Sayan Shee

Department of Organic Chemistry,
Indian Institute of Science,
Bengaluru - 560012,
Karnataka, INDIA.

Email : sayanshee@iisc.ac.in
Mobile : +91 821748533
website : sayanshee.com

Education

Indian Institute of Science — Bengaluru, India
Integrated Ph.D. in Chemical Sciences; — *Aug 2017 – present*

Midnapore College (Autonomous) — Midnapore, India
B.Sc., Chemistry (Honours), Physics, Mathematics; First Class; — *Aug 2014 – June 2017*

Bhogpur Kenaram Memorial High School — West Bengal, India
Higher Secondary education, Chemistry, Physics, Mathematics; First Class — *Aug 2012 – June 2014*

Research Experience

Indian Institute of Science — Bengaluru, India
Ph.D. in Organic Chemistry — *Aug 2019 – Dec 2024*
Supervisor: **Prof. Akkattu T. Biju**

Thesis: *N-Heterocyclic Carbene-Catalyzed Enantioselective Synthesis of C-O Axially Chiral Diaryl ethers, Tricyclic Lactones and Lactams*

Indian Institute of Science — Bengaluru, India
MS Research Project — *Aug 2018 – April 2019*
Supervisor: **Prof. Akkattu T. Biju**

Project: *N-Heterocyclic Carbene-Catalyzed Transformations via α,β-Unsaturated Acylazoliums*

Awards and Honours

The Prime Minister's Research Fellows (PMRF) — *Aug 2020*
Awarded the Prime Minister's Research Fellowship by the Goverment of India (*Received "Recommended with commendation grade" for outstanding performance in annual reviews).*

CSIR-UGC Junior Research Fellowship - Lectureship — *Dec 2017*
Awarded the LECTURESHIP by Joint Council of Scientific and Industrial Research and University Grants Commission, New Delhi (**All India Rank 36**).

Joint Admission Test for M.Sc. (JAM) — *Feb 2017*
Conducted by the Indian Institute of Technology, Delhi (**All India Rank 76**).

DST INSPIRE Scholarship — *Aug 2014 - July 2017*
Scholarship awarded by the Department of Science and Technology for being the top 1% in the state in Higher Secondary Examination.

Merit-Cum-Means scholarship — *July 2012 – June 2014*
Scholarship awarded by the Government of West Bengal.

Conferences

Pfizer Symposium 2024 — *Feb 2024*
Presented a talk on "Enantioselective Synthesis of C-O Axially Chiral Diaryl Ethers via NHC-Catalyzed Atroposelective Desymmetrization" during the Pfizer Symposium 2024 held at IISc, Bangalore (India).

Indo-French Seminar on Catalysis for Sustainability (IFSCS 2023) — *Dec 2023*
Presented a poster titled "Enantioselective Synthesis of C-O Axially Chiral Diaryl Ethers via NHC-Catalyzed Atroposelective Desymmetrization" during the IFSCS 2023 held at IISER Trivandrum.

International Conference on Organometallics and Catalysis (ICOC 2023) *Nov 2023*
Presented a poster titled "Enantioselective Synthesis of C-O Axially Chiral Diaryl Ethers via NHC-Catalyzed Atroposelective Desymmetrization" during the ICOC-2023 held at Goa, India.

Conference for Young Researchers National Organic Symposium Trust (J-NOST 2023) *Oct 2023*
Presented a talk on "N-Heterocyclic Carbene-Catalyzed Enantioselective Synthesis of Tricyclic β-Lactones, Pyrazoloquinolin-3-ones and C-O Axially Chiral Diaryl Ethers" during the XVIII J-NOST 2023 held at IISER Pune, Pune (India).

Thieme-IISc Organic Chemistry Symposium *Oct 2023*
Presented a poster titled "Enantioselective Synthesis of C-O Axially Chiral Diaryl Ethers via NHC-Catalyzed Atroposelective Desymmetrization" during the Thieme-IISc Organic Chemistry Symposium held at Bangalore, India.

PMRF Annual Symposium *Feb 2023*
Presented a poster titled "N-Heterocyclic Carbene Catalyzed Enantioselective Synthesis of Tricyclic β-Lactones and Pyrazoloquinolin-3-one Derivatives" during the PMRF Annual Symposium held at IIT Madras, Chennai (India).

International Conference on Organometallics and Catalysis (ICOC 2020) *Mar 2020*
Presented a flash talk on "N-Heterocyclic Carbene Catalysed Desymmetrization of Cyclic -1,3-Diketones via α,β-Unsaturated Acylazolium Intermediates" during the ICOC-2020 held at Goa, India.

