XXV NOST – Organic Chemistry Conference

August 18 –21, 2026

Program & Abstracts

Venue: Hotel Alila Diwa, Goa, India

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Program Schedule

August 18, 2026 (Tuesday)

14.00 to 15.20 h	**Arrival, Registration, Check-In and Lunch**

15.30 to 15.35 h	**Welcome Remarks by Chair-NOST Council** Krishna P Kaliappan (IIT Bombay)
15.35 to 15.45 h	**NOST- A Brief Overview by President-NOST** Ganesh Pandey (BHU, Varanasi)

Trustees Session	
Session I (15.45 to 17.25 h)	**Chairpersons: D. Srinivasa Reddy and Rakesh Bandichhor**
15.45 to 16.15 h	**Junichiro Yamaguchi (Tokyo University, Japan)** 'Development of Heteroarene Swapping Reactions'
16.20 to 16.50 h	**Manmohan Kapur (IISER Bhopal)** 'Unlocking Distal Reactivity: Transition-Metal-Catalyzed Enantioselective Remote γ- and ε-C–H Functionalizations'
16.55 to 17.25 h	**Kazuaki Ishihara (Nagoya University, Japan)** 'Iodine Catalysis'
17.30 to 17.50 h	**COFFEE BREAK**

Raghu and Venkata Palle Session	
Session II (17.50 to 19.25 h)	**Chairpersons: Venkata Palle and Ashwini K. Nangia**
17.50 to 18.10 h	**Pradeep Kumar (IIT Bombay)** 'Chemical Biology of Safrole-Induced DNA Damages'
18.15 to 18.35 h	**Surisetti Suresh (CSIR-IICT, Hyderabad)** 'N-Heterocyclic Carbene Organocatalysis: Unlocking New Bond-Forming Strategies'
18.40 to 19.00 h	**Ravindra Kumar (CSIR-CDRI, Lucknow)** 'Organo-catalysed Modular Approach for the Synthesis of Azaborines and of BN-Isosteres via Wolff-type rearrangement'
19.05 to 19.25 h	**Santanu Panda (IIT, Kharagpur)** 'Stereoselective Synthesis of Olefins and Heterocycles by Exploiting Organoboron Compounds and Strain-release-driven Ring Opening'
19.30 to 21.30 h	**Conference Mixer**

August 19, 2026 (Wednesday)

PI Industries Session	
Session III	**Chairpersons: G. Sekar & Rajesh Viswanathan**

(09.00 to 10.55 h)	
09.00 to 09.30 h	**Raghavan B. Sunoj (IIT, Bombay)** 'Asymmetric Catalysis: Perspectives from Computational Organic Chemistry and Machine Learning'
09.35 to 10.05 h	**Oliver Reiser (University of Regensburg, Germany)** 'Photocatalysis as an Enabling Tool for Applications in Small-Molecule Synthesis of Biologically Relevant Compounds'
10.10 to 10.30 h	**Diwan S Rawat (Kumaun University)** 'From Molecular Hybridization to the Clinic: Discovery of a Phase II Clinical Candidate for Parkinson Treatment'
10.35 to 10.55 h	**Rima Thakur (University of Delhi)** 'Catalytic Approaches to Controlled Glycosidic Bond Formation'
11.00 to 11.30 h	**Photo Session & COFFEE BREAK**

BASF Session	
Session IV **(11.30 to 13.00 h)**	**Chairperson: Harish Shinde**
11.30 to 12.00 h	**Viresh Rawal (University of Chicago, USA)** 'Beyond Total Synthesis An Unplanned Journey into Organo-Bismuth Chemistry'
12.05 to 12.35 h	**Hidetoshi Tokuyama (Tohoku University)** 'Total Synthesis of Structurally Complex Alkaloids: Denudatine alkaloids and Amatoxins'
12.40 to 13.00 h	**Thirupathi Barla (IISER Berhampur)** 'Total Synthesis of Bioactive Natural Products: From Structure Revision to Biological Activities'
13.05 to 14.00 h	**LUNCH BREAK**

Jubilant Life Sciences Session	
Session V **(14.00 to 15.35 h)**	**Chairperson: Swapnil Yerande**
14.00 to 14.30 h	**Teigo Asai (Tohoku University, Japan)** 'The Biosynthesis of a Fungal Flavonoid Chlorflavonin Is Precisely Controlled by Two Types of Equilibrium States'
14.35 to 15.05 h	**Satoshi Yokoshima (Nagoya University, Japan)** 'Synthesis of Natural and Unnatural Polycyclic Compounds'

Astra Zeneca Session	
Session VI **(15.10 to 15.55 h)**	**Chairperson: N. Selvakumar**
15.10 to 15.30 h	**Ramakrishna G. Bhat (IISER Pune)** 'Versatile Reactivity of Diazo Carbonyl Compounds Towards Metal Catalysts and Visible Light'
15.35 to 15.55 h	**Basudev Sahoo (IISER TVM)** 'Harnessing the Reactivity of Dihydroquinazolinones and Dihydropyridines in Organic Synthesis'
16.00 to 18.30 h	**COFFEE BREAK/NOST Trustees Meeting/Free Time/Interactions**

ICOS Session (Flash Presentation)	
Session VII (18.30 to 19.40 h)	**Chairpersons: Santosh J. Gharpure & Vishal Rai**
18.30 to 19.40 h	**1. Someswara Rao Sanapala (IIT Tirupati)** 'Alkylation of Sterically Hindered Alcohols and Sugar Hydroxyls via Organocatalyzed Reductive Etherification' **2. Venkateswarlu Yarlagadda (IIT Bombay)** 'Reengineered rifamycin exploits nutrient transporters to overcome Gram-negative permeability barriers' **3. Rishikesh Narayan (IIT Goa)** 'Making a Dent in the Universe of Classical Cross-Coupling Reactions: One Oxidative Heterocoupling at a Time' **4. Siddharth Sharma (Mohanlal Sukhadia University, Udaipur)** 'Merging Post-Ugi Cylization Reactions with Electrochemical Organic Synthesis' **5. Soumitra Maity (IIT(ISM) Dhanbad)** 'Manipulating Reactivity Paradigms by Photocatalysis' **6. Mangala Phadte (Syngenta Biosciences Private Limited, Goa)** 'Diversity-Oriented Total Synthesis of Waltherione Alkaloids' **7. Anupam Bandyopadhyay (IIT Ropar)** 'Sequential Boronic Acid Bioconjugation enables Site-selective Modification of Peptides and Potential Bacterial Imaging' **8. Vinod D. Chaudhari (CSIR – Institute of Microbial Technology, Chandigarh)** 'Discovery of MBLs Inhibitors to Tackle Multidrug Resistant Bacterial Infections'
19.45 to 21.30 h	**Dinner**

August 20, 2026 (Thrusday)

Syngenta Session	
Session VIII (09.00 to 10.55 h)	**Chairpersons: T. Punniyamurthy and Rajib Goswami**

09.00 to 09.30 h	**Masahiro Terada (Tohoku University, Japan)** 'Enantioselective Catalysis by Higher Order Organosuperbase'
09.35 to 10.05 h	**Igor V. Trushkov (Zelinsky Institute, Russia)** 'Donor-Acceptor Cyclopropanes: Magical Rings of Organic Chemistry'
10.10 to 10.30 h	**Md Mahiuddin Baidya (IIT Madras)** 'Transition Metal Catalysis towards C–H and C–C Bond Activation: From Biaryl Frameworks to Biorelevant Scaffolds'
10.35 to 10.55 h	**Guru Brahamam Ramani (IIT, Jammu)** 'Synthetic Versatility of Alkynyl Hydrazone and Diazo Compounds'
11.00 to 11.30 h	**COFFEE BREAK**

Sun Pharma Session	
Session IX (11.30 to 13.00 h)	**Chairperson: Namrata Rastogi**
11.30 to 12.00 h	**Yoshiharu Iwabuchi (Tohoku University, Japan)** 'Diversity-Oriented Terpenoid Synthesis through Peripheral Decoration and Skeletal Remodeling'
12.05 to 12.35 h	**Shinichiro Fuse (Nagoya University, Japan)** 'Innovations in Peptide Synthesis Driven by Microflow Synthesis Technology'
12.40 to 13.00 h	**M. Bakthadoss (Pondicherry University, Puducherry)** 'Palladium-Catalyzed meta-C–H Functionalization of Aromatics'
13.05 to 14.00 h	**LUNCH BREAK**

Panacea Biotech Session	
Session X (14.00 to 15.35 h)	**Chairperson: S. Srivatsan**
14.00 to 14.30 h	**Daniel Priebbenow (Monash University, Australia)** 'Advances in C–H Functionalisation: New Catalytic Strategies for Chemical Synthesis'
14.35 to 15.05 h	**Masanori Shigeno (Tohoku University, Japan)** 'Reactive Brønsted Base System for Direct Molecular Transformation'

AVRA Session	
Session XI (15.10 to 15.55 h)	**Chairperson: Santanu Mukherjee**
15.10 to 15.30 h	**Janakiram Vaitla (IIT, Delhi)** 'Vinyl Sulfoxonium Ylides: Unlocking New Opportunities in Organic Synthesis'
15.35 to 15.55 h	**Durga Prasad Hari (IISc, Bangalore)** 'The Carbene Face of [1.1.1]Propellane'
16.00 to 18.30 h	**COFFEE BREAK/Interactions/Free Time**

Dr. Gopal Rao Session	
Session XII (18.30 to 19.35 h)	**Chairperson: Harinath Chakrapani**
18.30 to 19.00 h	**Yujiro Hayashi (Tohoku University, Japan)** 'Organocatalysis for the Efficient Synthesis of Biologically Active Molecules'

19.05 to 19.35 h	**Manas Kumar Ghorai (IIT Kanpur)** 'Asymmetric Synthesis of Bioactive Compounds via ROC/DROC/DKR'
19.40 to 22.00 h	**Conference Dinner**

August 21, 2026 (Friday)

Cipla Session	
Session XIII (09.00 to 11.10 h)	**Chairpersons: S. S. V. Ramasastry and Alakesh Bisai**
09.00 to 09.30 h	**N. D. Pradeep Singh (IIT Kharagpur)** 'Wavelength-Selective Monochromophoric Photoremovable Protecting Groups for Tuning Soft Matter Material Properties'
09.35 to 10.05 h	**Cyril Bressy (Aix-Marseille Université, France)** 'Compartmentalized Multicatalysis: Chirality as Probe & Separation of Enantiomers'
10.10 to 10.30 h	**S. Adimurthy (CSIR - CSMCRI, Gujarat)** 'Transannulation of Pyridotriazoles and Their Selective Functionalization'
10.35 to 10.45 h	**Concluding Remarks**
10.45 to 11.15 h	**High Tea and Departure**

ABSTRACTS

Trustees Session

Chairpersons: D. Srinivasa Reddy and Rakesh Bandichhor

Junichiro Yamaguchi
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Prof. Junichiro Yamaguchi obtained his B.S. (2002), M.S. (2004), and Ph.D. (2007) from Tokyo University of Science (Japan) under the supervision of Professor Yujiro Hayashi, where he worked on the total synthesis of complex natural products. During his doctoral studies, he was a visiting student in the laboratory of Professor K. C. Nicolaou at The Scripps Research Institute (USA). He then joined the research group of Professor Phil S. Baran at The Scripps Research Institute as a JSPS Postdoctoral Fellow (2007–2008), working on total synthesis of Plau'amine. In 2008, he joined Nagoya University as an Assistant Professor under Professor Kenichiro Itami, was promoted to Associate Professor in 2012, and started his independent research laboratory at Waseda University as an Associate Professor in 2016. He has been a Professor at Waseda University since 2018.

