Jayanta Mukhopadhyay, Ph.D.

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EDUCATION

Ph.D., Biochemistry & Molecular Biology — *2000*
Jadavpur University, Calcutta, India

M.Sc., Physics — *1993*
Indian Institute of Technology, Kharagpur, India

B.Sc. (Hons.), Physics — *1991*
University of Calcutta, Calcutta, India

ACADEMIC APPOINTMENTS

Professor — *2020 – present*
Department of Chemistry, Bose Institute, Kolkata, India

Associate Professor — *2015 – 2020*
Department of Chemistry, Bose Institute, Kolkata, India

Assistant Professor — *2009 – 2015*
Department of Chemistry, Bose Institute, Kolkata, India

Research Specialist II — *2005 – 2008*
Howard Hughes Medical Institute, Waksman Institute, Rutgers University, Piscataway, NJ, USA

Postdoctoral Associate — *2000 – 2005*
Howard Hughes Medical Institute, Waksman Institute, Rutgers University, Piscataway, NJ, USA (Advisor: Dr. Richard H. Ebright)

Research Fellow — *1994 – 1999*
Department of Biochemistry, Bose Institute, Calcutta, India (Ph.D. research)

HONORS & AWARDS

Howard Hughes Medical Institute Postdoctoral Associate	*2000*
CSIR (Govt. of India) Predoctoral Research Fellowship	*1994 – 1999*
Graduate Aptitude Test in Engineering (GATE), qualified	*1993*
National Scholarship	*1988*

INSTITUTIONAL SERVICE

Vigilance Officer	*2022 – 2024*
Radiation Safety Officer	*2017 – present*
Chairman, Central Instrument Facility (CIF)	*2021 – 2025*
Chairman, Purchase Committee	*2020 – 2022*
Member, Library Committee	—
Member, Security Committee	—

RESEARCH GRANTS & FUNDING

Evaluating the mechanism of transcription in Bacillus subtilis — 2026 – 2029
Principal Investigator · ANRF (ARG/2025/001118/LS)

Setting up a state-of-the-art Cryo-EM Regional/National Facility in the Eastern Region at Bose Institute — transforming structure-guided drug discovery and therapeutics research 2020 – 2025
Co-Principal Investigator · IRPHA, SERB (SERB/IPA/2020/000414)

Next-generation advanced therapies for fighting β-hemoglobinopathies via rational intervention in the γ-globin regulatory network 2018 – 2022
Co-Principal Investigator · Indo-Swiss Joint Research Project

Evaluating the role and mechanism of function of the delta factor of Bacillus subtilis 2018 – 2021
Principal Investigator · SERB, Department of Science and Technology, Govt. of India

Evaluating the sensor kinase MtrB of Mycobacterium tuberculosis as a regulator of bacterial physiological responses and as a potential therapeutic target 2016 – 2019
Co-Principal Investigator (PI: Prof. Joyoti Basu) · Department of Science and Technology, Govt. of India

Systems Medicine (DBT cluster project) 2016 – 2021
Co-Principal Investigator · Department of Biotechnology, Govt. of India

Characterization and design of inhibitors of Mycobacterium tuberculosis transcription 2013 – 2016
Principal Investigator · Department of Biotechnology, Govt. of India

In vitro study of input–output robustness of the MprAB signalling pathway in Mycobacterium tuberculosis 2013 – 2016
Co-Principal Investigator (with Dr. S. Banik and Dr. M. Kundu) · Department of Biotechnology, Govt. of India

Identification of the genes regulated by Mycobacterium tuberculosis sigma factors 2010 – 2013
Principal Investigator · Department of Biotechnology, Govt. of India

PATENTS

1. *Non-MccJ25-related lariat peptide inhibitors of bacterial RNA polymerase.* Ebright RH, **Mukhopadhyay J**, Simenova E, Severinov K. U.S. Patent No. **US 8,354,246 B2** (2013).

