

Summary of Expertise

Highly accomplished Biochemist and Structural Biologist with over 10 years of research experience, dedicated to exploring fundamental biological questions from atomic to cellular resolution. Expert in Structural Biology methods, including state-of-the-art Cryo-electron microscopy (Cryo-EM) and X-ray Crystallography, with a proven track record of published manuscripts. Specialized in the structural and biophysical characterization of challenging systems, particularly membrane proteins and soluble protein-protein complexes. Demonstrated ability to secure funding and contribute to graduate and undergraduate education.

Employments

Dec 2021-present Senior Research Fellow (SRF), School of Biological Sciences, Nanyang Technological University, Singapore

Project: Structural and functional characterization of Ligand Gated Ion Channels.

- **Pioneered** the use of advanced **Cryo-electron microscopy (Cryo-EM)** (FEI Titan Krios G3i 300 kV) for the structural elucidation of complex membrane protein assemblies, including prokaryotic ligand-gated ion channels (GLIC) and the 5-HT_{3A} receptor.
- **Resolved** structures providing critical **insights into asymmetric gating mechanisms** and lipid environment effects on channel function (as detailed in *PNAS* and *Nature Communications*).
- **Contributed** to the teaching mission by conducting a 5-lecture PhD course on structural biology at Savitribai Phule Pune University, India.
- **Contributed** to practicals in the course of BS3021- Bioimaging Techniques in EM at SBS, NTU.

Sep 2017-Oct 2021 Postdoctoral Scholar (Advisor: Prof. Rajesh Ramachandran) at Case Western Reserve University, Cleveland, Ohio, USA

Project: Deciphering the structural and biophysical mechanisms of proteins (e.g., MiD51, Drp1) driving mitochondrial membrane remodeling and cellular bioenergetics using biophysical assays, NMR, and structural approaches.

- **Identified and characterized** a conserved Drp1 cardiolipin-binding motif essential for mitochondrial fission using **Biophysical methods** (Microscale Thermophoresis) and solid-state NMR (*PNAS* 2021).
- **Investigated** the coupling between cellular bioenergetics (ADP regulation) and **mitochondrial membrane remodeling** by characterizing MiD51-phospholipid interactions, directly addressing a fundamental biological question.
- **Developed** expertise in advanced **Biophysical tools** for analyzing protein-lipid interactions, including the use of Microscale Thermophoresis (MST) and reconstitution of proteins into nanodiscs.
- **Received** awards for poster presentations (1st and 2nd place) for presenting key findings at

the Biophysical Society Annual Meetings.

June 2015-Feb 2017 Post-Doctoral Research Associate (Advisor: Prof. Kaza Suguna) at Molecular Biophysics Unit, Indian Institute of Science, India

Project: Structural characterization of Adenylyl Cyclases from *Mycobacteria*.

- **Determined** the crystal structures of class III nucleotidyl cyclases from *Mycobacteria*, providing **structural insights** into autoinhibitory mechanisms and substrate specificity (*J Struct Biol* 2015, *FEBS J* 2016).
- **Leveraged X-ray Crystallography** and advanced protein purification techniques to study challenging enzyme systems critical for bacterial signaling.
- **Contributed** to the field by presenting research at international forums, including receiving a travel grant to attend the 23rd Jerusalem School in Life Sciences on Computational and Structural Biology.

Skills:

Protein structure determination using cryo-electron microscopy: Negative staining, Cryo-electron microscopy, Single particle analysis, Sample preparation, Data collection in FEI Tecnai G2 Spirit (120kV), Thermo TF-20 200 kV, FEI Tecnai Arctica, and FEI Titan Krios G3i 300 kV microscopes. Expert in data collection/processing software such as EPU, serial-EM, RELION, CryoSPARC, and CisTEM. Modelling software such as Coot, Phenix and CCP4. Graphical visualization software such as Pymol, UCSF Chimera, and ChimeraX.

Protein structure determination using X-ray Crystallography using molecular replacement, SAD, and MAD.

Recombinant protein expression and purification using ion-exchange chromatography and size-exclusion chromatography.

Experience with multiple challenging soluble protein-protein complexes and membrane protein systems. Reconstitution of membrane proteins into nanodiscs and liposomes. Experience in nanobody-protein interactions and stabilization. Expert in multiple expression systems such as mammalian, insect, and bacterial.

Gene cloning, site-directed mutagenesis, and deletion/insertion mutations.

Biophysical methods: ITC, CD, Microscale Thermophoresis, SEC-MALS, Fluorescence spectroscopy, DSF, and DLS.

Bioinformatics programs: HADDOCK, AutoDock, Fold-X, MODELLER, GROMACS

Teaching and Mentoring Experience

June 2008-May 2010 Assistant Professor, Modern College of Arts, Science and Commerce, Ganeshkhind, Pune, India.

My responsibilities included delivering lectures and practical sessions for master's students, as well as supervising research dissertations for a total of four students.