Book Chapter

Umpolung Organocatalytic Strategies – Beyond Classical Reactivity Patterns.
Shee, S.; Ghosh, A.; Biju, A. T. In ***Asymmetric Organocatalysis: New Strategies, and Opportunities*** Chapter 22, Editor: L. Albrecht, A. Albrecht, L. Dell'Amico; ***Wiley-VCH***. 2022, ISBN: 978-3-527-34907-4.

Publications

19. Electroredox N-Heterocyclic Carbene-Catalyzed Enantioselective (3+3) Annulation of Enals with 2-Naphthols.
Kale, V.; **Shee, S.**; Dutt, S.; Sinha, N.; Biju, A. T.; Banerjee, P. *ChemRxiv.* **2024**, preprint. DOI:10.26434/chemrxiv-2024-xrx41.

18. Atroposelective Synthesis of N-N Axially Chiral Indoles and Pyrroles via NHC-Catalyzed Diastereoselective (3+3) Annulation Strategy.
Ranganathappa, S. S.; Dehury, B. S.; Singh, G.; **Shee, S.**; Biju, A. T. *ACS Catal.* **2024**, *14*, 6965.

17. Enantioselective Synthesis of C-O Axially Chiral Diaryl Ethers via NHC-Catalyzed Atroposelective Desymmetrization.
Shee, S.; Ranganathappa, S. S.; Gadhave, M. S.; Gogoi, R.; Biju, A. T. *Angew. Chem. Int. Ed.* **2023**, *62*, e202311709.
This article appears in 'HOT Topic': Organocatalysis.

16. Oxygen vacancy mediated reactivity of CaO/CuO composite for the synthesis of amino-N-heterocycles.
Karuppusamy, R.; Madampadi, R.; **Shee, S.**; Subramaniam, R.; Khan, T. S.; Gupta, S.; Haider, M. A.; Jagadeesan, D. *ChemCatChem* **2023**, *15*, e202301048.

15. NHC-Catalyzed Enantioselective Synthesis of Tetracyclic δ-Lactones by (4 + 2) Annulation for the o-Quinodimethanes with Activated Ketones.
Sarkar, D.; Barik, S.; **Shee, S.**; Gonnade, R. G.; Biju, A. T. *Org. Lett.* **2023**, *25*, 7852.

14. N-Heterocyclic Carbene-Catalyzed Atroposelective Synthesis of N-N Axially Chiral 3-Amino Quinazolinones.
Balanna, K.; Barik, S.; Barik, S.; **Shee, S.**; Manoj, N.; Gonnade, R. G.; Biju, A. T. *ACS Catal.* **2023**, *13*, 8752.

13. N-Heterocyclic Carbene-Catalyzed aza-Michael-Mannich-Lactamization Cascade for the Enantioselective Synthesis of Pyrazoloquinolin-3-ones.
Shee, S.; Sarkar, D.; Biju, A. T. *Org. Lett.* **2023**, *25*, 220.

12. Enantioselective Synthesis of Dihydrothiopyranones via NHC Catalyzed [3 + 3] Annulation of 2-Bromoenals with β-Oxodithioesters.
Barik, S.; **Shee, S.**; Gonnade, R. G.; Biju, A. T. *Org. Lett.* **2022**, *24*, 8848.

11. Dynamic Kinetic Resolution of γ,γ-Disubstituted Indole 2-Carboxaldehydes via NHC-Lewis Acid Cooperative Catalysis for the Synthesis of Tetracyclic ϵ-Lactones.
Balanna, K.;Barik, S.; **Shee, S.**; Gonnade, R. G.; Biju, A. T. *Chem. Sci.* **2022**, *13*, 11513.

10. N-Heterocyclic Carbene-Catalyzed Umpolung of Cyclopent-4-ene-1,3-diones for Activated Olefin-Isatin Cross-Coupling.
Barik, S.; **Shee, S.**; Biju, A. T. *Org. Lett.* **2022**, *24*, 6066.

9. A Benzannulation Strategy for Rapid Access to Quinazoline-2,4-diones via Oxidative N-Heterocyclic Carbene Catalysis.
Ghosh, A.; **Shee, S.**; Biju, A. T. *Org. Lett.* **2022**, *24*, 2772.

8. Synthesis of Functionalized Dihydrocoumarins by NHC-Catalyzed [3+3] Annulation of Enals with 2-Substituted Naphthoquinones.
Shee, S.; Barik, S.; Ghosh, A.; Biju, A. T. *Org. Lett.* **2021**, *23*, 8039.

