. **Anupam Mondal**, Hamid Teimouri and Anatoly B. Kolomeisky. Elucidating Physicochemical Features of Holin Proteins Responsible for Bacterial Cell Lysis. ***The Journal of Physical Chemistry B***, 2024, 128, 7129−7140.
12. **Anupam Mondal** and Anatoly B. Kolomeisky. Why Are Nucleosome Breathing Dynamics Asymmetric? ***The Journal of Physical Chemistry Letters***, 2024, 15, 422−431.

13. **Anupam Mondal** and Anatoly B. Kolomeisky. Role of Nucleosome Sliding in the Protein Target Search for Covered DNA Sites. ***The Journal of Physical Chemistry Letters***, 2023, 14, 7073−7082.
14. **Anupam Mondal**, Cayke Felipe and Anatoly B. Kolomeisky. Nucleosome Breathing Facilitates the Search for Hidden DNA Sites by Pioneer Transcription Factors. ***The Journal of Physical Chemistry Letters***, 2023, 14, 4096−4103.

Book Chapter

15. **Anupam Mondal** and Anatoly B. Kolomeisky. How to Find Targets That Are Always Hidden: Nucleosome−Covered DNA and Pioneer Transcription Factors, in the book **"Target Search Problems"**, Editors: Denis Grebenkov, Ralf Metzler and Gleb Oshanin, **Springer Nature**, 2024, 579−600.

PhD Publications

Journal Articles

1. **Anupam Mondal**, Sangeeta and Arnab Bhattacherjee. Torsional Behaviour of Supercoiled DNA Regulates Recognition of Architectural Protein Fis on Minicircle DNA. ***Nucleic Acids Research***, 2022, 50, 6671−6686.
2. **Anupam Mondal**, S. K. Mishra and Arnab Bhattacherjee. Nucleosome Breathing Facilitates Cooperative Binding of Pluripotency Factors Sox2 and Oct4 to DNA. ***Biophysical Journal***, 2022, 121, 4526−4542.
3. **Anupam Mondal** and Arnab Bhattacherjee. Understanding Protein Diffusion on Force-Induced Stretched DNA Conformation. ***Frontiers in Molecular Biosciences***, 2022, 9, 953689.
4. **Anupam Mondal**, S. K. Mishra and Arnab Bhattacherjee. Kinetic Origin of Nucleosome Invasion by Pioneer Transcription Factors. ***Biophysical Journal***, 2021, 120, 5219−5230.
5. **Anupam Mondal** and Arnab Bhattacherjee. Mechanism of Dynamic Binding of Replication Protein A to ssDNA. ***Journal of Chemical Information and Modeling***, 2020, 60, 5057−5069.
6. **Anupam Mondal** and Arnab Bhattacherjee. Understanding the Role of DNA Topology in Target Search Dynamics of Proteins. ***The Journal of Physical Chemistry B***, 2017, 121, 9372−9381.
7. **Anupam Mondal** and Arnab Bhattacherjee. Searching Target Sites on DNA by Proteins: Role of DNA Dynamics Under Confinement. ***Nucleic Acids Research***, 2015, 43, 9176−9186.

Fellowships & Awards

2024 Received ***2024 Travel Award*** to present my research work at the 68^{th} **Biophysical Society Annual Meeting** held on February $10-14$, in Philadelphia, USA.

2023 ***Best Poster Award*** in **Smalley-Curl Institute Summer Research Colloquium** held on 4^{th} August, 2023 at Rice University, Houston, USA.

2019 Received ***International Travel Support (ITS) Grant*** from **DST SERB** to participate an international conference **Albany 2019: The 20th Conversation, 2019** in Albany, New York, USA.

2019 ***Best Poster Award*** in **National Science Day** held on 28^{th} February, 2019 at Jawaharlal Nehru University, New Delhi.

