Dr. Sabnam Kar

Sabnam Kar
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PERSONAL DETAILS

Age & Date of Birth: 33 yrs; July 11, 1988

Sex & Marital Status: Female, Married

ACADEMIC QUALIFICATIONS

- March 2022-Present: SERB Research Associate, IIT Bombay
  Advisor: Prof. Santosh J Gharpure
- November 2018- November 2021: Post-doctoral researcher, IIT Bombay
  Advisor: Prof. Nandita Madhavan
- August 2011–June 2018: Ph.D. (Chemistry) Indian Institute of Science Education and Research, Thiruvananthapuram (IISER-TVM), Thiruvananthapuram, India.
  Advisor: Prof. K. George Thomas
- August 2009–June 2011: Master of Science (Chemistry), Delhi University, Delhi, India.
- August 2006–May 2009: Bachelor of Science (Chemistry), St. Xavier's College, Kolkata, Affiliated to Kolkata University, West Bengal, India.

SERB RESEARCH ASSOCIATE

Project 1: **Study the emission properties of different carbazole derivatives**

Description: Detailed investigation on the self-assembly of aromatic carbazole derivatives and the variation of emission properties

Project 2: **Investigation of ion binding and ion transport efficiency of carbazole derivatives**

Description: Design of carbazole derivatives to transport ions in lipid bi-layer or bind ions to observe the changes in emission intensity and further to use them as photo-regulated sensors.

POST-DOCTORAL EXPERIENCE

Project 1: **Design of Bioactive Peptides as Ion Transporters through Lipid Membrane**
Description: Fabrication of small peptide derivatives and check their ion transport activity in artificial cell membrane.

Project 2: **Design of Peptide-Polymer Conjugate and Functionalized Membrane for Sensing Application**
Description: Design of peptide polymer conjugate (PPC) as artificial ion channel and functionalized membrane or pores derived from PPC for encapsulation of charged molecules *i.e.* in sieving technology (water purification).

Project 3: **Formation of Amyloid like Fibrils from Acyclic Peptides and their Applications**
Description: Supramolecular assembly of octapeptides leading to the formation of amyloid-like fibrils, which are the main cause of various neurodegenerative diseases. In addition, these peptides also act as chloride ion transporters, making them useful therapeutics for the treatment of cystic fibrosis and cancer.

Ph.D. THESIS

Title: **Chiroptical Properties of Phenylalanine Conjugated Phenyleneethynylenes**

Description: Evaluation of chiroptical properties in molecules and materials through asymmetric organizations has fascinated mankind in general and scientists in particular. However, the translation of chirality at the molecular level to macroscopic length scales is largely not well understood. Among various molecular building units based on chromophores, oligo(*p*-phenyleneethynylene)s (OPEs) have been studied extensively due to their rigid-rod like molecular framework. Various steps involved in the transmission of the 'local' chirality of the OPE based molecular systems to the 'global' chirality in supramolecular assemblies is presented here. The thesis deals with four different aspects: (i) design of various chiral OPE derivatives, (ii) investigation on the emergence of chiroptical properties in supramolecular structures, (iii) investigation on the chiral excited state properties by following the circularly polarised luminescence (CPL), (iv) induction of chirality from chiral OPE templates to an achiral chromophoric dye.

PUBLICATIONS

1.Emergence of Chiroptical Properties in Molecular Assemblies of Phenyleneethynylenes: The role of Quasi-degenerate Excitations– **S. Kar**, S. Konnath, C. Sissa, A. Painelli, and K. G. Thomas, J. Phys. Chem. Lett. 2018, 9, 4584−4590. [Citations: 4, IF: 6.4] (Link of ACS Live slides: https://pubs.acs.org/doi/suppl/10.1021/acs.jpclett.8b01988/suppl_file/jz8b01988_liveslides.mp4)

2.Chiral Plasmons: Au Nanoparticle Assemblies on Thermoresponsive Organic Templates- J. George, **S. Kar**, E. S. Anupriya, S. M. Somasundaran, A. D. Das, C. Sissa, A. Painelli, and K. G. Thomas, ACS Nano 2019, 13, 4392−4401. [Citations: 20, IF: 15.8]

(Highlighted this paper in Virtual Issue on Chiral Plasmonics- J. Phys. Chem. C 2021, 125, 10175-10178)

3.Self-assembly of Phenyeleneethynylenes: How Exciton Coupling and Delocalization Directs the Chiroptical Properties– S. Kar, M. Sujith, R. Shetty, T. Kawai and K. G. Thomas, manuscript under submission.