Professor Yamaguchi's laboratory is interested in developing transformative synthetic methodologies based on the concepts of building molecules, destroying molecules, and creating game-changing molecules. His group has pioneered a variety of molecular editing strategies through selective bond activation, skeletal transformation, and catalytic functional-group interconversion. Current research spans C–C and C–heteroatom bond activation, ringopening and ring-forming reactions, dearomatization chemistry, bond metathesis, and the development of new catalysts that enable previously inaccessible molecular transformations. These methodologies are applied to the synthesis of pharmaceuticals, agrochemicals, functional materials, and structurally unique organic molecules while expanding unexplored chemical space. In parallel with his research, Professor Yamaguchi founded Chem-Station, one of the largest chemistry communication platforms in Japan, which has played a leading role in disseminating chemical knowledge and connecting the chemistry community worldwide (https://www.chem-station.com). Among his honors and awards are the Mukaiyama Award (2024), the MEXT Young Scientists' Award (2017), the MEXT Science and Technology Award for Public Understanding Promotion (2019), the FACS Distinguished Young Chemist Award (2017), and multiple Asian Core Program Lectureship Awards. He has authored more than 170 peer-reviewed publications and continues to contribute actively to the advancement of synthetic organic chemistry through research, education, and international scientific collaborations.

Development of Heteroarene Swapping Reactions

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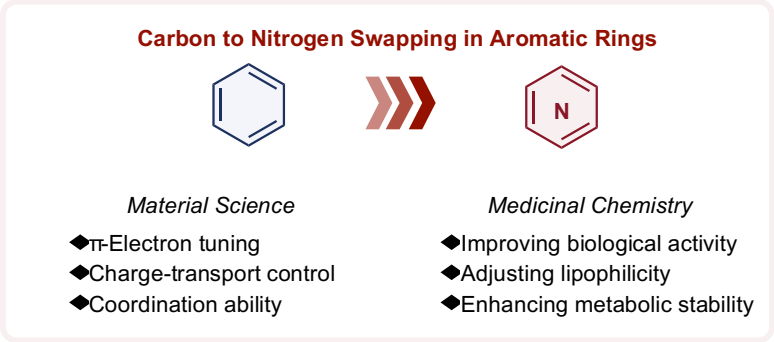
Heteroarenes are ubiquitous structural motifs in pharmaceuticals, agrochemicals, and functional materials, and replacing one heteroaromatic ring with another often leads to dramatic changes in physicochemical and biological properties. However, access to different heteroarene analogues generally requires de novo synthesis of each heterocyclic scaffold, limiting the rapid diversification of complex molecules.

Recently, atom-insertion and skeletal editing reactions have emerged as powerful strategies for directly converting arenes into heteroarenes. Despite their conceptual elegance, these methods often suffer from limited substrate scope and have rarely been applied to structurally complex molecules.[1]

During our studies on the deacylative transformation of aromatic ketones,[2] we unexpectedly discovered a onestep heteroarene swapping reaction that directly converts an arene moiety into a heteroaromatic ring.[3] This operationally simple transformation replaces the aromatic framework itself while preserving the overall molecular architecture, providing rapid access to structurally diverse heteroarenes from readily available aromatic compounds. The method enables late-stage heteroarene diversification of complex molecules without the need for de novo heterocycle synthesis. Furthermore, we have recently extended this concept beyond aromatic ketones to benzylic alcohols and α,β-unsaturated ketones, establishing a general platform for direct heteroarene swapping. The scope, limitations, and mechanistic aspects of these transformations will be presented.[3]



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Manmohan Kapur received his Ph.D. degree in 2003, working under the supervision of Prof. Ganesh Pandey at the National Chemical Laboratory, Pune. In the same year, he joined the group of Prof. Jin K. Cha at the Wayne State University, Detroit, USA, as a postdoctoral fellow. In 2004, he was awarded the Alexander von Humboldt Postdoctoral Research Fellowship for his second postdoctoral position at the Institut für Organische Chemie, Universität Tübingen, Germany, under the guidance of Prof. Dr. Martin E. Maier. Upon his return to India, he joined the industry before moving to Indian Institute of Science Education and Research Bhopal in 2009, where is presently a Professor in the Department of Chemistry. His research interests include the total synthesis of natural products by employing transition-metal catalysis as the key step and synthesis of natural products bearing peptide-based backbones, especially certain classes of anti-mycobacterial agents. He is the recipient of the Bronze Medal of the Chemical Research Society of India (CRSI) (2020) and the SERB-STAR Award (2020), Golden Jubilee Visiting Fellowship of ICT Mumbai (2021-22). He was also the member of the International Advisory Board of the *Asian Journal of Organic Chemistry* (2021-2024) and is presently an Editorial Board member of the journals *Tetrahedron* and *Tetrahedron Letters*. He is also an elected Fellow of The National Academy of Sciences, India, Prayagraj.

Unlocking Distal Reactivity: Transition-Metal-Catalyzed Enantioselective Remote γ- and ε-C–H Functionalizations

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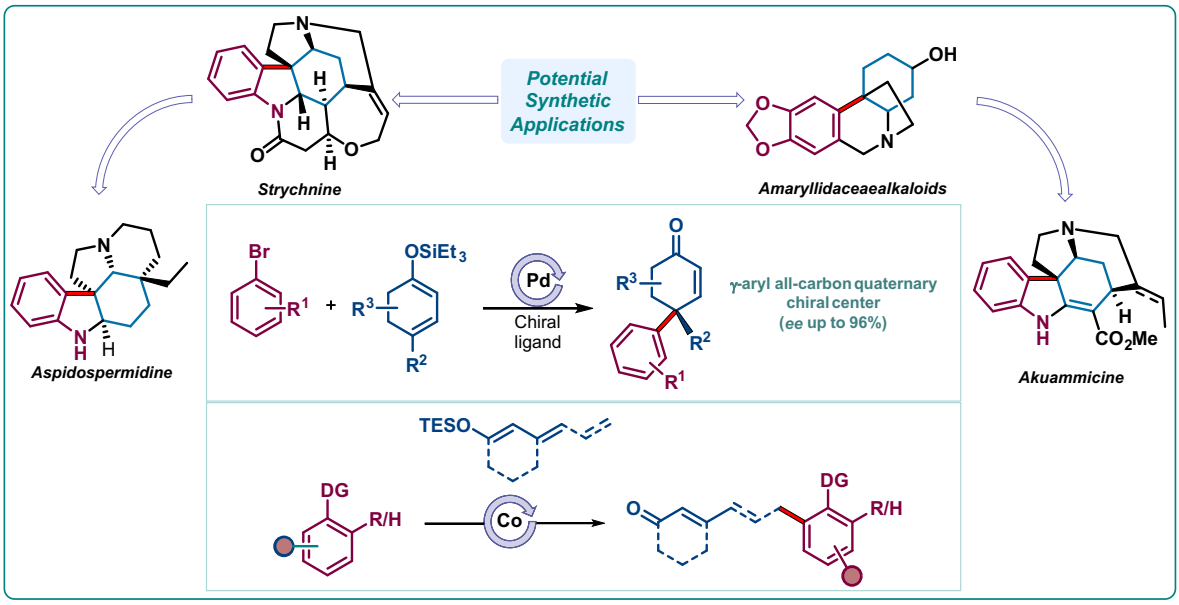
Remote functionalization has emerged as a powerful strategy for the selective modification of otherwise inaccessible positions in organic molecules. Unlike conventional proximal functionalization, remote transformations enable bond formation at distal sites either through spatial control or by exploiting molecular architecture, such as conjugated π-systems.[1] Our research group has been actively involved in developing selective γ- and ε-functionalizations of extended carbonyl compounds, including arylation, alkylation, and allenylation reactions *via* transition-metal catalysis.[2,3] Building on these advances, we have successfully achieved the enantioselective intermolecular γ-arylation of cyclic silyl dienol ethers, establishing a general platform for the synthesis of γ-aryl all-carbon quaternary stereocenters and providing a streamlined access to common chiral intermediates for the construction of complex natural products and pharmaceutically relevant molecular architectures.[4]



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Kazuaki Ishihara is a Professor in the Graduate School of Engineering at Nagoya University, Japan. He received his Doctor of Engineering degree from Nagoya University in 1991 under the supervision of Professor Hisashi Yamamoto. After completing a postdoctoral fellowship with Professor E. J. Corey at Harvard University, he returned to Japan in 1992 and joined Nagoya University, where he advanced through the academic ranks from Assistant Professor (1992–1997) to Associate Professor (1997–2002), and has held his current professorship since 2002.

Professor Ishihara has received numerous awards and honors in recognition of his research achievements. His representative awards include the Green & Sustainable Chemistry Award from the Minister of Education, Culture, Sports, Science and Technology (2003), the 5th Mukaiyama Award (2009), the SIS Award (Society of Iodine Science, 2015), the Synthetic Organic Chemistry Award (2016), and the Chemical Society of Japan Award (2017).

He has served on several editorial advisory boards, including *Letters in Organic Chemistry* (2007–), *Asian Journal of Organic Chemistry* (2021–2024), *Topics in Current Chemistry* (2014–), *Frontiers in Chemistry* (2021–), *Molecules* (2021–), *and Asymmetry* (2024–). His principal research interests have evolved from the design of asymmetric acid and base catalysts to supramolecular acid– base combined catalysts, iodine(I/III/V) and bromine(I/III) catalysts for stereoselective oxidative reactions, as well as environmentally benign amidation and esterification catalysts. His current research focuses on the development of catalytic organic reactions and processes directed toward green and sustainable chemistry.

Iodine Catalysis

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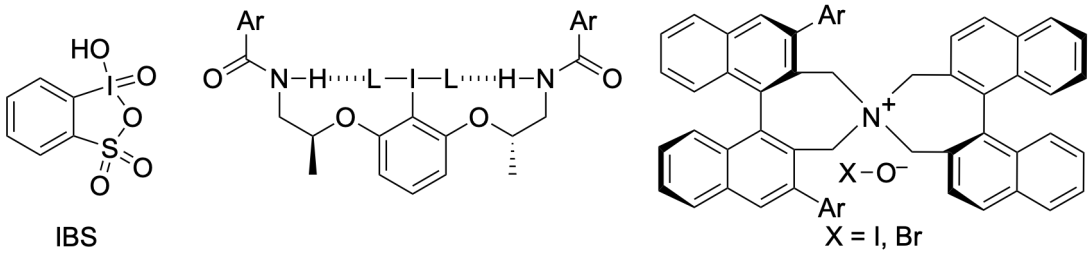
Because iodine can readily access oxidation states ranging from −I to +VII, it serves as an excellent central element for redox catalysis.[1] In this presentation, I will describe our recent advances in iodine catalysis.

We developed a selective oxidation of alcohols to aldehydes, ketones, carboxylic acids, and esters using an *in situ*-generated iodine(V) catalyst (IBS), prepared from 2-iodobenzenesulfonic acid and Oxone at room temperature.[2]

We also developed an enantioselective dearomatization catalyzed by an *in situ*-generated iodine(III) catalyst, prepared from a C_2-symmetric chiral iodoarene and *m*-CPBA. This transformation has been applied as a key step in the asymmetric synthesis of several natural products and figure-eight macrocycles.[3,4] Computational studies revealed that halogen bonding plays a crucial role in the origin of the observed enantioselectivity.[5]

Furthermore, we developed an enantioselective dearomatization catalyzed by an *in situ*generated iodine(I) catalyst, prepared from a C_2-symmetric chiral quaternary ammonium iodide and an oxidant such as hydrogen peroxide or an alkyl peroxide.[6a] For less reactive substrates, bromine(I) catalysis proved to be more effective.[6b] Finally, we achieved bromine(I)-catalyzed dearomatization under electrochemical conditions, in which electrolysis was used in place of a chemical oxidant.