2018 Received ***RATNA PHADKE AWARD*** at the 42^{nd} Annual Meeting of the **Indian Biophysical Society**, 2018 held at IISER Pune, India from 9^{th} to 11^{th} March 2018.

2017–2022 Received **CSIR-JRF/SRF** Fellowship – All India Rank 186.

2015–2016 Received Junior Research Fellowship from Department of Science and Technology (DST), India.

2013 Qualified **GATE** Examination – All India Rank 935.

2011 Qualified **JAM** Examination – All India Rank 574.

Presentation/Invited Talk at Meetings

2024 Invited for a Oral presentation in the **2024 Smalley-Curl Institute Annual Summer Research Colloquium** at Rice University held on August 2nd, 2024.

2024 Invited for a talk in the **Physics of Life: Students and Postdocs Edition symposium** at the CUNY Graduate Center in New York City, jointly organized by the Center for the Physics of Biological Function (CPBF) at Princeton University and the Graduate Center at CUNY.

2024 Invited for a talk in the **Synbio Supergroup Seminar** at the Rice Synthetic Biology Institute (RSBI), Rice University.

2024 Invited for a short talk at the **Multiscale Genome Organization (MGO) subgroup** at the 68^{th} Biophysical Society Annual Meeting held on February $10-14$, in Philadelphia, USA.

2024 Poster presentation in the 68^{th} **Biophysical Society Annual Meeting** held in Philadelphia, USA.

2023 Poster presentation in the 9^{th} **Annual Smalley-Curl Institute Summer Research Colloquium** at Rice University.

2023 Poster presentation in the **NSF Advisory Council Meeting** at Center for Theoretical Biological Physics (CTBP), Rice University.

2021 Oral presentation at the National Conference **Physical Chemistry Physical Biology (PCPB−2021)**.

2019 Oral presentation at the International Conference **Albany 2019: The 20th Conversation**.

2019 Oral presentation at the National Conference on Recent Advances in Agricultural, Food Tech and Human Health – **BioMilaap 2019**.

2019 Poster presentation at the International Conference **Multiscale Simulation and Mathematical Modelling of Complex Biological Systems (MSMM-2019).**

2019 Poster presentation in **National Science Day** at Jawaharlal Nehru University, New Delhi.

2018 Oral presentation at the 42^{nd} **Annual Meeting of the Indian Biophysical Society** titled **Emerging Trends in Biophysics**.

2018 Poster presentation at the 17^{th} **International Conference on Bioinformatics (INCOB).**

2018 Poster presentation in **National Science Day** at Jawaharlal Nehru University, New Delhi.

2017 Poster presentation in the **Annual Symposium of the Indian Biophyical Society** at IISER Mohali.

2017 Poster presentation in **National Science Day** at Jawaharlal Nehru University, New Delhi.

Reviewer Assignment

- iScience
- Nature Communications
- Computational Biology and Chemistry

Computer Skills

Programming Languages: C, Python

Teaching Assistantship

Winter, 2016 : **Stochastic Simulations in System Biology and Biophysics**, IIIT Delhi.

Monsoon, 2016 : **Linear Algebra**, IIIT Delhi.

Monsoon, 2015 : **Molecular Mechanics and Biological Physics/Biomolecular Simulations**, IIIT Delhi.

Nov 2013 – Sept 2014 : **Guest Lecturer**, Sundarban Mahavidyalaya, University of Calcutta.

Extracurricular Activities

1. Actively participated and volunteered in the International Conference on Multiscale Simulation and Mathematical Modelling of Complex Biological Systems (MSMM-2019 & MSMM-2021) at Jawaharlal Nehru University, New Delhi.
2. Member of the Biophysical Society (BPS), USA.
3. Member of the Indian Biophysical Society (IBS).
4. Actively participated and completed Winter Delhi Half (21.5 KM) Marathon 2019.

Languages

Bengali	**Mothertongue**	
English	**Intermediate**	*Conversationally fluent*
Hindi	**Intermediate**	*Conversationally fluent*

References

Available upon request.