2018-2021 Mentored four high school students during their summer training and supervised one

master's student for their dissertation.

2021 - present Supervised three final-year project (FYP) students for their dissertations.

Invited talks

2025 Talk on X-ray crystallography, NMR, and Cryo-EM in the Department of Microbiology, KTHM college, Nashik, India

2024 Invited speaker, Cryo-EM structure of a 55-kDa nucleoplasmin protein at the Biophysical Society of America conference, USA

2023 **Keynote speaker**, Introductory Seminar on Cryo-Electron Microscopy Technique for Structural Biology, NIT-W, India

2022 Invited speaker, Conducted 5 5-lecture PhD course on structural biology at the Department of Microbiology, Savitribai Phule Pune University, Pune, India

2022 Invited speaker, 153rd SATURDAY MEET at the Department of Microbiology, Savitribai Phule Pune University, Pune, India

2021 Invited speaker, National workshop on Protein structure and function determination: Part 1- X-ray crystallography, Part 2- Cryo-Electron microscopy, conducted by Modern College Ganeshkhind, Pune, India

2020 Invited speaker, Crystal structure of MiD51 bound to phospholipid at the Biophysical Society of America conference, USA

2019 Invited talk in the department of Molecular Biophysics Unit, Indian Institute of Science, Bangalore, on ADP-Regulated MiD51-Phospholipid Interactions Couple Cellular Bioenergetics to Mitochondrial Membrane Remodeling.

2017 Talk on Glimpses of structural biology in the Department of Microbiology, Fergusson College, Pune, India

2016 Talk on Techniques in Biophysics in the Department of Microbiology, RYK College, Nashik, India

Honors & Awards

2019 1st position in poster presentation during the 18th Annual DPB retreat, Case Western Reserve University, Cleveland, USA.

2018 2nd position in poster presentation during the 17th Annual DPB retreat, Case Western Reserve University, Cleveland, USA.

2016 Received travel grant awarded 'International Travel Support Grant' by the organizers to attend and present a poster at the 23rd Jerusalem School in Life Sciences on

"Computational and Structural Biology", Israel 2016. The school-directed by Nobel Laureate Prof. Roger Kornberg, Stanford University

2015 Granted 'Travel Bursary of £1020' by the organizers to attend CCP4 study weekend 2015 on 'Advances in Experimental Phasing.'

2015-2017 Scholarship for Postdoctoral Research, Indian Institute of Science, Bangalore, India

2012-2015 Institute Scholarship for Senior Research Fellow, Indian Institute of Science, Bangalore, India

2010-2012 Institute Scholarship for Junior Research Fellow, Indian Institute of Science, Bangalore, India

2008 Council of Scientific and Industrial Research Fellowship – Junior Research Fellow from CSIR, New Delhi, India

Education

2010-2016 Ph.D. in Biochemistry, Biophysics and Structural Biology (Advisor: Prof. Kaza Suguna), Molecular Biophysics Unit, Indian Institute of Science, India. (Performance: 6.5 CGPA)

2006-2008 M.Sc in Microbiology (Advisor: Prof. Anjana Desai), Department of Microbiology and Biotechnology, Maharaja Sayajirao University (MSU), Vadodara, India (Performance:63%)

2003-2006 B.Sc in Microbiology, HPT Arts & R.Y.K Science College, Nashik., India (Performance:75%)

Publications (Research articles and book chapter)

1. Wahyu, S., **Bharambe N.**, Tan, Paula., Basak, S., Torres, J. (2026) *Cardiolipin disperses aquaporin Z tetramers to enhance water permeability*. [Int. Journal of Biological Macromolecules](#). 358, 151540
2. Li, Z., **Bharambe N.**, Lande K. M., Feddersen B., M. Balakrishna A., Biggin P., Sahu G., and Basak, S. (2025) *Asymmetric gating of a homopentameric ion channel GLIC revealed by cryo-EM*. [PNAS](#). 122 (43) e2512811122
3. **Bharambe, N.***, Saharan, K.*, Vasudevan, D, Basak, S. (2025) *2.0 Å cryo-EM structure of the 55 kDa nucleoplasmin domain of AtFKBP53*. [J Struct Biol](#). 217, 108203
4. Li, Z., **Bharambe, N.** and Basak, S. (2024) *Structural insights into the 5-HT3A receptor revealed by cryo electron microscopy (cryo-EM)*. [Cryo-Electron Microscopy in Structural Biology](#). Taylor & Francis Publishing Group of CRC Press. 1st edition, page 8.
5. **Bharambe, N.**, Li, Z, Seiferth, D, M. Balakrishna A, Biggin P., Basak, S. (2024) *Cryo-EM structures of prokaryotic ligand-gated ion channel GLIC provide insights into gating in a lipid environment*. [Nature Communications](#). 15, 2967
6. The Atomwise AIMS Program (2024) *AI is a viable alternative to high throughput screening: a 318-target study*. [Scientific Reports](#) volume 14, Article number: 7526
7. **Bharambe N.**, Macdonald P., Stepanyants, N., Ramachandran, R. *ADP-regulated*