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Raghu and Venkata Palle Session

Chairpersons: Venkata Palle and Ashwini K. Nangia

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Pradeepkumar received his Ph.D. in Bioorganic Chemistry in 2004 from Uppsala University, Sweden, working under the guidance of Prof. Jyoti Chattopadhyaya. Subsequently, he spent three years at the University of Illinois at Urbana-Champaign, USA, as a postdoctoral fellow in the laboratory of Prof. Scott K. Silverman. In 2007, he joined the Department of Chemistry at IIT Bombay as an Assistant Professor and rose to the rank of Professor in 2016. He was also a Max Planck India Fellow at the Max Planck Institute of Biophysical Chemistry, GÖttingen, from 2008 to 2012 and an ASEM-DUO visiting professor at the University of Würzburg, Germany in 2022. His laboratory is interested in various aspects of nucleic acid chemical biology, including therapeutic siRNAs/CRISPR-Cas gRNAs, G-quadruplex nucleic acids, damaged DNAs, nucleic acid aptamers, and DNA catalysts. He is a recipient of the IIT Bombay Excellence in Research and Chemistry Department Teaching awards.

Chemical Biology of Safrole-Induced DNA Damages

Pradeepkumar P.I.

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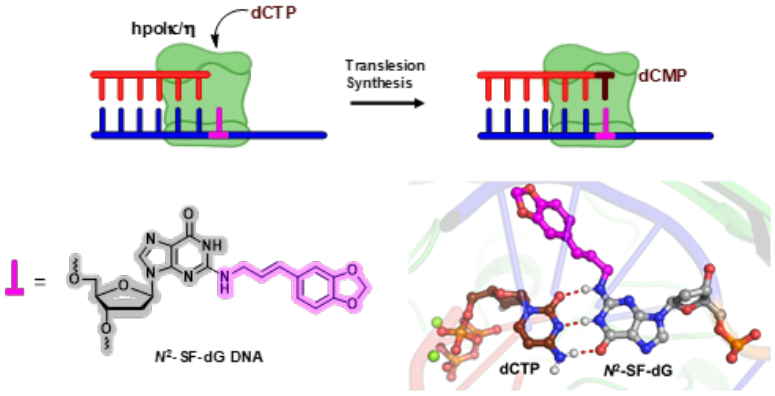
Safrole (SF) is a natural product found in various plants, spices, and essential oils. During cellular metabolism, it converts into a highly reactive intermediate that directly interacts with genomic DNA, forming adducts. Notably, N^2-SF-dG and N^6-SF-dA DNA adducts have been identified in the oral tissue of oral cancer patients with a history of betel quid chewing.[1] Research indicates that SF may act as a hepatocarcinogen, leading the International Agency for Research on Cancer (IARC) to classify it as a Group 2B carcinogen. To investigate SF-induced carcinogenesis and the role of low-fidelity translesion synthesis (TLS) polymerases in bypassing SF adducts, we synthesized N^2/N^6-SF-dG modified DNAs using phosphoramidite chemistry.[2-4] The presence of the SF modification in duplex DNA did not impact thermal stability and preserved the B-form helical conformation, suggesting that this adduct may evade typical DNA repair mechanisms. Primer extension studies demonstrated that human TLS polymerases hpolκ and hpolη can bypass the SF-dG adduct, performing error-free replication across it. Additionally, molecular modelling and dynamics studies indicated that the adduct reorients to pair with incoming nucleotides, facilitating effective bypass. Overall, the findings suggest that TLS polymerases hpolκ and hpolη may not contribute to safrole-induced carcinogenicity.



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Dr Surisetti Suresh obtained his MSc in Chemistry (1999) and PhD in Organic Chemistry (2006), under the supervision of Prof. M. Periasamy, from the University of Hyderabad, INDIA. He completed two postdoctoral research associate fellowships: at the Royal College of Surgeons in Ireland (research advisor: Dr M. F. A. Amado), Dublin, IRELAND and at Uppsala University (research advisors: Prof. A. Karlén and Prof. M. Larhed), SWEDEN. During this time, he worked in the areas of synthetic organic chemistry/medicinal chemistry.

Suresh joined CSIR-IICT, Hyderabad as a Scientist in November 2011 and is currently working as a Senior Principal Scientist (Scientist-F) in the Department of Organic Synthesis & Process Chemistry, CSIR-IICT. His research interests encompass the development of synthetic methodologies focusing on transition metal-catalyzed organic transformations, vinylogous reactions, organocatalysis by N-heterocyclic carbenes (NHCs); synthesis of pharmaceutically/biologically relevant compounds and the process development of KSMs/APIs.

Suresh is a recipient of awards and honours including Dr A. K. Singh Memorial Best Scientist Award (2018), CSIR-IICT-Director's Young Scientist Award (2017), Associate Fellow of Telangana Academy of Sciences (2017), Outstanding Scientist in Organic Chemistry (2017) by Venus International Foundation, Chennai. He has been elected as a Fellow of Telangana Academy of Sciences (2024), a Fellow of the Association of Researchers & Academicians (India) – ARAI and awarded the APJ Abdul Kalam Award – 2024 for Outstanding Scientists by ARAI. He has been a Life Member of various professional organizations including CRSI, ISCA, ISCB, SPER and NESA.

Suresh has authored 67 papers in peer-reviewed international journals published by ACS, RSC, Wiley and Elsevier. He has published two invited book chapters with Springer and Wiley publishers. Under his guidance, 9 students have received PhD degrees, and he is currently supervising 5 research fellows in their pursuit of PhD degrees. Additionally, he has mentored 21 Master's students in their dissertation work, guided several project assistants, and trained students in a skill-development program focused on synthetic organic chemistry.

N-Heterocyclic Carbene Organocatalysis: Unlocking New Bond-Forming Strategies

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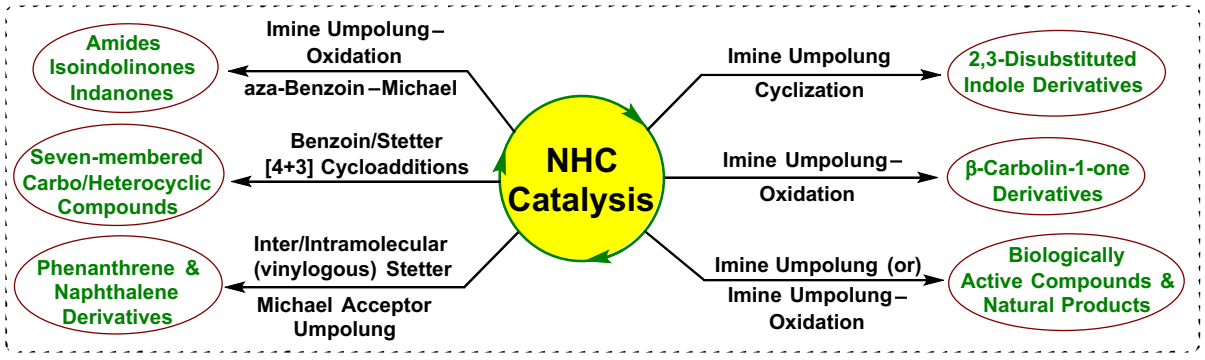
N-Heterocyclic carbene (NHC) organocatalysis has become a powerful platform in modern organic synthesis owing to its unique ability to induce umpolung (polarity inversion) of electrophilic substrates, particularly aldehydes.[1] Classical NHC-catalyzed transformations such as the benzoin condensation and Stetter reaction have been extensively explored; however, the use of imines as reaction partners remained elusive until 2017. Our group initiated the development of NHC-catalyzed imine umpolung, establishing a new activation mode that has enabled diverse synthetic transformations.[2a] Since then, we have developed a range of NHC-catalyzed imine umpolung reactions for the efficient synthesis of structurally diverse and biologically important heterocycles, including indoles, β-carbolinones, amides, and isoindolinones.[2a-2f] This lecture will present the conceptual development, mechanistic insights, and synthetic applications of these transformations. In addition, recent advances from our laboratory in NHC-catalyzed annulation and cascade reactions involving (aza)benzoin chemistry, Stetter reactions, and β-umpolung reactivity will be discussed, demonstrating efficient strategies for the rapid construction of structurally complex heterocyclic and carbocyclic frameworks.[2g-2o]



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Dr. Ravindra graduated from the University of Delhi with specialization in Organic Chemistry in 2003. Subsequently, he joined CSIR-NCL, Pune for Ph.D. under the supervision of Prof. Ganesh Pandey. After completing his Ph.D. in the total synthesis of natural products and alkaloids, he joined Venture Laboratory, Kyoto Institute of Technology (KIT), Kyoto, Japan as a postdoctoral fellow for two years. Then, he moved to Graduate School of Engineering, Osaka University, Japan as specially appointed assistant professor (2013-2017). Dr. Ravindra worked on wide range of subjects, like total synthesis of complex natural products, organo- and transition-metal asymmetric catalysis. He joined CSIR-CDRI, Lucknow, in the Medicinal and Process Chemistry (MPC) division as a Senior Scientist in 2018. Since 2022, he has been in the position of Principal Scientist. During his independent career, he received several grants (DST-CRG 2019, 2023, ICMR and CSIR projects) and mentored so far 12 Ph.D. students and several project students. His group published >35 research articles with an average impact factor > 7, including *Nature Chemistry*, 2025 and a book chapter and a patent. His current research interests lie on methodology development for diverse chemical space, specially synthesis of sp^3-rich molecules, synthesis of novel boron-heterocycles and exploring their reactivity, total synthesis of natural products and medicinal chemistry, especially on AMR and CNS area.

Fellowship/Awards: i) Meritorious Award and Jean and Ashit Ganguly Education Scholarship: University of Delhi during MSc. ii) CSIR-JRF and GATE (2003). Iii) Thieme Chemistry Journal Award, 2026. iv) CRSI Bronze Medal for the year 2027.

Organo-catalysed Modular Approach for the Synthesis of Azaborines and of BN-Isosteres via Wolff-type rearrangement

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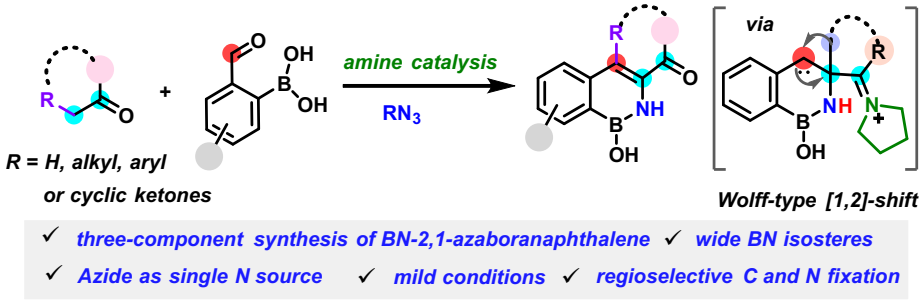
Diversification of privileged molecular scaffolds is key to drug design and the development of novel pharmaceutical candidates,1 which are typically built from carbon and other elements such as hydrogen, nitrogen, and oxygen. When chemists swap a carbon-carbon bond with a boron–nitrogen pair, called BN "isosteres" may behave like the parent C=C compounds (isoelectronic) with unique benefits due to the inherent property of elemental boron. Recently, bioisosteric replacement chemistry has emerged as an important tool for modifying existing biologically active compounds, potentially influencing the overall pharmacological activity of related compounds.[2] Moreover, the formation of covalent B-N bonds for the generation of novel boron-containing heterocycles drew much attention from the wide research community, comprised of synthetic, medicinal and materials chemists.[3] They often exhibit better therapeutic features, such as improved metabolic stability and aqueous solubility, than the parent molecules, probably because the NH groups of the azaborines can act as hydrogen-bond donors for better binding to proteins.[4]

We developed a simple and sustainable method for constructing such high-valued BN-isosteres, commonly named BN-2,1-azaboranaphthalenes, from inert feedstock materials, by an organo-catalyzed three-component reaction.[5] The developed transformation followed unprecedented Wolff-type rearrangement with the concomitant formation of Carbon–Carbon, Carbon–Nitrogen, and Boron–Nitrogen bonds in a single go at ambient temperature or with mild heating. The reaction tolerates a broad range of substituents, allowing chemists to incorporate electron-rich or electron-poor groups without sacrificing yield or selectivity. The methodology has also been adapted to tune privileged scaffolds, drug molecules, and natural products to BN-congeners. Its modular nature and benign reaction conditions make the method scalable and ideal for generating boron-based diverse chemical libraries for medicinal chemistry or materials science. Details of the work will be presented during the conference.



