Dr. SOUMIT CHATTERJEE

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Current affiliation: Assistant Professor, IIT (ISM) Dhanbad, India. Date of joining: 29th November 2017

Research Interests: keywords
Fluorescence spectroscopy, ultrafast dynamics, bio-molecules, microscopy, organic synthesis.

Highlights (Techniques and instrumentation)

- Steady state absorption and fluorescence spectroscopy
- Time Correlated Single Photon Counting (TCSPC)
- Femtosecond Fluorescence Upconversion Technique
- NMR spectroscopy
- MASS spectrometry
- IR spectroscopy
- HPLC
- Organic synthesis

Academic Profile

Degree/Exam	University/Board	Year	%of marks/Remarks
Ph.D.	Macquarie University, Sydney, Australia	2011 - 2014	(Discontinued at IIT Bombay and moved to Macquarie University as a collaborative student, degree was awarded from Macquarie University)
Ph.D.	IIT Bombay	2008 - 2011	
M.Sc. (Physical Chemistry)	University of Delhi	2008	71.55
B.Sc.	University of Calcutta, Kolkata	2006	71.38
Higher Secondary	WBCHSE	2003	77.00
Secondary	WBBSE	2001	86.75

Current Research

1. Study of locked GFPc derivatives in second-harmonic generation as well in bio-imaging
2. Study of excited state dynamics of protoporphyrin derivatives
3. Study of complex photophysisc of small molecule aggregates

Previous Research Experience

November, 2016-November, 2017: Post-Doctoral Fellow
Department of Particle Physics and Astrophysics, Weizmann Institute of Science, Israel
Supervisor: *Dr. Oded Heber.*
Research area: *Electrostatic Ion Beam Trapping in cryogenic condition.*

March, 2016-November, 2016: National Post-Doctoral Fellow (DST-SERB NPDF): Principal Investigator
Department of Spectroscopy, Indian Association for the Cultivation of Science
Mentor: *Dr. Prashant Chandra Singh*
Research area: *Study of ultrafast excited state dynamics of bilirubin*

**The project was discontinued when the post-doctoral position was offered from Weizmann Institute of Science, Israel.*

January, 2015-November, 2015: Research Associate
Department of Spectroscopy, Indian Association for the Cultivation of Science
Supervisor: *Dr. Prashant Chandra Singh.*
Research area: *Aggregation studies of dyes in solvents*

March, 2011-November, 2014: PhD fellow
Macquarie University, Sydney, Australia
Supervisor: *Prof. Peter Karuso*
Adjunct supervisor: *Prof. Anindya Datta, IIT Bombay, India*
Thesis title: *Synthesis and Photophysical Studies of Analogues of the GFP Chromophore and Epicocconone*

Research highlights

1. **Designing and synthesis of GFP chromophore analogues**

The isolated chromophore of GFP (Green Fluorescent Protein) is not fluorescent due to bond isomerism. Design and synthesis of GFP chromophore analogues, with the aim of developing a new class of fluorescent labels, which would allow the tracking of biomolecules and could open new frontiers to cell biology and microscopy, had been one of the research projects.

- Synthesis of several analogues of green fluorescent protein chromophores, via a novel route,
- Study of the excited state dynamics of the analogues using steady state and time resolved fluorescence techniques.

2. **Study of ultrafast excited state dynamics of epicocconone**

Epicocconone is a protein stain used widely in biotechnology. However, this molecule is weakly fluorescent itself in aqueous solution. Several analogues, which were better fluorophores than epicocconone, had been synthesized by our collaborators.

- Detailed steady state and time resolved fluorescence study of epicocconone and its analogues to understand the reason behind the non-fluorescing nature of epicocconone.
- To generate a new generation of protein stains.

July, 2008-March, 2011: PhD fellow
Indian Institute of Technology Bombay, India
Supervisor: *Prof. Anindya Datta*

Research highlights

- Early stage of PhD work.
- Completed one year course-work
- Started early stage work with epicocconone.

Moved to Macquarie University as a collaborative student.

June, 2007-July, 2007: Indian Academy of Sciences Summer fellow
Indian Association for the Cultivation of Science
Supervisor: *Prof. Shankar Prasad Bhattacharyya*
Dissertation: *Study of dynamics of hydrogen transfer reactions with combined morse potential.*

Teaching experience as TA (Teaching Assistant) DURING Ph.D.

- Tutorials of CH 101, Preparatory Chemistry, IIT Bombay; Basic numericals of Quantum Chemistry.
- Conducted CH 117 L, Chemistry Lab, IIT Bombay; Physical Chemistry laboratory experiments.
- Teaching Assistant, Chem101, Macquarie University, Sydney; Organic Chemistry laboratory.

