Sourav Kumar Dey, PhD

Phone: + 91-8274964758

E-mail: souravdey@iitism.ac.in, souravd1987@gmail.com.

Current position

Assistant Professor (Grade I), IIT (ISM) Dhanbad, Dhanbad, India (from August 2022).

Education

2016-2021	**Weill Cornell Medical College, New York, USA** Postdoctoral Associate, Department of Pharmacology Advisor: Dr. Samie R. Jaffrey
2010–2016	**Carnegie Mellon University, Pittsburgh, USA** Graduate Student, Department of Chemistry Doctor of Philosophy (PhD) Co-advisors: Dr. Subha R. Das and Dr. Linda A. Peteanu
2007-2009	**Indian Institute of Technology, Kanpur, India.** Master of Science (M. Sc.) in Chemistry
2004-2007	**Presidency College, Kolkata, India.** Bachelor of Science (B. Sc.) in Chemistry

Research experience

Postdoctoral Research: Weill Cornell Medical College, Sept 2016-Sept 2021

Research focus: **Development of novel fluorogenic aptamers for live cell RNA imaging tags and RNA-based metabolite sensors.**

Relevant skills:

- Development of novel SELEX methods for generating high affinity and extremely bright RNA-fluorophore complexes from bacterial riboswitches.
- Synthesis of new classes of fluorogenic dyes.
- Development of RNA-based metabolite sensors for quantitative real time imaging in live cell.
- Live cell imaging of single mRNAs using fluorogenic RNA aptamers.
- Development of novel RNA-based affinity tags for protein pulldown for studying RNA-protein interaction.

Graduate Research: Carnegie Mellon University, Dec 2010- Sept 2016.

Dissertation title **Biochemical and Single Molecule Studies of Backbone Branched RNA and Lariat Debranching Enzyme (Dbr1p).**

Relevant skills

- Solid phase synthesis of DNA and RNA, including modifications for probes, backbone branches and mini-lariats. Nucleic acid characterization using HPLC, ion-exchange chromatography, acrylamide and agarose gel electrophoresis; UV-Visible spectroscopy, MALDI-TOF, ESI etc.
- Click chemistry for bio-conjugation of proteins, nucleic acids and small molecules.
- Enzyme kinetics using real time fluorescence, anisotropy and stopped-flow methods.
- Steady state and time resolved fluorescence spectroscopy techniques including FRET and anisotropy.
- Setup and use of TIRF and confocal microscopes for single molecule fluorescence studies using FRET. Analysis of single molecule images using software such as ImageJ and Image-Pro Plus.

Publications and presentations

Published Manuscripts

***** Indicates authors who contributed equally.

1. Negi K, Pathak NK, Tripathy U, Dey SK, Sahu SK. **Two-photon NIR-responsive carbon dots incorporated into NMOFs for targeted photodynamic therapy**. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 2024, 694, 134163.

2. Manna K, Dey S, Phukan, Dey SK, Pal S. **Alginic acid-based pH and thermo responsive reversible switched polymeric micelle via RAFT polymerization**. *Polymer*, 2024, 291, 126581.

3. VarnBuhler, B*****, Moon JD*****, Dey SK, Jaffrey SR. **Detection of SARS-CoV-2 RNA using a DNA aptamer mimic of green fluorescent protein.** *ACS Chemical Biology*, 2022, 17(4), 840–853.

4. Dey SK, Filonov GS, Olarerin-George AO, Jackson BT, Finley LWS, Jaffrey SR. **Repurposing an adenine riboswitch into a fluorogenic imaging and sensing tag.** *Nature Chemical Biology*, 2022, 18 (2), 180-190.

5. Truong L, Kooshapur H, Dey SK, Li X, Tjandra N, Jaffrey SR, Ferré-D'Amaré AR. **The fluorescent aptamer Squash extensively repurposes the adenine riboswitch fold.** *Nature Chemical Biology*, 2022, 18 (2), 191-198.

6. Moon JD, Wu J, Dey SK, Litke JL, Li X, Kim H, Jaffrey SR. **Naturally occurring three-way junctions can be repurposed as genetically encoded RNA-based sensors.** *Cell Chemical Biology*, 2021, 28 (11), 1569-1580.