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Dr. Santanu Panda obtained his PhD on 2013 in organocatalysis and total synthesis of natural products under Prof. Antony Pearson, Case Western Reserve University, Cleveland, USA. After finishing his PhD, he moved to Dallas and joined Prof. Joseph Ready group as postdoc. During his postdoc, he was exposed to transition metal catalysed cross coupling and organoboron chemistry. On July 2018, he joined IIT Kharagpur as an assistant professor. His group is very much active in organoboron chemistry, organophotoredox chemistry and strain-release-driven ring opening chemistry.

Awards / Honors / Membership:

- Gajria Faculty Excellence Award from IIT Kharagpur 2025
- Tetrahedron/Tetrahedron Lett. early career editorial board member
- Merck Young Scientist Award 2023, Winner
- CRS (Chirantan Rasayan Sanstha) Bronze Medal 2022
- Ramanujan Fellowship 2018
- Best Poster Award at 2017 UTSW Biochemistry Retreat at Dallas Botanical Garden, Dallas
- Graduate outstanding teaching assistant award 2013, Department of Chemistry, Case Western Reserve University

Stereoselective Synthesis of Olefins and Heterocycles by Exploiting Organoboron Compounds and Strain-release-driven Ring Opening

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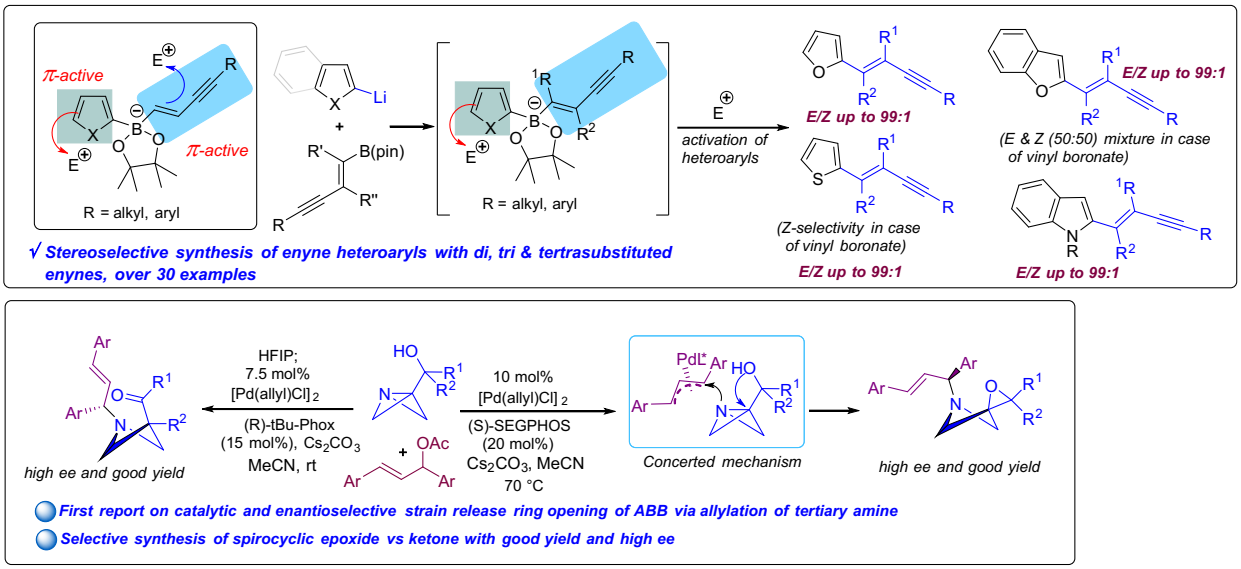
The Zweifel olefination has emerged as an attractive transition metal-free strategy for the stereoselective synthesis of olefins. However, its application has largely been limited to reactions between π-inactive and π-active partners. In this context, we have developed a stereoselective 1,2-migration strategy from substituted vinyl and heteroaryl boronate complexes, enabling access to both cis- and *trans*-vinyl heteroaryl frameworks. We have further extended this mechanistic dichotomy to structurally distinct enyne framework in place of the conventional vinyl group, which is an ongoing project in my group. We have also established an unprecedented palladium-catalyzed dehydrogenative deborylation allylation strategy for the one-pot conversion of 1,2-bis(pinacol)boronic esters into a range of skipped dienes, delivering good yields and high regioselectivity. Our group is also involved in strain-release-driven ring opening reactions to access chiral or achiral azetidines.



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PI Industries Session

Chairpersons: G. Sekar and Rajesh Viswanathan

Raghavan B. Sunoj

Google cloud chair professor

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Raghavan B. Sunoj received a PhD in the year 2001 from Indian Institute of Science Bangalore and a postdoctoral training at the Ohio State University (USA) before joining IIT Bombay in 2003. He is currently a professor of chemistry and at the centre for machine intelligence and data science and holds the Google cloud chair professor position. His research interests are in computational organic chemistry and machine learning as applied to practically important problems in asymmetric catalysis and reaction mechanism.

He is a receipt of prestigious national awards such as the Shanti Swarup Bhatnagar prize in Chemical Sciences (2019) and National Award to Teachers (higher education) (2023). He is an elected fellow of the Indian Academy of Sciences as well as the National Academy of Sciences India. He is an elected member of the board of World Association of Theoretical and Computational Chemists (WATOC), Asia Pacific Association of Theoretical and Computational Chemists (APATCC), and Structural and Mechanistic Chemistry Division of the IUPAC. He is an associate editor of The Journal of Organic Chemistry. He serves on the editorial boards of Chemical Society Reviews (since 2023) and WIRES: computational molecular science (2020-2024). He is a member of editorial advisory boards of Chemical Science, Chem, Journal of Computational Chemistry, and Organic Letters. He has published well over 180 research articles in journals of repute with an h-index of 55. He has delivered more than 150 invited/keynote lectures in leading conferences as well as in universities globally.

Asymmetric Catalysis: Perspectives from Computational Organic Chemistry and Machine Learning

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Computational science is an enabling technology capable of accelerating growth and for gathering insights into problems of practical value. For instance, computational quantum chemistry has been increasingly employed toward rationalizing the stereochemical outcome of catalytic reactions.[1] In our laboratory, density functional theory computations are employed to gain molecular insights into stereoselective reactions of contemporary significance.[2] The key objective of our research is to decipher the factors responsible for stereoselectivity and to harness such knowledge for *in silico* design of novel asymmetric catalysts.[3]

In general, the presentation would focus on chirality transfer from the chiral catalysts to the developing stereogenic center(s) in the product, as understood from suitable transition state models for the enantio-/diastereo-controlling step in the catalytic cycle. In keeping with the latest multidisciplinary research efforts, we have effectively been able to tap the potential of machine learning (ML) algorithms for chemical catalysis.[4] An overview of how ML models, built on intuitively chosen molecular descriptors or by using language-like representation of molecules, could be exploited in asymmetric catalysis would also be presented.[5] In addition, a critical assessment of whether computational chemistry and/or ML driven predictions can actually work under the wet-lab conditions would be put forward.[6] The contents are designed to cater to a broad and diverse group of audience; hence, the chemical insights would be emphasized, rather than a labyrinth of technical details.

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Oliver Reiser studied chemistry at the universities of Hamburg, Jerusalem, and Los Angeles (UCLA). He earned his PhD in 1989 at the University of Hamburg in the group of Prof. Dr. A. de Meijere. After 2.5 years as a postdoctoral fellow at IBM Research Center, San Jose, USA, with Dr. R. Miller, and at Harvard University, Cambridge, USA, with Prof. Dr. D. A. Evans, he moved in 1992 to the Universität Göttingen as an assistant professor and in 1996 to the Universität Stuttgart as an associate professor. In November 1997, he moved to the Universität Regensburg as professor, where he also served as Dean of the Faculty of Chemistry and Pharmacy and Vice President (Research). Together with his group, he has published >350 papers in synthesis and catalysis, with a focus on photocatalysis, sustainable chemistry, and natural products. From 2025 to 2027, he was appointed as a visiting distinguished professor at IIT Indore.

Photocatalysis as an Enabling Tool for Applications in Small-Molecule Synthesis of Biologically Relevant Compounds

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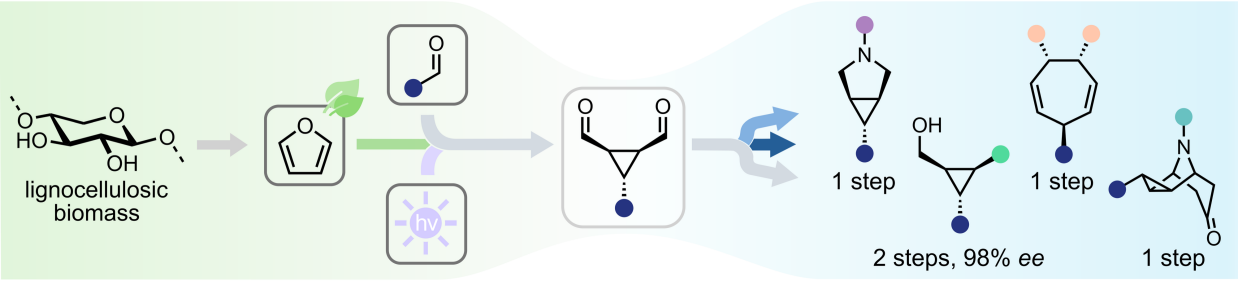
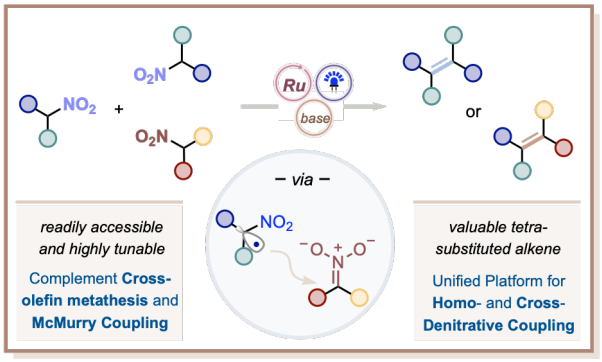
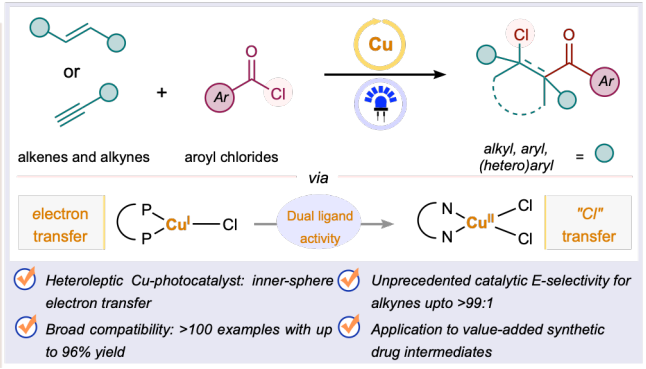
Photocatalysis offers attractive opportunities for the efficient synthesis of small organic molecules. In particular, the energy input from light makes it possible to drive endergonic reactions without using high-energy reagents. We are focusing on using renewable resources in combination with earth-abundant base metal catalysts (iron or copper) as an entry point for the synthesis of biologically relevant compounds. Cycloadditions, ATRA or Cross Coupling Reactions.







