

Tanmoy Khan

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[Google Scholar](#) | [Personal Website](#)

ORCID: 0000-0003-1101-2827

Research Experience

Ph.D. Candidate (August 2019–Present)

Indian Institute of Technology Kanpur (IITK)

Advisor: Prof. Pratik Sen

Thesis: “Critical Role of Water to Maintain Protein Stability and Activity in Hydrated Deep Eutectic Solvent and Beyond”

- Linked protein unfolding thermodynamics with water dynamics in DES and macromolecular crowding.
- Proposed a mechanistic model for entropy–enthalpy compensation.
- Utilized REES to probe hydration-layer dynamics.
- Led/supported roles in:
 - Amyloid detection via FCS
 - Developing BEEmS to track solvation heterogeneity.
 - Solvation mapping using steady-state fluorescence.
 - Stability enhancement in perovskite nanocrystals.

M.Sc. Thesis (August 2018– May 2019)

IIT Hyderabad

Supervisor: Prof. Ch. Subrahmanyam

Project: Plasmonic Bi nanoparticle decorated BiVO₄/rGO as a photoanode for water splitting (*Published*)

Summer Internship (May – July 2018)

IIT Kanpur

Advisor: Prof. Pratik Sen

Project: Synthesis of quinoline-based Cu²⁺ sensor (*Published*)

Education

M.Sc. in Chemistry (2017–2019)

Indian Institute of Technology Hyderabad

GPA: 9.45 | Class Rank: 2

B.Sc. in Chemistry (2014–2017)

Ramakrishna Mission Residential College, Narendrapur

Percentage: 82.1% | Class Rank: 5

Publications

First-Author Publications:

1. Critical Role of Water beyond the Media to Maintain Protein Stability and Activity in Hydrated Deep Eutectic Solvent.

Tanmoy Khan, Nilimesh Das, Suman Bhowmik, Kuldeep Singh Negi, Pratik Sen* *J. Phys. Chem. B*, **2025**, 129, 162–175.

2. Role of Associated Water Dynamics on Protein Stability and Activity in Crowded Milieu.

Tanmoy Khan, Bisal Halder, Nilimesh Das*, Pratik Sen* *J. Phys. Chem. B*, **2024**, 128, 8672–8686.

3. Tracking Heterogeneous Protein Aggregation at Nanoscale through Fluorescence Correlation Spectroscopy.

Bisal Halder[#], Shreya Ghosh[#], **Tanmoy Khan**[#], Subhendu Pal[#], Nilimesh Das*, Pratik Sen* *Photochem. Photobiol.*, **2024**, 100, 989-999.

4. Understanding the Intricacy of Protein in Hydrated Deep Eutectic Solvent: Solvation dynamics, conformational fluctuation dynamics, and stability.

Tanmoy Khan, Nilimesh Das, Kuldeep Singh Negi, Suman Bhowmik, Pratik Sen* *Int. J. Biol. Macromol.*, **2023**, 253, 127100.

5. Multiple Evidences for Molecular Level Heterogeneity in a Non-ionic Biocatalytic Deep Eutectic Solvent.

Tanmoy Khan[#], Ejaj Tarif[#], Yuto Awano, Lou Serafin Lozada, Nilimesh Das, Keisuke Tominaga, Pratik Sen* *J. Mol. Liq.*, **2023**, 389, 122882.

Co-author Publications:

6. Interplay of Protein Fluctuation and Associated Water Dynamics on the Osmolyte-induced Protein Stabilization.

Kuldeep Singh Negi, Subhajit Rana, **Tanmoy Khan**, Dipankar Mondal, and Pratik Sen* *Biophys. J.*, **2025**, 124, 2082-2091.

7. Macromolecular Crowding Effects on Protein Dynamics.

Nilimesh Das, **Tanmoy Khan**, Bisal Halder, Shreya Ghosh, Pratik Sen* *Int. J. Biol. Macromol.*, **2024**, 281, 136248.

8. Osmolytes Induced Protein Stabilization: Modulation of Associated Water Dynamics might be a Key Factor.

Kuldeep Singh Negi, Nilimesh Das, **Tanmoy Khan**, Pratik Sen* *Phys. Chem. Chem. Phys.*, **2023**, 25, 32602-32612.

9. The Shift of Excitation Spectra at Blue Edge of Emission (BEE_mS) as a new Methodology to Probe Heterogeneity.

Nilimesh Das, **Tanmoy Khan**, Pratik Sen* *Chemical Physics*, **2024**, 577, 112138.

10. Site-specific Heterogeneity of Multi-domain Human Serum Albumin and its Origin: A Red Edge Excitation Shift Study.

Nilimesh Das, Subhrasmita Sahu, **Tanmoy Khan** and Pratik Sen* *Photochem. Photobiol.*, **2023**, 99, 538-546.

11. Massive Amplification of Photoluminescence and Exceptional Water Stability of MAPbBr₃ Nanocrystals through Core-Shell Nanostructure Formation in a Self-Defence Mechanism.

Shovon Chatterjee, **Tanmoy Khan**, Arghya Sen, Nilimesh Das,* and Pratik Sen* *Mater. Adv.*, **2022**, 3, 7360-7369.

12. Correlating Bromelain's Activity with its Structure and Active-site Dynamics and the Medium's Physical Properties in a Hydrated Deep Eutectic Solvent.

Nilimesh Das, **Tanmoy Khan**, Navin Subba, and Pratik Sen* *Phys. Chem. Chem. Phys.*, **2021**, 23, 9337-9346.