4. Biomimetic Ion Transport of Dipeptides having Lipid like Structure- S. Kar, N. Madhavan, 2022, manuscript under preparation

5. General aspects on Peptide-Polymer Conjugates: Properties and Applications- S. Kar, N. Madhavan, 2022, manuscript under preparation

TEACHING ASSISTANCE

- Principles of Physical Chemistry course, IISER-TVM 01/2013-05/2013
- Advanced Physical Chemistry Laboratory course, IISER-TVM 08/2015-12/2015
- Organic Thermal and Photochemical Reactions course, IIT-Bombay 01/2019-05/2019 & 08/2020-12/2020
- Advanced Laboratory Techniques course, IIT-Bombay 08/2019-12/2019

ORAL & POSTER PRESENTATIONS

Dec 2021: Poster presentation (*virtual mode*) in In House Symposium (IHS 2021) of Department of Chemistry, IIT Bombay, India.

Dec 2020: Poster presentation (*virtual mode*) in a national workshop on Fluorescence and Raman Spectroscopy organized by IIT Bombay, India.

Aug 2018: Poster presentation followed by oral presentation in Chemical Frontiers Goa 2018, jointly organized by IIT-Bombay and JNCASR, Bangalore (***Selected as Best Oral Presentation***).

Jan 2017: Oral presentation in 6th Inter IISER Chemistry Meet, held in IISER-Bhopal, India.

Nov 2015: Poster presentation in International Conference on Challenges in Organic materials and Supramolecular Chemistry (ISACS18), held at Bangalore, Karnataka, India.

Nov 2014: Participated in Asian Photochemistry Conference, APC-2015, held in Trivandum, Kerala, India.

ACCOMPLISHMENTS

- Qualified Graduate Aptitude Test Engineering- GATE 2011, Ministry of Human Resource Development, Government of India (March 2011) – with all India rank 511, Percentile: 95.1
- Qualified UGC-JRF fellowship of the Council of Scientific and Industrial Research, Government of India (June 2011) with all India rank 92
- Elected as a Summer Research Fellow by Indian Academy of Sciences, Bangalore in May-July 2010.
  Advisor: Prof. K. George Thomas
- Special Research Fellow under DST-JSPS bilateral collaborative project at Nara Institute of Science and Technology, Japan from February, 2014-March, 2014 and June, 2015-July, 2015.
  Advisor: Prof. T. Kawai

RESEARCH INTERESTS

Supramolecular chirality, Design of photoactive organic molecules, Chiral spectroscopy, Photophysics and photochemistry, Peptide chemistry, Peptidomimetic ion transport, Peptide-polymer conjugates, Functionalized polymeric membranes, Peptide drugs and therapeutics.

EXPERIMENTAL AND TECHNICAL SKILLS

Synthesis, and characterization of organic chromophoric systems, peptides and polymers using spectroscopic methods such as NMR, IR, HPLC, HRMS and CHN.

Synthesis of gold, silver nanoparticles, nanorods using colloidal methods and overcoating with silica and various polymers and their characterization using spectroscopic and microscopic techniques.

Solid-state and solution state synthesis of peptide based templates.

Hands-on experience in the operation of recycling and reversed-phase HPLC, solid-state peptide synthesizer, UV-Vis absorption spectrometer, NMR spectrophotometer, fluorimeter, spectropolarimer, time-correlated single photon counter, zetasizer, atomic force microscope, circular dichroism, and circularly polarized luminescence spectroscopy.

Computer skills: Adept at using various MS Word, Power Point and other MS office programs, ChemDraw, Origin, Endnote, Topspin.

Languages: Fluent in English, Hindi and Bengali (native)

REFERENCES

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