7. Li X, Mo L, Litke JL, Dey SK, Suter SR, Jaffrey SR. **Imaging Intracellular S-Adenosyl Methionine Dynamics in Live Mammalian Cells with a Genetically Encoded Red Fluorescent RNA-Based Sensor.** *Journal of the American Chemical Society*, 2020, 142 (33), 14117-14124.

8. Dey SK, Jaffrey SR. **RIBOTACs: Small Molecules Target RNA for Degradation.** *Cell Chemical Biology*, 2019, 26 (8), 1047-1049.

9. Fouz MF**,** Dey SK**,** Mukumoto, K, Matyjaszewski, K, Armitage, BA, Das SR. **Accessibility of Densely Localized DNA on Soft Polymer Nanoparticles.** *Langmuir*, 2018, 34 (49), 14731-14737.

10. Dey SK, Pettersson JR, Topacio AZ, Das SR, Peteanu LA. **Eliminating Spurious Zero-Efficiency FRET States in Diffusion-Based Single-Molecule Confocal Microscopy.** *Journal of Physical Chemistry Letters*, 2018, 9 (9), 2259–2265.

11. Ransey E, Paredes E, Dey SK, Das SR, Heroux A, Macbeth MR. **Crystal structure of the Entamoeba histolytica RNA lariat debranching enzyme EhDbr1 reveals a catalytic Zn^{2+}/Mn^{2+} heterobinucleation.** *FEBS Letters*, 2017, 591 (13), 2003–2010.

12. Mack S***,** Fouz MF***,** Dey SK***,** Das SR. **Pseudo-ligandless Click Chemistry for Oligonucleotide Conjugation.** *Current Protocols in Chemical Biology***,** 2016, 8, 83–95**.**

13. Averick SE*****, Dey SK*****, Grahacharya D, Matyjaszewski K, Das SR. **Solid Phase Incorporation of an ATRP Initiator for Polymer-DNA Biohybrids**. *Angewandte Chemie International Edition*, 2014, 53 (10), 2739-2744.

14. Tan X, Dey SK, Telmer C, Zhang X, Armitage BA, Bruchez MP. **Aptamers Act as Activators for the Thrombin Mediated-Hydrolysis of Peptide Substrates.** *ChemBioChem*, 2014, 15 (2), 205-208.

15. Averick SE*****, Paredes E*****, Dey SK*****, Snyder KM, Tapinos N, Matyjaszewski K, Das SR. **Autotransfecting Short Interfering RNA through Facile Covalent Polymer Escorts.** *Journal of the American Chemical Society*, 2013, 135 (34), 12508-12511.

16. Dey SK, Paredes E, Evans M, Das, SR. **The Diverse Active Sites in Splicing, Debranching and microRNA Processing Around RNA Phosphodiester Bonds**. *From Nucleic Acid Sequences to Molecular Medicine.* Editors: Erdmann VA and Barciszewski J. Springer Verlag, 2012, 475-501.

Patents

1. Das SR, Averick SE, Dey SK, Matyjaszewski K. **Functionalized Polymer Hybrids**. US Patent # US 9,765,169 B2

2. Jaffrey SR, Dey SK. **RNA sequences that induce fluorescence of small molecule fluorophores, molecular complexes, sensors, and methods of use thereof**. Provisional US Patent application # 63/282,347.

Oral presentations

1. Dey SK. **Plug-and-play fluorophores for Squash RNA aptamer allow live cell mRNA imaging in multiple colors**. International Conference on Optics Within Life Sciences (OWLS-17), IIT Bombay, November 21st, 2024.

2. Dey SK. **Marriage of native chemical ligation and click chemistry for synthesis of peptide-oligonucleotide conjugates and site-specific labeling of enzymes**. Summer Seminar Series, Department of Chemistry, Carnegie Mellon University, August 1st 2013, Pittsburgh. PA.

3. Dey SK, Holtermann J, Gangel H, Gramlich M. **Fast Relaxation Imaging: Heat Shock Response in living cells.** Center for Physics of Living Cell (CPLC) Summer School, University of Illinois at Urbana Champaign, August 4th 2012, Champaign, IL.

4. Dey SK. **Biochemical and single molecule studies of backbone branched RNAs and the lariat debranching enzyme**. National Centre for Biological Sciences, Dec 19th 2017, Bangalore, India.