BOOK CHAPTER

1. **Mukhopadhyay J**. *Mechanism of transcription in prokaryotes.* ***Nova Science Publishers, Inc.,*** Hauppauge, NY, USA **(2013).**

REVIEW ARTICLES

1. *Recent advances in mycobacterial transcription: insights beyond the general pathway.* Hazra N, **Mukhopadhyay J**. ***Journal of Bacteriology*** **(2025).** doi:10.1128/jb.00154-25.
2. *New target for inhibition of bacterial RNA polymerase: the 'switch region'.* Srivastava A, Talaue M, Liu S, Degen D, Ebright RY, Sineva E, Chakraborty A, Druzhinin SY, Chatterjee S, **Mukhopadhyay J**, Ebright YW, Zozula A, Shen J, Sengupta S, Niedfeldt RR, Xin C, Kaneko T, Irschik H, Jansen R, Donadio S, Connell N, Ebright RH. ***Curr Opin Microbiol*** 14:532–543 **(2011).**
3. *Fluorescence resonance energy transfer (FRET) in analysis of transcription-complex structure and function.* **Mukhopadhyay J**, Mekler V, Kortkhonjia E, Kapanidis AN, Ebright YW, Ebright RH. ***Methods Enzymol*** 371:144–159 **(2003).**

SELECTED PEER-REVIEWED PUBLICATIONS

Name in bold denotes the author; asterisk (*) denotes corresponding author or equal contribution.

1. *A noncanonical pathway of RNA polymerase subunit assembly in B. subtilis.* Tewary A, Chakraborty A, Sur R, **Mukhopadhyay J**. ***JBC Communication*** **(2026).** doi:10.1016/j.jbc.2026.111478.
2. *RFA1 inhibits rifampicin-resistant RNA polymerase by binding via a similar mechanism as rifampicin.* Saha S, Tewary A, Ghosh Majumdar S, Cabal M, **Mukhopadhyay J**. ***Journal of Molecular Biology*** **(2026).** doi:10.1016/j.jmb.2026.169773.
3. *Differential association of primary and alternative σ factors with RNA polymerase of M. tuberculosis during transcription elongation.* Hazra N, **Mukhopadhyay J**. ***Nucleic Acids Research*** **(2026).** doi:10.1093/nar/gkaf1459.
4. *The genomic SELEX-based method identifies 350 SigA-specific promoters in Mycobacterium tuberculosis.* Jaiswal R, Dutta S, Mukherjee S, Hazra N, Saha S, **Mukhopadhyay J**. ***FEBS Journal*** **(2025).** doi:10.1111/febs.70251.

5. *Bacillus subtilis σA and Escherichia coli σ70 lacking σ region 1.1 are not released during transcription initiation and elongation.* Tewary A, Sengupta S, Mukherjee S, Hazra N, Ebright YW, Ebright RH, **Mukhopadhyay J**. ***Proc Natl Acad Sci USA*** **(2025).** doi:10.1073/pnas.2503801122.

6. *Control of replication and gene expression by ADP-ribosylation of DNA in Mycobacterium tuberculosis.* Butler RE, Schuller M, Jaiswal R, **Mukhopadhyay J**, Barber J, Hingley-Wilson S, Wasson E, Alves AC, Ahel I, Stewart GR. ***EMBO J*** **(2025).** doi:10.1038/s44318-025-00451-y.

7. *Mechanism of δ-mediated transcription activation in Bacillus subtilis: interaction with a CTD of RNA polymerase stabilizes δ and successively facilitates the open complex formation.* Tewary A, Prajapati RK, **Mukhopadhyay J**. ***Journal of Molecular Biology*** 435:168366 **(2023).** doi:10.1016/j.jmb.2023.168366.

8. *A saponin–polybromophenol antibiotic (CU1) from Cassia fistula bark against multi-drug-resistant bacteria targeting RNA polymerase.* Chakraborty AK, Saha S, Kousik K, Samanta T, Gautam S, **Mukhopadhyay J**. ***Current Research in Pharmacology and Drug Discovery*** 3:100090 **(2022).**

9. *Functional insights into Mycobacterium tuberculosis DevR-dependent transcriptional machinery utilizing Escherichia coli.* Sharma S, Kumar R, Jain A, Kumar M, Gauttam R, Banerjee R, **Mukhopadhyay J**, Tyagi JS. ***Biochem J*** 478(16):3079–3098 **(2021).**

10. *Identification of genome-wide targets and DNA recognition sequence of the Arabidopsis HMG-box protein AtHMGB15 during cold stress response.* Mallik R, Prasad P, Kundu A, Sachdev S, Biswas R, Dutta A, Roy A, **Mukhopadhyay J**, Bag SK, Chaudhuri S. ***Biochim Biophys Acta Gene Regul Mech*** 1863(12):194644 **(2020).**