- MiD51-phospholipid interactions couple cellular bioenergetics to mitochondrial membrane remodeling.* (Manuscript under preparation)
8. Doh, C. Y., Dominic, K., Swanberg, C., **Bharambe, N.**, Willard, B., Li, L., Ramachandran, R., Stelzer, J. (2022) *Identification of phosphorylation and other post-translational modifications in the central C4C5 domains of murine cardiac myosin binding protein C* [Journal: ACS Omega](#). 16, 14189–14202.
 9. Doh, C. Y., **Bharambe, N.**, Homes, J., Dominic, K., Swasberg, C., Mamidi R., Chen, Y., Bandopadhyay, S., Ramachandran, R., Stelzer, (2022) *Molecular characterization of linker and loop-mediated structural modulation and hinge motion in the C4-C5 domains of cMyBPC.* [J Struct Biol](#). 214, 107856.
 10. Mahajan, M.*, **Bharambe, N.***, Shang, Y.*, Bin, L.*, Mandal, A., Mohan, P. M., Wang, R., Boatz, J. C., van der Wel P., Buck, M., Shnyrova, A., Qi, X., Ramachandran, R. (2021) *NMR identification of a conserved Drp1 cardiolipin-binding motif indispensable for mitochondrial fission.* [PNAS](#). 118, 29.
 11. Li, J., Mamidi, R., Doh, C., Holmes, J., **Bharambe, N.**, Ramachandran, R., Stelzer, J. (2020) *AAV9 gene transfer of cMyBPC N-terminal domains ameliorates cardiomyopathy in cMyBPC-deficient mice.* [JCI Insight](#). 5, 17.
 12. **Bharambe, N.**, Ramachandran, R. (2020) *Microscale Thermophoresis (MST) as a Tool for Measuring Dynamin Superfamily Protein (DSP)–Lipid Interactions.* [Methods in Molecular Biology. Springer](#) Chapter 7, 85-92.
 13. **Bharambe, N. G.**, Barathy, D. V., Syed, W., Visweswariah, S. S., Colaço, M., Misquith, S., Suguna, K. (2016) *Substrate specificity determinants of class III nucleotidyl cyclases.* [FEBS J](#). 283, 3723-3738
 14. Barathy, D V.*, **Bharambe, N. G.***, Syed, W., Zaveri, A., Visweswariah, S.S., Colaço, M., Misquith, S., Suguna, K. (2015) *Autoinhibitory mechanism and activity-related structural changes in a mycobacterial adenylyl cyclase.* [J Struct Biol](#). 190, 304-13.
 15. Satbhai, A., Kasodekar, A., Pachua, L., **Bharambe, N.** (2015) *Isolation of halophiles from the Dead Sea and exploring their potential biotechnological applications.* [Int J Curr Microbiol Appl Sci](#). 2, 1-17.
 16. Akolkar, A., **Bharambe, N.**, Trivedi, S., Desai A. (2009) *Statistical optimization of medium components for extracellular protease production by an extreme haloarchaeon, Halobacterium sp SPI(1).* [Lett Appl Microbiol](#). 48. 77-83

*Authors contributed equally

[Funding:](#)

Received a grant of 3,00,000/- INR for the project proposal submitted to BCUD, University of Pune in 2009. Optimization of medium components for enhanced growth of Mycobacterium tuberculosis using factorial design.

[Affiliations](#)

2006 - present Member, Society of Biological Chemists of India

2008 - present Member, Association of Microbiologists of India

2010 - present Member, Indian Crystallographic Association, India

2018 - 2024 Member, Biophysical Society, USA

2023 – 2024 Member, Society of General Physiologists, USA

Conferences and workshops

2024 Biophysical Society 68th Annual Meeting, Philadelphia, Pennsylvania, USA.

2020 Biophysical Society 64th Annual Meeting, San Diego, USA.

2019 Biophysical Society 63rd Annual Meeting, Baltimore, USA.

2019 18th Annual DPB retreat, Cleveland, USA.

2018 17th Annual DPB retreat, Cleveland, USA.

2018 76th Annual Pittsburgh Diffraction Conference, Cleveland, USA.

2016 23rd Jerusalem School in Life Sciences on Computational and Structural Biology, Jerusalem, Israel.

2015 CCP4 Study Weekend, 2015: “Advances in experimental phasing”, Nottingham, UK

2013 International Conference on Biomolecular Forms & Functions: A Celebration of 50 years of Ramachandran map, Bangalore, India.

2013 National Tuberculosis meeting, Bangalore, India.

2011 National Seminar on Crystallography, Chennai, India

2008 Glimpses on DNA biotechnology, Learning Center, Nashik, India.

2006 Human Heritage: Our Genome and Stem Cells, organized by the Society of Biological Chemists, India

2003 National Conference on “Sustainability of pollen and pollinator resources for food and nutritional security for human welfare”.