Poster presentations

1. Dey SK, Jaffrey SR. **Repurposing riboswitch aptamers for RNA imaging and biosensor applications.** RNA Imaging and Intracellular Dynamics Workshop - Hosted by the NCI RNA Biology Initiative, NIH, April 26, 2022.

2. Dey SK, Peteanu LA, Das SR. **Analysis of the lariat debranching enzyme (Dbr1p) using dual-fluorescently labeled branched RNA substrates**. Biophysical Society 60th Annual Meeting, March 2016, Los Angeles, CA.

3. Dey SK, Peteanu LA, Das SR. **Analysis of the debranching reaction with backbone-branched RNA substrates**. Rustbelt RNA Meeting, October 2015, Sandusky, OH.

4. Dey SK, Peteanu LA, Das SR. **Single Molecule Fluorescence Studies on Conformation of Backbone Branched RNA.** Rustbelt RNA Meeting, October 2014, Pittsburgh, PA.

5. Dey SK, Grahacharya D, Das SR. **A general method for site-specific labeling and conjugation of enzymes - exemplified by the lariat debranching enzyme Dbr1p.** Rustbelt RNA Meeting, October 2013, Cleveland, OH.

6. Dey SK, Averick SE, Paredes E, Matyjaszewski K, Das SR. **Autotransfecting siRNA through covalent polymer escorts**. Molecular Recognition in Biological Systems Strategic Strength Research Symposium (The Many Lives of RNA), October 2013, Amherst, NY**.**

7. Dey SK, Averick SE, Paredes E, Matyjaszewski K, Das SR. **A self-transfecting siRNA-polymer hybrid nanomaterial**. International Conference of RNA Nanotechnology and Therapeutics, April 2013, Lexington, KY.

8. Dey SK, Paredes E, Grahacharya D, Das SR. **Solid phase synthesis of lariat RNAs for RNA interference.** Rustbelt RNA Meeting, October 2012, Dayton, OH.

External Funding

S. No	Title of project	Funding agency	Sanctioned budget (Rs)	Project duration		Working as PI/ Co-PI
				From	To	
1.	Live cell imaging of RNA aggregation in nucleotide repeat expansion disorders.	SERB	29,53,500.00	11/03/2024	10/03/2026	**PI**: (Dr. Sourav Kumar Dey)
2.	Assessing the feasibility of using locked GFP chromophore derivatives in protein sensing, protein imaging as well as fluorogenic RNA-aptamer based imaging to design improved fluorophores.	SERB	29,81,000.00	20/01/2024	19/01/2027	**PI**: (Dr. Soumit Chatterjee **Co-PI**: (Dr. Sourav Kumar Dey)
3.	Bioscopy - Towards modern transdisciplinary education and research in microscopy" under Indo-Norwegian Cooperation Programme 2024 (INCP2)	UGC	1,14,66,000.00	05/03/2025	04/03/2028	**PI**: (Dr. Biswajit Chowdhury **Co-PI**: (Dr. Sourav Kumar Dey)

Honors and Awards

1. Recipient of **CSIR Shyamaprasad Mukherjee Fellowship** (SPMF), **2009**.
2. Secured **3rd rank in GATE**, **2009** in Chemistry.
3. Received the **General Proficiency Medal, 2009** for **best academic performance** in Chemistry at IIT Kanpur.
4. Secured **3rd rank in JAM** (Joint Admission test for Masters), **2007**.
5. Secured **2nd rank in the B. Sc Chemistry (Hons), 2007** examination, University of Calcutta.

References

Dr. Samie R. Jaffrey (Postdoctoral advisor)
Professor, Department of Pharmacology,
Weill Cornell Medical College
Email: srj2003@med.cornell.edu
Phone: +1-917-589-7401.

Dr. Subha R. Das (Doctoral advisor)
Associate Professor, Department of Chemistry,
Carnegie Mellon University
Email: srdas@andrew.cmu.edu
Phone: +1-312-213-6934.

Dr. Linda A. Peteanu (Doctoral advisor)
Professor, Department of Chemistry,
Carnegie Mellon University
Email: peteanu@andrew.cmu.edu
Phone: +1-412-606-8385.

Dr. Lydia Finley (collaborator)
Assistant Professor, Cell Biology Program,
Memorial Sloan Kettering Cancer Center
Email: finleyl@mskcc.org
Phone: +1-212-639-6722.