Teaching experience as Assistant Professor

Theory

- Quantum Chemistry for M.Sc (Chemistry)
- Molecular Spectroscopy for M.Sc (Chemistry)
- Kinetics and Statistical Thermodynamics for M.Sc (Chemistry)
- Chemistry for 1st year B.Tech (Common)
- Material Science and Technology for Chemical Engineering students (6th Sem)
- Advanced Fluorescence Spectroscopy, elective course for M.Sc and JRFs

Practical

- Physical Chemistry Practical, for 1st year and 2nd year M.Sc (Chemistry)
- Chemistry Practical for 1st year B.Tech (Common)
- Chemistry Practical for B.Tech (5th Sem) in Environmental Science.

Funding

External: 1. SERB Funding: Rs. 29.81 lakhs
2. Consultancy: Rs. 9.79 lakhs

Internal: 1. FRS funding (IIT (ISM) Dhanbad) : 13.5 lakhs
2. TEQIP III funding (IIT (ISM) Dhanbad): 2 lakhs
3. IIT (ISM) Dhanbad funding: 9 lakhs

PhD Guidance: Currently supervising four (**4**) PhD student.

Invited lectures

1. Invited talk at OWLS-17, at IIT Bombay, November, 2024.
2. Short Invited talk at the National Conference, RTCST-2024 at IIT Patna, India, March, 2024.
3. Invited lecture series, Poznan University of Technology, July, 2023.
4. Invited lecture at Universite de Rouen, France, July 2014.
5. Invited lecture at Universite de Bordeaux, France, July 2014.

Professional membership

Life member of Indian Society for Radiation and Photochemical Sciences (ISRAPS)

Peer reviewing

Journal of Luminescence, RSC Advances, Chemical Physics Impact, Journal of Chemical Sciences, Journal of the Iranian Chemical Society, Photochemical & Photobiological Sciences, Journal of Photochemistry & Photobiology, A: Chemistry.

Awards and honors

- Faculty Dean Fellowship for two years, Weizmann Institute of Science.
- Visiting Fellow, Macquarie University, Sydney, Australia. July 1st – July 16th, 2016.
- DST-SERB-National Post Doc Fellowship, 2016. Granted INR 19.2 lacs for two years.
- Post Graduate Research Fund from Macquarie University, 2014.
- CSIR-UGC fellow, 2008-2011.
- First Prize for poster presentation in APSRC-TSRP-2010, Lonavala, India.
- Meritorious award from Zakir Husain College, University of Delhi.
- Jeans and Ashit Ganguly scholarship from University of Delhi.

- Qualified CSIR-UGC National Eligibility Test (NET) – June 2007.
- IAS summer fellow, 2007.

Presentations/Participations in Symposia/Workshop/Conferences

1. Invited poster presentation at SoPhyC-2024, at IIT Bombay, October, 2024.
2. Participated in 7th ESD (**E**lectrostatic **S**torage **D**evice) workshop and conference, held at Universite de Lyon, France in July, 2017.
3. Poster presentation at 'Ultrafast through Ultraslow Dynamics in Molecules and Clusters' conference, held at Weizmann Institute of Science in January 2017.
4. Oral presentation at 23rd IUPAC Conference on Physical Organic Chemistry, 'ICPOC23', held at University of New South Wales, Sydney, Australia in July 2016.
5. Poster presentation in Asian Academic Seminar and School 2015, at IACS, Kolkata.
6. Poster presentation in ASUD-2014 at IACS, Kolkata, India.
7. Poster presentation at 25th IUPAC conference on Photochemistry, Bordeaux, France, July 2014.
8. Poster presentation at RACI conference, 2011 at University of Wollongong, Sydney, Australia.
9. Poster presentation at National Workshop on FCS in Chemistry 2010 at NEHU, India.
10. Poster presentation in APSRC-TSRP-2010, Lonavala, India; awarded first prize.
11. Participated in workshop on Imaging at nanoscale 'ICONSAT' 2010-International conference on nanoscience and technology, held at IIT Bombay, India.