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Professor Rawat is the youngest Vice Chancellor in the 53-year history of Kumaun University, Nainital, the University from where he did graduation and postgraduation in 1993. After obtaining his Ph.D. from Central Drug Research Institute, Lucknow and he worked with Panchsheel Org Ltd, Indore and Lupin Labs from 1997-1999. From 1999 – 2002 worked at Indiana University and Purdue University, USA. In 2002, he joined National Institute of Pharmaceutical Education and Research, Mohali as Assistant Professor and in 2003 he joined Delhi University as a Reader. He was promoted to Full Professor in 2010 and became senior Professor in 2020. Prof. Rawat has published over 182 research papers, authored a book, the book was forwarded by Nobel Laureate Sir DHR Barton, he authored 7 book chapters, and 25 patents to his credit. His research work has been cited over 8300 times with impressive h-index of 55 and i-10 index of 145. Professor Rawat has developed a molecule which has potential to treat Parkinson disease for which there is no drug available. **Recently, the molecule has progressed to phase II human clinical trials and two molecules are in preclinical development, one for autoimmune and other for dementia. This is the first molecule that got US FDA approval from any Indian academic institute.** Prof Rawat has supervised 29 PhD students and 9 post-doctoral students.

He has vast administrative experience and has introduced digital degree concept at University of Delhi and DU became first University in the country to release over 1.78 lakh digital degrees in 2021. As Vice Chancellor of Kumaun University he introduced many reformative initiatives such as internal research funding, talent hunt program, internship etc and University got MERU status with Rs 100 Cr grant and ANRF-PAIR project. **Ministry of Defense, Govt of India conferred Honorary Colonel rank to Prof Rawat for his contribution to NCC at Kumaun University.**

Selected Awards and Honors (from 2015 onwards only):

1. Outstanding Vice Chancellor of India award (2026), 15th Indian Education Summit organised by India Education Network, February 7, 2026, New Delhi
2. Fellow, Indian National Science Academy (FNA), 2025.
3. Acharya PC Ray Memorial Award, Indian Chemical Society, 2025.
4. Vasvik research award, 2022**.**
5. ISCB Excellence award in drug discovery, 2022.
6. Fellow, National Academy of Sciences (FNASc), 2021.
7. Excellence Award for Exemplary Services, University of Delhi 2021.
8. President of Chemical Sciences Section, Indian Science Congress, 2019-2020.
9. Visiting Professor, Japan Advanced Institute of Science and Technology, Japan.
10. Professor SP Hiremath Memorial Award, Indian Council of Chemist, 2016.
11. Professor RC Shah Memorial Lecture Award, Indian Science Congress 2015.
12. Associate Editor, Royal Society Advances and Scientific Report.

From Molecular Hybridization to the Clinic: Discovery of a Phase II Clinical Candidate for Parkinson Treatment

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The 'one drug, multiple targets' concept has gained attention of both the academic and the pharmaceutical industry in recent years. To achieve such goals concept of molecular hybridization was put forward wherein two or more distinct pharmacophores are covalently linked into a single molecule.[1,3] The benefit of using molecular hybrid is to activate different or same targets by a single molecule, and increase the therapeutic efficacy and bioavailability. Molecular hybridization approach has resulted many drug candidates with improved activity profile and some of these compounds are in clinical trials.[4] We have utilized this concept in designing antimalarial molecules with aminiquinoline and pyrimidine phamacohpore and many hybrids showed low nano molar activity. Later a massive multi-institutional collaboration was started and over 700 new molecules were studies for Nurr1 activation, a potential target for Parkinson disease model and identified 15 hits out of which 3 compounds have cleared pre-clinical trials.[5-8] These molecules activate the Nurr1 enzyme which is essential for the survival of the dopamine neurons, stops the aggregation of α-synuclein protein in the brain, and promotes autophagy. Systematic studies demonstrated that these compounds can cures the Parkinson induced mice model at 5 mg/kg body weight without any toxicity and recently one of the molecules has successfully cleared phase I human clinical trials and it has moved to human phase II clinical trials (Figure) and two molecules are in the pre-clinical stage of development, one for auto-immune disease and other for dementia.

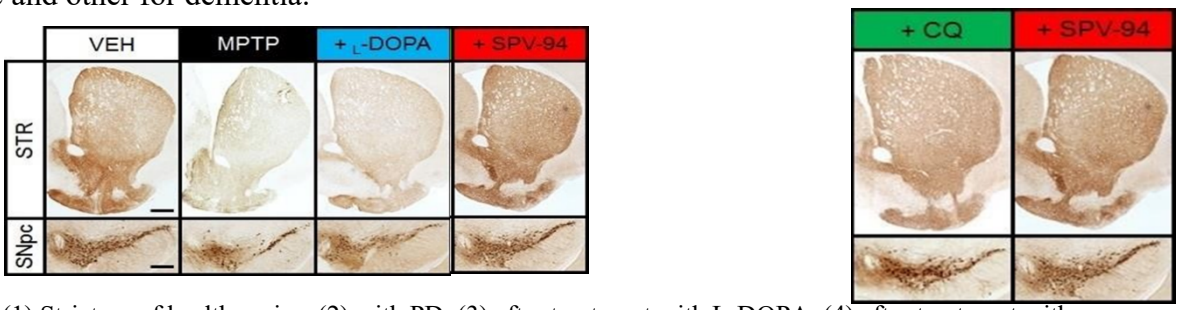

Figure: (1) Striatum of healthy mice, (2) with PD, (3) after treatment with L-DOPA, (4) after treatment with our compound

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Dr. Rima Thakur received her B.Sc. degree from Presidency College, University of Calcutta in 2005 and M.Sc. degree from IIT Kanpur in 2007. She completed her Ph. D. from IIT Kanpur in 2013 where her doctoral work involved synthesis of *N*-containing sugar mimics from carbohydrate pool - starting materials. Immediately after completion of her doctoral degree, she joined as Assistant Professor in the Department of Chemistry, NIT Patna in 2014 and started her independent research career. In May, 2025 she joined as an Associate Professor in the Department of Chemistry, University of Delhi.

Dr. Thakur's research interests include development of sustainable synthetic methods for stereoselective glycosylation through designing glycosyl donors, synthesis of C2-modified glycosides through one-pot glycal difunctionalization, development of catalyzed methods, glycodiversification and complex sugar synthesis using the newly developed methodologies. The research work in RT lab has been funded by external project grants and published in several well-reputed peer reviewed journals by ACS, Wiley-VCH and RSC publications.

Recognitions:

1. Recipient of Prof. D. K. Banerjee Memorial Endowment Award by Department of Organic Chemistry, IISc Bangalore in 2025.
2. Editorial board member of Journal of Carbohydrate Chemistry (Taylor & Francis), 2023 – 2028.
3. Editorial board member of Carbohydrate Research (Elsevier), since June 2024.
4. Young Scientist in J-NOST-2011 and invited speaker as research scholar in NOST-OCC 2012.
5. Represented India as a SAARC nation in Japan during JENESYS 2010, an exchange program for research scholars.
6. Recipient of Durga Devi Memorial Scholarship in 2006 at IIT Kanpur.

Catalytic Approaches to Controlled Glycosidic Bond Formation

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Cell surface sugars or glycans are an intriguing class of biomolecules that participate in crucial cellular processes like cell-cell adhesion, fertilization, host-pathogen interaction and recognition of microorganisms.[1] Since the natural complex sugars are isolated in micro-heterogenous forms, chemical glycosylation methods have emerged as a reliable pathway to obtain these therapeutically valuable organic scaffolds.[2] Bacterial glycans frequently involve monosaccharides that bear functionalities other than hydroxyl groups at the C-2 and C-3 positions. Owing to their less prevalence in comparison to the polyhydroxylated congeners, development of elegant glycosylation strategies towards these functionalized complex carbohydrates is in significant demand to generate sugar-based drugs and vaccines[3]. Nonetheless, in contrast to the elegant enzymatic pathways adopted by nature to obtain the specific glycosides, controlling chemo-, regio- and stereoselectivities in chemical glycosylations remain a long-standing challenge. This presentation will highlight our recent development of sustainable catalytic strategies for the stereoselective synthesis of 2,3-unsaturated glycosides[4] and 2-deoxyglycosides[5] from glycals (Figure 1). The work encompasses systematic reaction optimization, broad substrate scope, selectivity studies, and mechanistic investigations, providing efficient and environmentally benign approaches for the synthesis of biologically important carbohydrate derivatives.

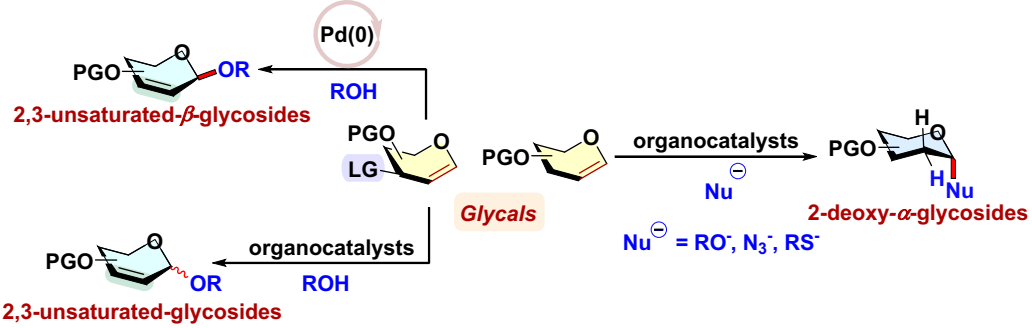

Figure 1. Catalytic approaches for chemoselective syntheses of 2,3-unsaturates and 2-deoxyglycosides

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BASF Session

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Viresh Rawal was born in India and immigrated to the United States with his family at a young age, settling in Connecticut. He received a BS degree from the University of Connecticut in 1980 and PhD from the University of Pennsylvania in 1986 under the direction of Professor Michael Cava. Following postdoctoral research in the laboratories of Professor Gilbert Stork at Columbia University, he joined the faculty of Ohio State University in 1988, where he was promoted to Associate Professor in 1994. He moved to the University of Chicago in 1995 and was promoted to Professor in 1998. He served as Chair of the Department of Chemistry from 2015–2018 and again from 2021–2023.