7. Oxidative N-Heterocyclic Carbene (NHC) Catalysis for the Rapid Access to Functionalized Pyrrolo-oxazinones.
Ghosh, A.; Barik, S.; Barik, S.; **Shee, S.**; Biju, A. T. *Tetrahedron* **2021**, *94*, 132330.

6. Enantioselective Synthesis of Tetra-Substituted Tetralines and Tetrahydro-Indolizines by NHC Catalyzed Azolium–Enolate Cascade.
Ghosh, A.; Barik, S.; **Shee, S.**; Biju, A. T. *Chem. Commun.* **2021**, *57*, 7794.

5. Enantioselective Synthesis of 5,6-Dihydroindolizines by N-Heterocyclic Carbene (NHC)-Catalyzed Core-Structure-Inspired Strategy of Azolium-Enolate Cascade.
Ghosh, A.; **Shee, S.**; Barik, S.; Gonnade, R. G.; Biju, A. T. *Org. Lett.* **2021**, *23*, 5223.

4. NHC-Catalyzed Desymmetrization of N-Aryl Maleimides Leading to the Atroposelective Synthesis of N-Aryl Succinimides.
Barik, S.; **Shee, S.**; Das, S.; Gonnade, R. G.; Jindal, G.; Mukherjee, S.; Biju, A. T. *Angew. Chem. Int. Ed.* **2021**, *60*, 12264.
This article appears in 'HOT Topic': Organocatalysis. Highlighted in Synfacts ***2021****, 17, 691.*

3. Enantioselective Synthesis of Tricyclic β-Lactones by NHC-Catalyzed Desymmetrization of Cyclic 1,3-Diketones.
Shee, S.; Mukherjee, S.; Gonnade, R. G.; Biju, A. T. *Org. Lett.* **2020**, *22*, 5407.
Highlighted in Organic Chemistry Portal.

2. Catalytic, Enantioselective C2-Functionalization of 3-Aminobenzofurans Using N-Heterocyclic Carbenes.
Barik, S.; **Shee, S.**; Ghosh, A.; Biju, A. T. *Org. Lett.* **2020**, *22*, 3865.

1. Enantioselective N-Heterocyclic Carbene-Catalyzed Cascade Reaction for the Synthesis of Pyrroloquinolines via N–H Functionalization of Indoles.
Mukherjee, S.; **Shee, S.**; Poisson, T.; Besset, T.; Biju, A. T. *Org. Lett.* **2018**, *20*, 6998.

Teaching Experience

Teaching Assistant *Aug 2020 – Dec 2020*
UG (major) Organic Chemistry Practical course: **UC-206 Lab**
Instructors: **Prof. Mrinmoy De** & **Prof. P. Rajamalli**
Class Strength: 120 students
Responsibilities involved planning and conducting lab sessions; guiding students in experiments; ensuring safety; routinely giving feedback to students for improving performance in the course; and assisting in course grading.

PMRF Teaching Assistant *Jan 2021 – May 2021*
Students of grade 11
Instructor: **Ms. Vasantha J**
Class Strength: 60 students
Responsibilities involved designing instructional materials about ***"Fundamental concepts in organic reaction mechanism"*** *for students of Grade 11 at Kendriya Vidyalaya as a part of the mandatory teaching requirement for PMRF awardees.*

PMRF Teaching Assistant *Aug 2022 – Dec 2023*
Second year undergraduates at Maharani Lakshmi Ammanni College for Women
Class Strength: 70 students
Served as an instructor for a course on ***"Stereochemistry"*** *for second-year undergraduate students as a part of the mandatory teaching requirement for PMRF awardees.*

Mentorship

Mentored 5 students (4 women 1 men)
Mentees - Jayalakshmi K. (Current position - project assistant at NIIST Trivandram), Athulya S. (Current position - Ph.D. at Cochin University of Science and Technology), Sourav Banerjee (Current position - Ph.D. at University of Illinois), Krishnendu K.R. (MSc.student), Darshini R (Integrated Ph.D. student)

References

Prof. Akkattu T. Biju
Professor,
Dept of Organic Chemistry,
Indian Institute of Science,
Bengaluru - 560012.
E-mail: atbiju@iisc.ac.in

Prof. Santanu Mukherjee
Professor,
Dept of Organic Chemistry,
Indian Institute of Science,
Bengaluru - 560012.
E-mail: sm@iisc.ac.in

Prof. Durga Prasad Hari
Assistant Professor,
Dept of Organic Chemistry,
Indian Institute of Science,
Bengaluru - 560012.
E-mail: dphari@iisc.ac.in