11. *Evidence of robustness in a two-component system using a synthetic circuit.* Dutta A, Rudra P, Banik SK, **Mukhopadhyay J**. ***J Bacteriol*** 202(4):e00672-19 **(2020).**

12. *A transcriptomic analysis of the mycobacteriophage D29 genome reveals the presence of novel stoperator-associated promoters in its right arm.* Bhawsinghka N, Dutta A, **Mukhopadhyay J**, Das Gupta SK. ***Microbiology*** 164(9):1168–1179 **(2018).**

13. *Identification of a suitable promoter for the sigma factor of Mycobacterium tuberculosis.* Mallick Gupta A, Mukherjee S, Dutta A, **Mukhopadhyay J**, Bhattacharyya D, Mandal S. ***Mol Biosyst*** 13:2370–2378 **(2017).**

14. *A novel function of δ factor from Bacillus subtilis as a transcriptional repressor.* Prajapati RK, Sur R, **Mukhopadhyay J**. ***J Biol Chem*** 291(46):24029–24035 **(2016).**

15. *Mode of action of a designed antimicrobial peptide: high potency against Cryptococcus neoformans.* Datta A, Yadav V, Ghosh A, Choi J, Bhattacharyya D, Kar RK, Ilyas H, Dutta A, An E, **Mukhopadhyay J**, Lee D, Sanyal K, Ramamoorthy A, Bhunia A. ***Biophysical Journal*** 111:1724–1737 **(2016).**

16. *Deciphering the role of the AT-rich interaction domain and the HMG-box domain of ARID-HMG proteins of Arabidopsis thaliana.* Roy A, Dutta A, Roy D, Ganguly P, Ghosh R, Kar RK, Bhunia A, **Mukhopadhyay J**, Chaudhuri S. ***Plant Molecular Biology*** 92(3):389–390 **(2016).**

17. *Bacillus subtilis δ factor functions as a transcriptional regulator by facilitating the open complex formation.* Prajapati RK, Sengupta S, Rudra P, **Mukhopadhyay J**. ***J Biol Chem*** 291(3):1064–1075 **(2016).**

18. *Promoter escape with bacterial two-component sigma factor suggests retention of sigma region two in the elongation complex.* Sengupta S, Prajapati RK, **Mukhopadhyay J**. ***J Biol Chem*** 290(47):28575–28583 **(2015).**

19. *Novel mechanism of gene regulation: the protein Rv1222 of Mycobacterium tuberculosis inhibits transcription by anchoring the RNA polymerase onto DNA.* Rudra P, Prajapati RK, Banerjee R, Sengupta S, **Mukhopadhyay J***. ***Nucleic Acids Research*** 43:5855–5867 **(2015).**

20. *Revisiting the mechanism of activation of cyclic AMP receptor protein (CRP) by cAMP in Escherichia coli: lessons from a subunit-crosslinked form of CRP.* Saha A, **Mukhopadhyay J**, Datta AB, Parrack P. ***FEBS Letters*** 589:358–363 **(2015).**

21. *MtrA, an essential response regulator of the MtrAB two-component system, regulates the transcription of resuscitation-promoting factor B (RpfB) of Mycobacterium tuberculosis.* Sharma AK, Chatterjee A, Gupta S, Banerjee R, Mandal S, **Mukhopadhyay J**, Basu J, Kundu M. ***Microbiology*** 161(6):1271–1281 **(2015).**

22. *Recombinant reporter assay using transcriptional machinery of Mycobacterium tuberculosis.* Banerjee R, Rudra P, Saha A, **Mukhopadhyay J**. ***Journal of Bacteriology*** 197:646–653 **(2015).**

23. *Optimization of recombinant Mycobacterium tuberculosis RNA polymerase expression and purification.* Banerjee R, Rudra P, Prajapati RK, Sengupta S, **Mukhopadhyay J**. ***Tuberculosis (Edinb)*** 94:397–404 **(2014).**

24. *Polyphosphate kinase 1, a central node in the stress response network of Mycobacterium tuberculosis, connects the two-component systems MprAB, SenX3–RegX3 and the extra-cytoplasmic function sigma factor SigmaE.* Sanyal S, Banerjee SK, Banerjee R, **Mukhopadhyay J**, Kundu M. ***Microbiology*** 159:2074–2086 **(2013).**