Rawal's research spans synthetic methodology, asymmetric catalysis, and the total synthesis of architecturally complex natural products, with an emphasis on developing broadly useful strategies for molecular construction. His laboratory has completed concise syntheses of numerous natural products, including (-)-isocomene, modhephene, silphiperfol-6-ene, (+)tabersonine, (-)-quebrachamine, vindoline, arborescidines A-C, (+)-geissoschizine, dehydrotubifoline, akuammicine, zenkerene, elisapterosin B, elisabethin, mycalamides A and B, pederin, platencin, welwitindolinones B, C, and D, ambiguines G, P, Q, heilonine, ussuriedine, verarine, hinckdentine A, and strychnine (two routes). A central focus of his research has been the development of new synthetic methods, particularly transition-metal-catalyzed and enantioselective transformations that have expanded the synthetic toolbox available to organic chemists. Rawal's laboratory also made pioneering contributions to the field of organocatalysis, particularly through the use of chiral hydrogen bond donors. His group was the first to demonstrate that simple chiral alcohols can serve as highly enantioselective catalysts. His laboratory later introduced chiral squaramides—bifunctional hydrogen-bond donor catalysts that are now among the most widely used catalyst classes in asymmetric synthesis.

Rawal has delivered more than 350 invited or plenary lectures worldwide, and his work has been recognized with numerous awards, including the ACS Award for Creative Work in Organic Synthesis (2024), the E.C. Taylor Award from the International Society of Heterocyclic Chemistry (2022), CRSI Medal (2019), the Japan Society for the Promotion of Science Lectureship (2015). He served as the 2024 CNRS Ambassador for Chemical Sciences in France. He has served on the editorial boards of numerous leading journals in organic chemistry, including *The Journal of Organic Chemistry*, *Organic Syntheses*, *Heterocycles*, *Organic & Biomolecular Chemistry, Organic Chemistry Frontiers*, *Asian Journal of Organic Chemistry*, *Tetrahedron,* and *Tetrahedron Letters*.

Beyond Total Synthesis
An Unplanned Journey into Organo-Bismuth Chemistry

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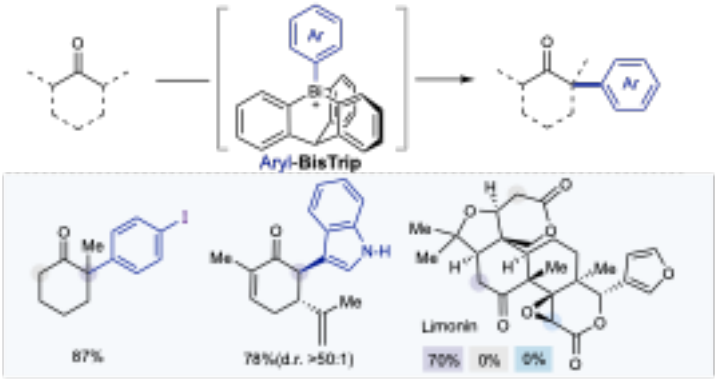
The synthesis of complex natural products often provides opportunities for the discovery of new reactions and concepts that find application well beyond the original synthetic objective. Such was our experience during studies directed toward the ambiguine alkaloids, a structurally intricate subgroup of the hapalindole family of natural products. While these efforts culminated in concise syntheses of several ambiguines, they also revealed the need for a more efficient preparation of a key synthetic intermediate. The search for such a solution led us to reexamine the relatively unexplored chemistry of organobismuth compounds and ultimately to the design of conformationally constrained organobismuth reagents that function as reusable aryl transporters. In this presentation, I will describe how this unexpected journey has evolved into a broader investigation of organobismuth chemistry, leading to practical solutions for several longstanding challenges in organic synthesis, including the general □-arylation of carbonyl compounds and concise, regiocontrolled synthesis of indoles from simple carbonyl precursors. Collectively, these studies illustrate how the pursuit of an "ideal" synthesis can inspire new directions in synthetic methodology and expand the synthetic toolbox available to chemists.



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Professor Hidetoshi Tokuyama obtained his Ph.D. in Organic Chemistry from the Tokyo Institute of Technology in 1994. He subsequently moved to the USA for a post-doctoral position with Prof. Amos B. Smith, III (1994-95). He joined the Tohru Fukuyama Group at the Graduate School of Pharmaceutical Sciences, the University of Tokyo as an Assistant Professor in 1995 and was promoted to Associate Professor in 2003. Since 2006, he has been in his current position at Tohoku University. He is an associate member of the Science Council of Japan and a fellow of the Royal Society of Chemistry. He is currently a member of Editorial Board of *Organic Syntheses* and *Natural Products Reports* (RSC).

He has made significant contributions to the field of organic chemistry with a special emphasis on the development of synthetic methodologies and the total synthesis of biologically active natural products. He has developed synthetic methodologies for nitrogen-containing heterocycles and applied them to total syntheses of a number of alkaloids including (+)-halophytine, (–)-haouamine A, (–)-histrionicotoxin, (–)-rhazinilam, (–)-acetylaranotine, (+)-MPC1001B, discorhabdins, aleutianamine, and (+)-bipleiophylline. He has more than 200 publications with more than 9000 citations. More than fifty students have been already awarded Ph.D. degrees under his guidance. For his contributions to synthetic organic chemistry with focus on the synthesis of structurally complex natural products, he has received several awards including Katritzky Junior Award in Heterocyclic Chemistry from the International Society of Heterocyclic Chemistry, 2015, the Pharmaceutical Society of Japan Award for Divisional Scientific Promotion, 2015, and the Young Scientist's Prize: The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Japan, 2007.

Total Synthesis of Structurally Complex Alkaloids: Denudatine alkaloids and Amatoxins

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In this lecture, I will present our group's recent progress on the total synthesis of two classes of structurally complex alkaloids. The first topic focuses on the asymmetric and divergent total syntheses of the denudatine alkaloids cochlearenine (**1**), macrocentrine (**2**), and dictizine (**3**), alongside the asymmetric synthesis of the proposed structure of acochlearine (**4**).[1] The highly fused tetracyclic A/B/E/F ring system featuring diverse N-alkyl substituents was constructed via Brønsted acid-mediated intramolecular Mannich reactions, while the bicyclo[2.2.2]octane C/D rings were established through a two-fold intermolecular Diels–Alder reaction. Leveraging these key processes enabled the construction of the complex, cage-like hexacyclic core common to these alkaloids. Late-stage chemo- and stereoselective modifications of the A/C rings then afforded the four target compounds. The second topic will focus on the development of a synthetic methodology for 2-substituted indoles via the ring expansion of benzocyclobutenone oxime sulfonates using various nucleophiles, along with its application to natural product synthesis.[2-4] In addition to exploring the reaction scope w to access diverse 2-substituted indoles, its utility was demonstrated through synthetic studies on alkaloids including batzelline A (**5**) and amaninamide (**6**).

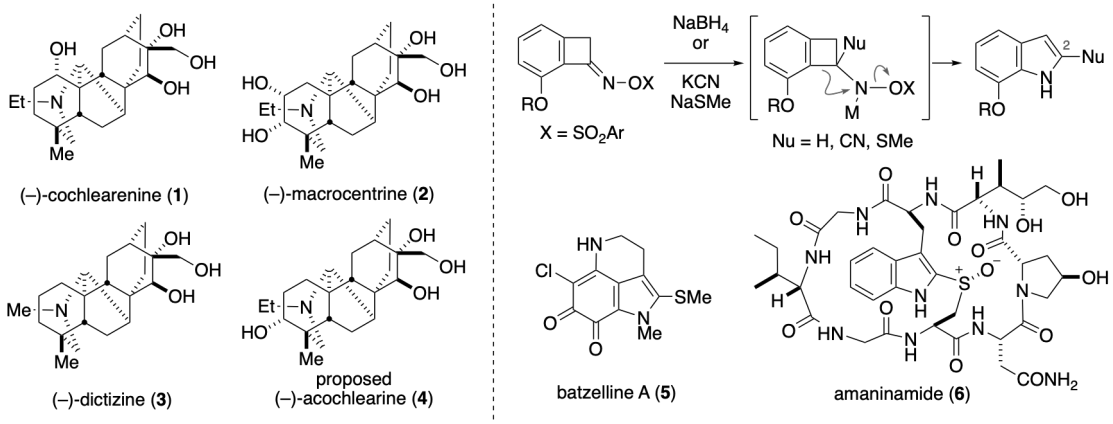

Figure 1: Structures of pleocarpamine (**3**), bipleiophylline (**2**), and amaninamide (**4**).

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Dr. Thirupathi Barla was born in Madavelli, Mancherial district, Telangana, India, in 1984. After completing his M.Sc. in Organic Chemistry from Osmania University (2006–2008), he worked as a Research Chemist at Aragen Life Sciences (formerly GVK Biosciences), Hyderabad, from 2008 to 2009. In 2009, he joined the CSIR–Indian Institute of Chemical Technology (IICT), Hyderabad, where he completed his doctoral studies (2009–2014). He subsequently worked as an Associate Research Scientist in the Process R&D Division at Sai Life Sciences, Hyderabad (2014–2015). From 2015 to 2018, Dr. Barla was a postdoctoral fellow at Harvard University, USA, working with Prof. E. J. Corey, where he contributed to the development of highly active fluorinated second-generation oxazaborolidine catalysts for enantioselective Diels–Alder reactions. In July 2018, he joined the Indian Institute of Science Education and Research Berhampur as an Assistant Professor and was promoted to Associate Professor in February 2024. Dr. Barla is a recipient of the Thieme Chemistry Journals Award 2023. His research focuses on the development of novel carbon–carbon bond-forming reactions and their applications in the total synthesis of structurally complex natural products. His group is also engaged in the synthesis of biologically active natural products and the development of structurally diverse molecules with potential therapeutic applications.

Total Synthesis of Bioactive Natural Products: From Structure Revision to Biological Activities

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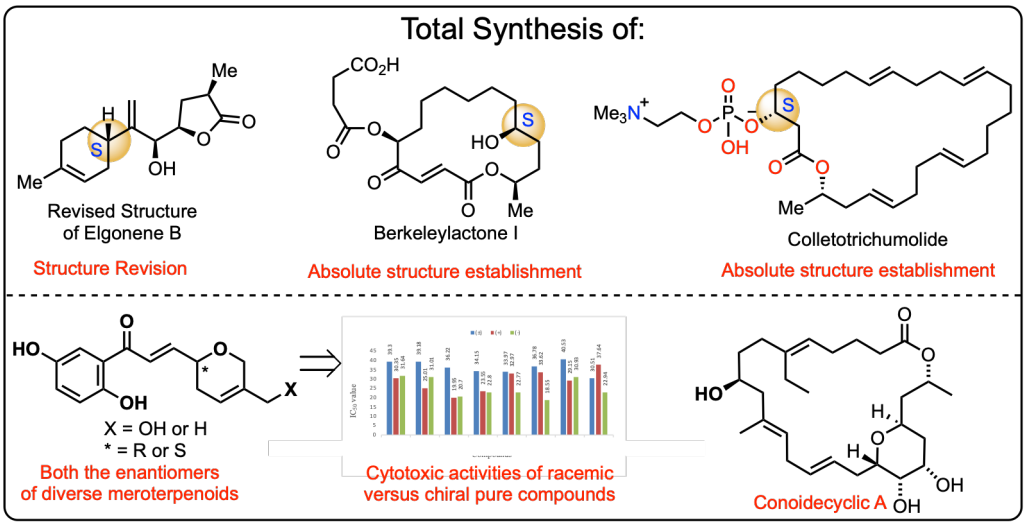

Natural products remain an indispensable source of lead molecules for drug discovery. However, the determination of their correct molecular structures and absolute configurations often requires total synthesis.[1] Our research focuses on developing efficient and stereoselective synthetic strategies for complex bioactive natural products. Using these approaches, we have accomplished the total synthesis and stereochemical revision of several natural products, including elgonenes,[2] berkeleylactone,[3] and colletotrichumolide.[4] More recently, we achieved the collective total synthesis of baoslingzhines F–H, chizhiene C, and lingzhines E–F, enabling their biological evaluation. This lecture will highlight how total synthesis serves as a powerful tool for structure determination, revision, and biological investigations, bridging synthetic chemistry with drug discovery.