Publications

Published in peer-reviewed journals

1. Paul, D.; Sahoo, P.; Sengupta, A.; Tripathy, U.; **Chatterjee, S.*** Revealing the Role of Electronic Effect to Modulate the Photophysics and Z-Scan Responses of o-Locked GFP Chromophores *J. Phys. Chem. B* **2025**, *129*, 692.
2. Shukla, A.; Biswal, A. S.; Chowdhury, A.; Halder, R.; **Chatterjee, S.*** Aggregation-Induced Modulation of Ground and Excited State Photophysics of 5-(tert-Butyl)-2-Hydroxy-1,3-Isophthalaldehyde (5-tBHI). *J. Phys. Chem. B* **2024**, *128*, 5437.
3. Shukla, A.; Jha, V.K.; **Chatterjee, S.*** Non-trivial ground and excited state photophysics of a substituted phenol. *Phys. Chem. Chem. Phys.* **2024**, *26*, 6655.
4. Shukla, A.; Sarkar, A.; **Chatterjee, S.*** Surfactant Mediated Modulation of Photophysics and Self-Assembly Process of A Small, Substituted Phenol. *J. Mol. Liq.* **2023**, *390*, 123161.
5. Ghosh, S.; Sarkar, A.; **Chatterjee, S.***; Nayek, H. P. Elucidation of Selective Adsorption Study of Congo Red using New Cadmium(II) Metal-Organic Frameworks: Adsorption Kinetics, Isotherm and Thermodynamics. *J. Solid State Chem.* **2021**, *296*, 121929.
6. Karmakar, P. D.; Shukla, A.; Maiti, P.; **Chatterjee. S.***; Pal, S. Reversible Addition Fragmentation Chain Transfer-Mediated Bioconjugated Amphiphilic Graft-Block Copolymer Using Dextran, Poly (N-isopropylacrylamide), and Poly (vinyl acetate). *J. Appl. Polym. Sci.* **2020**, e50381.
7. Mondal, S.; Patra, N.; Nayek, H. P.; Hira, S.; **Chatterjee, S.***; Dey, S. Unusual Absence of FRET in Triazole Bridged Coumarin-hydroxyquinoline, an effective sensor for Hg^{2+} detection. *Photochem. Photobiol. Sci.* **2020**, *19*, 1211.
8. **Chatterjee, S.**; Ahire, K.; Karuso, P. Room-Temperature Dual Fluorescence of a Locked Green Fluorescent Protein Chromophore Analogue. *J. Am. Chem. Soc.* **2020**, *142*, 738.
9. Karmakar, P. D.; Seesala, V. S.; Pal, A.; Dhara, S.; **Chatterjee, S.**; Pal, S. Synthesis of RAFT- Mediated Amphiphilic Graft Copolymeric Micelle Using Dextran and Poly (Oleic Acid) toward Oral Delivery of Nifedipine. *J. Polym. Sci., Part A: Polym. Chem.* **2018**, *56*, 2354.
10. Mondal, S.; **Chatterjee, S.**#; Halder, R.; Jana, B.; Singh, P. Role of Dispersive Fluorous Interaction in the Solvation Dynamics of the Perfluoro Group Containing Molecules. *J. Phys. Chem. B* **2017**, *121*, 7681.

11. **Chatterjee, S.**; Karuso, P. An Efficient and Concise Method to Synthesize Locked GFP Chromophore Analogues. *Tetrahedron. Lett.* **2016**, *57*, 5197.
12. **Chatterjee, S.**; Karuso, P.; Boulangé, A.; Franck, X.; Datta, A. Excited State Dynamics of Brightly Fluorescent Second Generation Epicocconone Analogues. *J. Phys. Chem. B* **2015**, *119*, 6295.
13. **Chatterjee, S.**; Karuso, P.; Boulangé, A.; Peixoto, P. A.; Franck, X.; Datta, A. The Role of Different Structural Motifs in the Ultrafast Dynamics of Second Generation Protein Stains. *J. Phys. Chem. B* **2013**, *117*, 14951.
14. **Chatterjee, S.**; Burai, T. N.; Karuso, P.; Datta, A. Ultrafast Dynamics of Epicocconone, A Second Generation Fluorescent Protein Stain. *J. Phys. Chem. A* **2011**, *115*, 10154.
15. Sadhu, K. K.; **Chatterjee, S.**; Sen, S.; Bharadwaj, P. K. Role of Spacer in Single- or Two-Step FRET: Studies in The Presence of Two Connected Cryptands with Properly Chosen Fluorophores. *Dalton Trans.* **2010**, *39*, 4146.

[*] Corresponding author, [#] Equal contribution

Patent:

Dual emission fluorescent compounds

Karuso, P. & Chatterjee, S., 8 Sept 2017, (Submitted) IPC No. C07D 263/22 (2006.01), C07D 233/06 (2006.01), C07C 233/76 (2006.01), C07C 231/10 (2006.01), Patent No. WO2017147646, 28 Feb 2017, Priority date 29 Feb 2016, Priority No. AU2016900739