Shalini Gupta

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Education

2022 **Massachusetts Institute of Technology (MIT)**, Cambridge, MA
PhD in Biochemistry (GPA: 5/5)

2016 **Indian Institute of Technology (IIT) Kanpur**, India
Bachelor of Science in Chemistry (Department Rank 1, GPA: 9.7/10.0)

Research Experience

2022- **Postdoctoral Fellow, Genentech**
Advisors: Dr. Andrea Cochran and Dr. Ishan Deshpande
- Identified interactors of a membrane protein target essential for killer-lymphocyte cytotoxicity via IP/MS from human CD8+ T-cells.
- Determined affinity of nanobodies against a membrane protein via SPR.
- Leveraged single-particle cryo-EM to study an E3 ligase complex.

2017 - 22 **Graduate Research, Massachusetts Institute of Technology (MIT)**
Advisor: Prof. Stephen P. Bell
- Investigated how eukaryotic DNA helicase enzymes are loaded on DNA.
- Developed 4 novel single-molecule FRET assays to monitor multiple protein-protein and protein-DNA interactions in helicase loading.
- Expressed and purified multiple proteins in yeast and bacteria.
- Bioconjugated 40+ large protein complexes with fluorescent peptides.
- Implemented an internal library of MATLAB scripts for kinetic analysis.
- Collaborated across institutions with Jeff Gelles's lab at Brandeis.
- Supervised in-house implementation of a protein labeling technology.

2014-16 **Undergraduate Project, IIT Kanpur, India**
Advisor: Prof. Nisanth Nair
- Investigated how the drug aztreonam can treat antibiotic-resistant infections by escaping hydrolysis by bacterial β-lactamase enzymes.
- Performed computational QM/MM simulations to study mechanism.

2015 **Summer Research, University of California, San Francisco (UCSF)**
Advisors: Prof. William DeGrado and Prof. Michael Grabe
- Molecular dynamics simulations to study a designed Zn^{2+} transporter.

Publications and Conferences

- Pourmal S, ... , **Gupta S**, ... , Dixit VM, Deshpande I. *Autoinhibition of dimeric NINJ1 prevents plasma membrane rupture*. Nature. 2024.
- **Gupta S**, Friedman LJ, Gelles J, Bell SP. *An ORC Backflip Enables Bidirectional Helicase Loading*. eLife 2021; 10:e74282. Selected for eLife Insight (top 15%).
- Amasino A, **Gupta S**, ... , Bell SP. *Regulation of replication origin licensing by ORC phosphorylation reveals a two-step mechanism for Mcm2-7 ring closing*. PNAS. 2023.
- Awasthi S, **Gupta S**, Tripathi R, Nair NN. *Mechanism and Kinetics of Aztreonam Hydrolysis Catalyzed by Class–C β-Lactamase*. J. Phys. Chem. B, 2018.

Technical Skills

Biochemical assays: surface plasmon resonance (SPR), single-molecule fluorescence microscopy, FRET for protein-protein and protein-DNA interactions.

Protein biochemistry and Structural biology: expression and purification of membrane, nuclear and cytoplasmic proteins from a variety of systems - Expi293, yeast, bacteria, cryo-EM sample prep and analysis, AKTA size-exclusion chromatography, IEX, fluorescent modification (Cysteine, Sortase, Sfp, SNAP/CLIP).

Cell biology: Human CD8+ T cell isolation, mammalian cell culture, CRISPR-Cas9 knockout generation, RNA extraction, FACS, IP/MS, fixed cell imaging.

Programming languages and software: CryoSPARC, MATLAB, Adobe Illustrator, Pymol, Prism, Snapgene, Benchling

Awards and Fellowships

MIT
MathWorks Science Fellowship (2020-22)
Graduate Woman of Excellence (2019)
NSF GRFP Honorable Mention (2018)

IIT Kanpur
Director's Gold Medal (2016), Women's Gold Medal (2016)
General Proficiency Medal (2016), Academic Excellence Awards (2014-15)
SN Bose Fellowship (2015) - US internship fund for top 1.5% applicants
KVPY (2012-16) - four-year undergraduate scholarship for top science majors

Teaching and Science Communication

MITx Content Creator, Cell Biology and Genetics (2021-22)
- Developed assessment questions for two free-to-audit MIT Biology MOOCs.

Teaching Development Fellow, MIT Biology (2020-21)
- Organized a Careers in Biology Education panel featuring MIT Biology alumni.
- Developed and facilitated workshops on course design and effective feedback.

Teaching Assistant, Molecular Biology (2020) and Grad Biochemistry (2017), MIT
- Independently facilitated recitations and conducted assessments (rating 6.7/7.0).

Certifications and Training

- **Scientific Leadership and Management**, Gladstone Institutes (2024)
- **Kaufman Teaching Certificate Program** • **Conflict Management**, MIT (2018)

Outreach and Leadership

Genentech
Postdoc Buddy Committee (2024)
Mentor, 4 high-school students (2024) and 3 fouth graders (2023-24)

Community
Judge, San Mateo County Office of Education STEM Fair (2023)
Instructor for 6-week course on CRISPR, CRLS (2018)
Judge, MJAS high school science symposium (2016-21)
MIT Biology Exhibitor at a minority STEM conference ABRCMS (2018)

MIT Biology
President, Biology Graduate Students Council (BGSC) (2018-19)
Events Chair, Biology Graduate Students Council (2017-18)
- Led organization of the 2019 biology graduate student retreat, department social hours and annual student-run seminars.