25. *The RNA polymerase "switch region" is a target for inhibitosr.* **Mukhopadhyay J**, Das K, Ismail S, Koppstein D, Jang M, Hudson B, Sarafianos S, Tuske S, Patel J, Jansen R, Irschik H, Arnold E, Ebright RH.. ***Cell*** 135(2):295–307 **(2008).**

26. *Systematic structure–activity analysis of microcin J25.* Pavlova O, **Mukhopadhyay J**, Sineva E, Ebright RH, Severinov K. ***J Biol Chem*** 283:25589–25595 **(2008).**

27. *Direct observation of abortive initiation and promoter escape within single immobilized transcription complexes.* Margeat E, Kapanidis AN, Tinnefeld P, Wang Y, **Mukhopadhyay J**, Ebright RH, Weiss S. ***Biophys J*** 90:1419–1431 **(2006).**

28. *Retention of transcription initiation factor σ70 in transcription elongation: single-molecule analysis.* Kapanidis AN, Margeat E, Laurence TA, Doose S, Ho SO, **Mukhopadhyay J**, Kortkhonjia E, Mekler V, Ebright RH, Weiss S. ***Mol Cell*** 20:347–356 **(2005).**

29. *Inhibition of bacterial RNA polymerase by streptolydigin: stabilization of a straight-bridge-helix active-center conformation.* Tuske S, Sarafianos S, Wang X, Hudson B, Sineva E, **Mukhopadhyay J**, Leroy O, Ismail S, Clarke A, Birktoft JJ, Dharia C, Napoli A, Laptenko O, Lee J, Berman H, Borukhov S, Ebright RH, Arnold E. ***Cell*** 122:541–552 **(2005).**

30. *Accurate FRET measurements within single diffusing biomolecules using alternating-laser excitation.* Lee NK, Kapanidis AN, Wang Y, Michalet X, **Mukhopadhyay J**, Ebright RH, Weiss S. ***Biophys J*** 88:2939–2953 **(2005).**

31. *Distance-restrained docking of rifampicin and rifamycin SV to RNA polymerase using systematic FRET measurements: developing benchmarks of model quality and reliability.* Knight JL, Mekler V, **Mukhopadhyay J**, Ebright RH, Levy RM. ***Biophys J*** 88:925–938 **(2005).**

32. *Antibacterial peptide microcin J25 (MccJ25) inhibits transcription by binding within, and obstructing, the RNA polymerase secondary channel.* **Mukhopadhyay J**, Sineva E, Knight J, Levy RL, Ebright RH. ***Mol Cell*** 14:739–751 **(2004).**

33. *The σ70 subunit of RNA polymerase mediates a promoter-proximal pause at the lac promoter.* Nickels BE, **Mukhopadhyay J**, Garity SJ, Ebright RH, Hochschild A. ***Nat Struct Mol Biol*** 11:544–550 **(2004).**

34. *Structure of antibacterial peptide microcin J25: a 21-residue lariat protoknot.* Bayro MJ, **Mukhopadhyay J**, Swapna GV, Huang JY, Ma LC, Sineva E, Dawson PE, Montelione GT, Ebright RH. ***J Am Chem Soc*** 125:12382–12383 **(2003).**

35. *Structural organization of bacterial RNA polymerase holoenzyme and the RNA polymerase–promoter open complex.* Mekler V*, Kortkhonjia E*, **Mukhopadhyay J***, Knight J*, Revyakin A, Kapanidis AN, Niu W, Ebright YW, Levy R, Ebright RH. ***Cell*** 108:599–614 (equal contribution) **(2002).**

36. *Translocation of σ70 with RNA polymerase during transcription: fluorescence resonance energy transfer assay for movement relative to DNA.* **Mukhopadhyay J**, Kapanidis AN, Mekler V, Kortkhonjia E, Ebright YW, Ebright RH. ***Cell*** 106:453–463 **(2001).**

37. *A novel RNA polymerase binding site upstream of the galactose promoter in Escherichia coli exhibits promoter-like activity.* Sur R, Debnath D, **Mukhopadhyay J**, Parrack P. ***Eur J Biochem*** 268:2344–2350 **(2001).**

38. *Functional roles of the two cyclic AMP-dependent forms of CRP (cyclic AMP receptor protein) from Escherichia coli.* **Mukhopadhyay J**, Sur R, Parrack P. ***FEBS Letters*** 453:215–218 **(1999).**