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Jubliant Life Sciences Session

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Teigo Asai received his Ph.D. in 2011 from Tokyo Institute of Technology under the supervision of Professors Yoshinori Fujimoto. During his doctoral studies, he investigated the chemical constituents accumulated in plant surface micro structures, especially exudate from glandular trichomes. Middle of his Ph.D. course, he joined Professor Yoshiteru Oshima's group at Tohoku University as an assistant professor (2009–2016), where he focused on fungal silent biosynthetic gene clusters and successfully discovered a variety of novel natural products by using chemicals, such as epigenetic modifiers and plant hormones. And then, he has applied synthetic biology method based on genome mining and heterologous expression into his natural product discovery research. In 2016, he moved to The University of Tokyo as an associate professor and launched his lab.. (2016–2019), initiating research on genome mining of fungal natural products. Since 2021, he has been serving a professor at Tohoku University. His research focuses on genome mining for novel natural products, identification of unique biosynthetic machineries and natural product based drug discovery.

The Biosynthesis of a Fungal Flavonoid Chlorflavonin Is Precisely Controlled by Two Types of Equilibrium States

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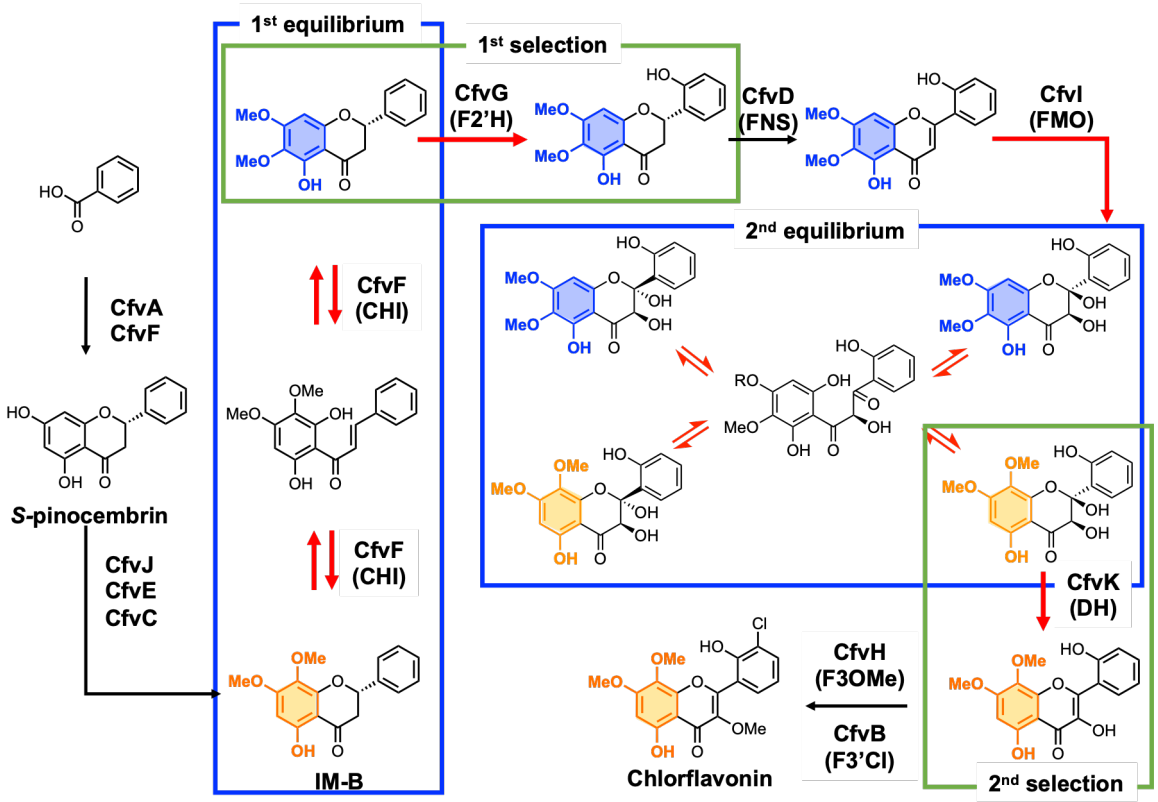
Flavonoids are polyphenolic natural products known for diverse biological activities and significant pharmaceutical value. Chlorflavonin is a rare fungal flavonoid exhibiting potent antitubercular activity, yet its complete biosynthetic pathway has remained elusive. In this study, we fully elucidate the chlorflavonin biosynthetic pathway through functional analyses of its enzymes. Contrary to the conventional stepwise introduction model, we uncovered an intricate network involving dynamic interconversions between 6- and 8-methoxy flavonoid skeletons, mediated by the chalcone isomerase CfvF and the oxygenase CfvI. Despite generating equilibrium mixtures, the downstream enzymes precisely select and convert specific reaction species. Furthermore, crystal structure analysis of the dehydratase CfvK, combined with mutagenesis, revealed the structural basis of its strict substrate selectivity. Together, this comprehensive study establishes a versatile framework for synthesizing 46 natural and unnatural flavonoids, paving the way for sustainable fungal production of structurally diverse flavonoid libraries.[1]



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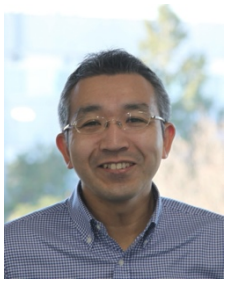

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Satoshi Yokoshima received his B.S. in 1997, and his Ph.D. in 2002 from The University of Tokyo under the guidance of Professor Tohru Fukuyama. After working for Mitsubishi Pharma Corporation as a medicinal chemist (2002–2004), he joined Professor Fukuyama's group at The University of Tokyo as an assistant professor. He was promoted to lecturer in 2008 and to associate professor in 2011. In 2012 he moved to Nagoya University as an associate professor and was promoted to professor in 2017. His current research interests focus on the synthesis of natural and unnatural molecules with polycyclic systems.

Synthesis of Natural and Unnatural Polycyclic Compounds

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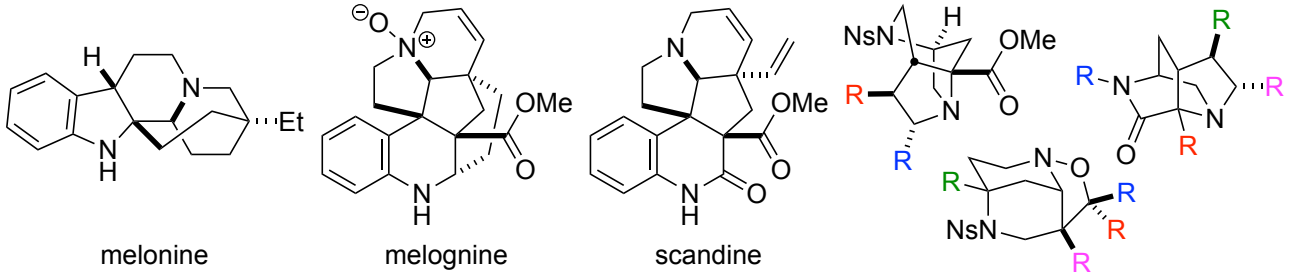
Natural products are an invaluable resource for drug discovery and development. Their unique three-dimensional and conformationally rigid frameworks not only enable selective interactions with biological targets but also often provide favorable physicochemical and pharmacokinetic properties, such as improved solubility and metabolic stability. These characteristics make natural products attractive scaffolds for medicinal chemistry. At the same time, however, the structural complexity of natural products often presents significant challenges for their utilization in drug development. When natural products are available in sufficient quantities, they can serve as starting materials for the preparation of analogues and derivatives. In contrast, rare natural products or compounds that cannot be readily accessed through derivatization require the development of efficient and practical synthetic routes. In our laboratory, we have focused on the synthesis of polycyclic natural products as well as unnatural polycyclic compounds that possess natural product-like structural features. In this presentation, we will highlight our recent achievements in the synthesis of natural and unnatural polycyclic compounds.



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Astra Zeneca Session

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Professor Ramakrishna G. Bhat (RGB) obtained his PhD degree (2004) from the Department of Organic Chemistry, Indian Institute of Science (IISc) Bengaluru under the supervision of Prof. Srinivasan Chandrasekaran. Subsequently, he joined Prof. Brian M. Pinto's research group as a postdoctoral fellow at the Simon Fraser University, British Columbia, Canada. Later in the year 2006, he began his independent career at the Indian Institute of Science Education and Research (IISER) Pune and he was promoted to Full Professor in 2019. His research focusses on 'Organic Synthesis and Catalysis' encompassing the broad research areas on Photoredox catalysis, Photoinduced as well as metal catalyzed Carbene transfer reactions, C-H bond functionalization and Organocatalysis. He has been actively involved in the outreach educational activities and Teachers' training programs extensively. IISER Pune has conferred on him the very first 'Excellence in Teaching and Contributions to Teaching' award in 2022, the commencement year of the Teaching Award. He is also a member of Early Career Editorial Board in the *Tetrahedron Letters and Tetrahedron*.

Versatile Reactivity of Diazo Carbonyl Compounds Towards Metal Catalysts and Visible Light

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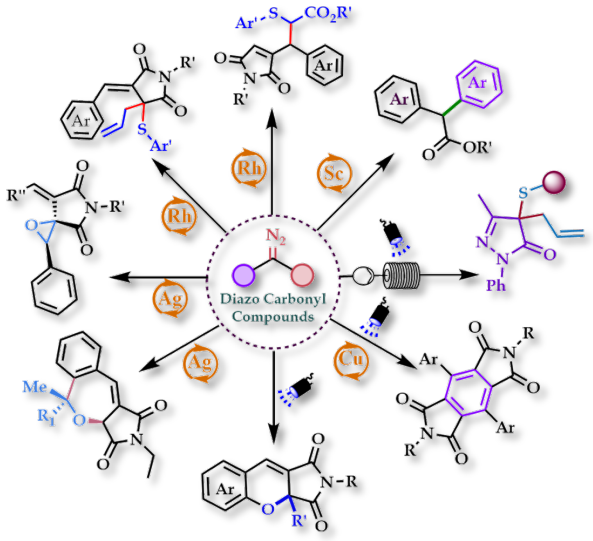
Diazo carbonyl compounds have broad and tuneable reactivity.[1a] Owing to their versatile reactivity, diazo compounds have been utilized in diverse transformations in organic synthesis as well as in interdisciplinary fields.[1b] Developing catalytic methods for the chemo- and regio-selective C-H bond functionalization is highly desirable as well as challenging. Over the years, we have been exploring the reactivity of diazo carbonyl compounds both under metal and visible light catalysis. We have developed a robust propargyl α-aryl-α-diazoacetate as a new class of reagent for the effective C-H bond functionalization of unactivated arenes, 1,3 diketones & β-keto acids via scandium catalysis to access useful functionalized compounds.[2] Likewise, we have been exploring the diverse reactivity of diazo arylidene succinimides (DASs) under metal as well visible light catalysis to access useful compounds like 2*H*-chormenes, PMDI etc.[3] This presentation will provide an overview of some of the recent advancements from our research group.