13. Synthesis of a Novel Quinoline Derivative for Selective and Sensitive Visual Detection of PPB Level Cu^{2+} in Aqueous Solution.

Nilimesh Das, **Tanmoy Khan**, Aritra Das, Vipin Kumar Jain, Joydev Acharya, Md. Serajul Haque Faizi, Joseph Daniel, and Pratik Sen* *Curr. Anal. Chem.*, **2022**, 18, 196-203.

14. Highly Selective and Sensitive (PPB Level) Quinolin-based Colorimetric Chemosensor for Cu(II).

Vaisakh Mohan, Nilimesh Das, Vipin Kumar Jain, **Tanmoy Khan**, Sarvesh Kumar Pandey, Md. Serajul Haque Faizi, Joseph Daniel, and Pratik Sen* *ChemistrySelect*, **2020**, 5, 9435-9442.

15. Plasmonic Bi Nanoparticle Decorated BiVO_4/rGO as an Efficient Photoanode for Photoelectrochemical Water Splitting.

Palyam Subramanyam, **Tanmoy Khan**, Gudipati Neeraja Sinha, Duvvuri Suryakala, Challapalli Subrahmanyam* *Int. J. Hydrogen. Energy*, **2020**, 45, 7779-7787.

Under Review / In Preparation:

16. Site-Specific Water Dynamics Drives Protein Stability in Hydrated Deep Eutectic Solvents.

Tanmoy Khan, Kuntal Debnath, Kuldeep Singh Negi, Pratik Sen* (under review)

17. Dissecting the Role of Substrate Folding in Enzymatic Digestion.

Nilimesh Das[#], **Tanmoy Khan**[#], Soumya Chaudhury, Bhaswati Sengupta, Pratik Sen* (under review)

18. Crucial Role of Hydrophobicity in Determining the Synergism and Heterogeneity in Binary Solvent Mixture.

Tanmoy Khan, Kuntal Debnath, Soumya Chaudhury, Nilimesh Das, Pratik Sen*

19. Modulation of Associated Water Determines the Protein Stability in Hydrated Deep Eutectic Solvents.

Tanmoy Khan, Soumya Chaudhury, Pratik Sen*

20. Solvation dynamics from Steady-state Emission. Nilimesh Das, **Tanmoy Khan**, Pratik Sen*

Teaching Experience

- **Scientific mentorship** to 2 doctoral and 6 postgraduate students.
- **Guest Lecturer**, Athena B.Ed. College, West Bengal (Jul 2023 – May 2024)
- **Guest Lecturer**, CSJM University, Kanpur (Mar – May 2023)
- **Problem-solving session**, NPTEL Course, 'Chemistry and Physics of Surfaces and Interfaces' (Jul – Sep 2022).
- **Chemistry Educator** for "SATHEE", an initiative by the Ministry of Education, Govt. of India (July– August, 2024)
- **Teaching Assistant**, 'Basic Physical Chemistry (CHM-222A)', IIT Kanpur (January-May 2021)

- **Chemistry Educator**, Kendriya Vidyalaya, IIT Kanpur (Oct – Dec 2021)
 - **Chemistry Educator**, Unacademy (Jan – Mar 2020)
 - **Founder and Educator** of YouTube learning platform ‘Prochesta’: an initiative for teaching during the COVID period; (May-Nov 2020)
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Awards & Honors

- **Fellowship for Academic and Research Excellence (FARE)**, IIT Kanpur (June 2025– Present)
 - **Prime Minister Research Fellow**, Ministry of Education, Govt. of India (2020–2024)
 - Selected among Top 51 Research Works by PMRFs (2023)
 - Qualified Graduate Aptitude Test in Engineering (GATE)-2019
 - AIR 26, CSIR-NET Lectureship (2018)
 - **JENESYS Scholar**, Ministry of Foreign Affairs, Japan (2018)
 - Academic Excellence Award, RKMRC
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Technical Skills

- Proficient in operating the following instruments-
 - Fluorescence Correlation Spectroscopy (including assembling and troubleshooting)
 - Time Correlated Single Photon Counting
 - Femtosecond fluorescence up-conversion
 - CD spectrometer and Spectrofluorometer
 - Basic level exposure-
 - Transient Absorption Spectroscopy
 - Fluorescence microscope
 - Site-specific tagging of proteins with fluorescence markers
 - Protein expression and purification (limited exposure)
 - Software- IgorPro, OriginPro, Femtosuite, Chimera, CDNN, ChemDraw
 - Basic Bioinformatics Skills.
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Conferences & Presentations

- Poster, OWLS-17 (2024), IIT Bombay
 - Poster, SDCBS (2023), IIT Kanpur
 - Poster, PMRF Symposium (2023), IIT Madras
 - Poster, Research Scholar Day (2022), IIT Kanpur
 - FCS Conferences (2020, 2021), IIT Bombay & IISER TVM
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References

- **Prof. Pratik Sen** – (Advisor), Professor, IIT Kanpur (psen@iitk.ac.in)
- **Dr. Nilimesh Das** – (Ph.D. Senior), Postdoctoral Fellow, Harvard Medical School (nilimesh.das@childrens.harvard.edu)
- **Prof. Ch. Subrahmanyam** – (M.Sc. Thesis advisor), Professor, IIT Hyderabad (csubbu@chy.iith.ac.in)
- **Dr. Rathindranath Ghosh** – (UG Instructor), Professor, RKMRC (to.rathin@gmail.com)