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Basudev Sahoo completed his BSc in chemistry from the Ramakrishna Mission Residential College, Narendrapur, affiliated to the University of Calcutta in 2009 and MSc in Chemistry from the Indian Institute of Technology (IIT) Kanpur in 2011. Then, he moved to Germany to pursue his PhD under the supervision of Prof. Frank Glorius at the University of Muenster. After completing his PhD in 2015, he moved to the group of Prof. Matthias Beller at the Leibniz Institute for Catalysis (LIKAT), Rostock, Germany as a Leibniz Postdoctoral Fellow. In 2018, he received Marie Curie (MSCA) postdoctoral fellowship and joined the group of Prof. Ruben Martin at the Institute of Chemical Research of Catalonia (ICIQ), Tarragona, Spain. He is currently an associate professor in the school of chemistry, IISER Thiruvananthapuram. His research interest is organic synthesis relying on metal catalysis, photocatalysis and molecular editing.

Recognition

2025	Merck Young Scientist Award (Runner) in Scientific Excellence Category
2025 - present	ChemCatChem Early Career Advisory Board (ECAB) member
2022	Thieme Chemistry Journals Award from Thieme Verlag
07/2018–02/2020	Marie Curie Fellowship (MSCA-IF) from the European Commission
2016	Springer Thesis Prize for PhD research

Harnessing the Reactivity of Dihydroquinazolinones and Dihydropyridines in Organic Synthesis

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Ketone functionality is highly ubiquitous in natural products, (pre)clinical drugs, and commodity chemicals while glyoxalic acid is naturally occurring compound engaged in various biosynthesis. Compared to explored nucleophilic addition to C=O bond and α C-H functionalization, recently, the evolution of catalytic C-C bond functionalization of aliphatic ketones remains sought-after for streamlining organic synthesis.[1] In this context, pro-aromatic dihydroquinazolinones, readily accessible from unstrained (di)ketones, have emerged as versatile alkyl/acyl radical precursors through aromaticity-driven C-C bond cleavage under photocatalytic or metal-catalyzed conditions (Figure 1).[2,3] We have exploited this platform to develop a range of catalytic C-C and C-X bond-forming transformations.[4-9] Furthermore, we have developed glyoxylic acid-derived 1,4-dihydropyridine chalcogen esters as a new class of radical precursors, enabling metallaphotoredox-catalyzed regiodivergent hydrothio- and hydroselenocarbonylation of (un)activated alkenes/alkynes (Figure 1).[10-12]

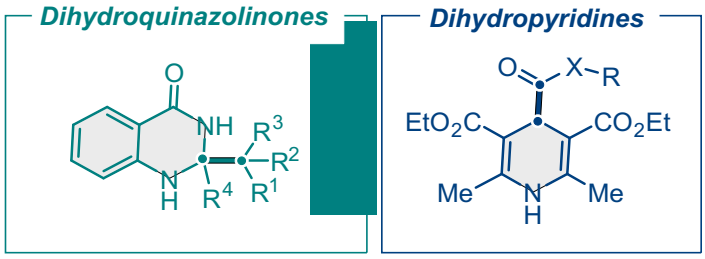

Figure 1: Harnessing reactivity of dihydroquinazolinones and dihydropyridines

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Someswara Rao Sanapala is an Assistant Professor in the Department of Chemistry at the Indian Institute of Technology Tirupati, India. He received his Ph.D. in Organic Chemistry with Prof. Suvarn S. Kulkarni from IIT Bombay in 2016 for the development of synthetic methods and total synthesis of rare amino L-sugar containing glycans. Following 2.5 years of postdoctoral research with Prof. Peter H. Seeberger at the Max Planck Institute of Colloids and Interfaces, Germany, where he focused on the chemical synthesis of glycan antigens for semisynthetic glycoconjugate vaccines against pathogenic bacteria, he joined Idorsia (formerly Vaxxilon GmbH, Germany) in 2019. At Idorsia, he contributed to the discovery, development, and commercialization of innovative synthetic carbohydrate vaccines. He was a recipient of the ACCTI Young Scientist Award in 2016.

He returned to India in 2022 and joined the Indian Institute of Technology Tirupati as an assistant professor. His current research interests include the development of synthetic methods towards regioselective protection of sugars and efficient glycosylation strategies. His research focuses on the design and synthesis of biologically relevant oligosaccharides from pathogenic bacteria and fungi as vaccine antigens, and on the development of carbohydrate-based vaccine adjuvants.

Alkylation of Sterically Hindered Alcohols and Sugar Hydroxyls *via* Organocatalyzed Reductive Etherification

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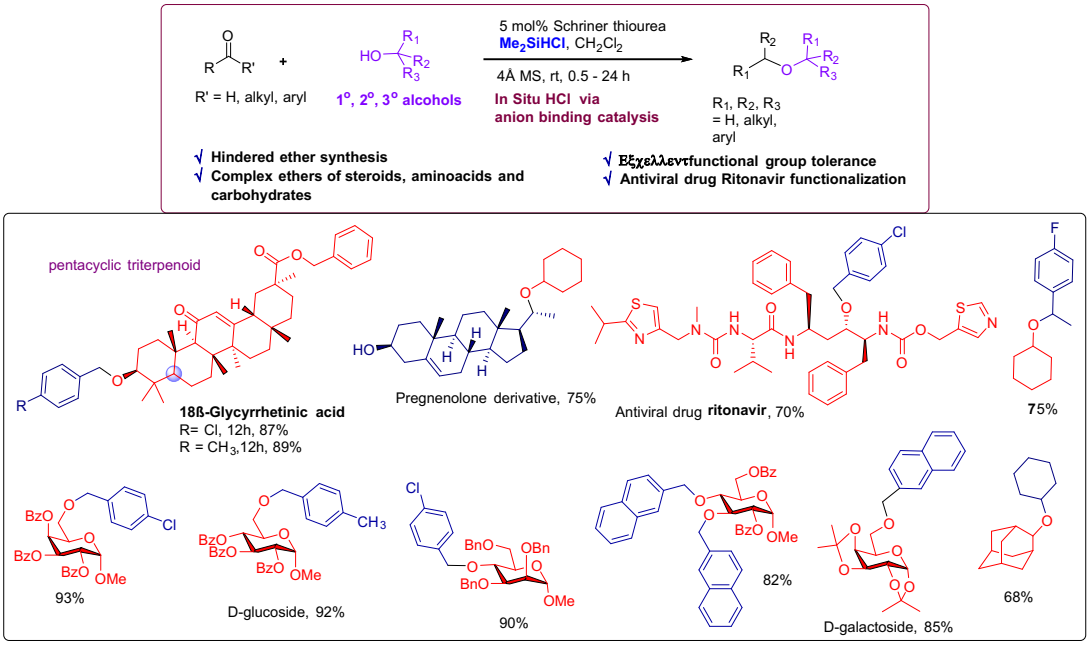
Alkylation of sterically congested alcohols represents a fundamental synthetic transformation in organic synthesis, providing access to ethers, that find applications in natural products, drug candidates, and protective groups in carbohydrate/peptide chemistry.[1] We developed an efficient metal-free and scalable reductive etherification method to synthesize hindered ethers using chlorodimethylsilane (CDMS) and catalytic Schreiner thiourea.[2] The reaction relies on *in situ* generated HCl and thiourea *via* anion-binding catalysis, activating carbonyls to form an oxocarbenium intermediate, enabling hydride transfer to create an ether bond. This method showed excellent functional group tolerance towards base-sensitive esters, acid-sensitive acetals, and silyl groups. Synthesis of complex ethers of steroids, terpenoids, peptides, carbohydrates, and late-stage ritonavir modification was demonstrated. The method significantly advanced the carbohydrate building block synthesis, where introducing ether-type protecting groups in the presence of base-labile esters is essential. This method was exemplified in the synthesis of the common trimannoside structure of N-glycan.



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Venkateswarlu Yarlagadda received his Ph.D. from JNCASR, Bangalore in 2016, followed by a postdoctoral stay at McMaster University (January 2016 – October 2020). He then moved to Dalriada Drug Discovery, Inc. in Toronto, Canada, as a Research Scientist II (November 2020 – April 2022). He returned to India in 2022 and joined the Indian Institute of Technology Bombay as an Assistant Professor of Chemistry.

His group's research focuses on the discovery and development of antibacterial agents effective against bacteria that are resistant to current medicines. Their strategies include rational chemical modification of obsolete antibiotics to introduce additional modes of action, bioactivity-guided mining for novel natural product scaffolds, and the development of small-molecular therapeutics and adjuvants that enhance antibiotic efficacy by targeting resistance mechanisms. He has co-authored 28 publications and is a co-inventor of 7 patents.

Awards and Recognitions

1) Associate Editor, *Journal of Medicinal Chemistry* (January 2026 onwards)
2) Topic Editor, *Journal of Medicinal Chemistry* (March 2024 – December 2025)
3) Early Career Board Member, *ACS Infectious Diseases* (Since 2023 -)
4) Member, The British Society for Antimicrobial Chemotherapy (2022)
5) IIT Bombay Young Faculty Award (2022)
6) Michael G DeGroote Postdoctoral Research Award (2017)
7) BIRAC-Gandhian Young Technological Innovation (GYTI) Award (2015)

Reengineered rifamycin exploits nutrient transporters to overcome Gram-negative permeability barriers

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Antimicrobial resistance (AMR) has emerged as one of the leading global public health threats of the 21st century. In fact, AMR is perceived as a slow-moving silent pandemic with catastrophic economic consequences. Bacterial antibiotic resistance evolves through natural selection, a process that is unavoidable since AMR has developed alongside the discovery of antibiotics. In addition, Gram-negative bacteria and Mycobacteria are intrinsically resistant to many clinical antibiotic classes.

Our laboratory is engaged in addressing AMR through rational medicinal chemistry strategies and natural product antibiotic discovery. One of our key approaches involves the chemical modification of natural product antibiotic scaffolds to enhance their potency and broaden their spectrum of activity while evading resistance mechanisms. In this talk, I will discuss our recent semi-synthetic efforts with narrow-spectrum Gram-positive antibiotic rifamycin aimed at transforming into broad-spectrum agents. The rationale for semi-synthetic rifamycin design, SAR-driven lead identification, mechanistic studies, and the efficacy of the leads in murine infection models will be demonstrated in this talk.

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Dr. Rishikesh Narayan is an associate professor of chemistry in the School of Chemical and Materials Sciences at IIT Goa since Nov. 2023. He leads a research group in the domain of sustainable catalysis and bioactive compound discovery. Prior to that he was an assistant professor in the same department from Oct 2017-Oct 2023. His other prior professional engagements include working as a research investigator at Biocon-Bristol Myers Squibb Research Center (BBRC) at Bengaluru, India in the domain of early-phase drug discovery (2015-2017).

Dr. Narayan, a native of Bihar, completed B.Sc.(H) in Chemistry from Hindu College, University of Delhi in 2006 and subsequently, M.Sc. from IIT Madras in 2008. He obtained his 'Doctorate in Natural Sciences' from the Organic Chemistry institute, University of Muenster, Germany in 2012, followed by a 3-year post-doctoral research in chemical biology at Max Planck Institute for Molecular Physiology, Dortmund, Germany as a Max-Planck Post-Doctoral fellow from 2012-15.

His research is generously supported by the national agencies such as DST-SERB, ISRO, ANRF etc. as well as international agencies such as CEFIPRA (Indo-French), IGSTC (Indo-German) etc. He has been a recipient of a few awards and scholarships including "Excellence in Teaching" award by IIT Goa (2024), Global Engagement award by CGHSR, University of Minnesota, USA etc.

Making a Dent in the Universe of Classical Cross-Coupling Reactions: One Oxidative *Heterocoupling* at a Time

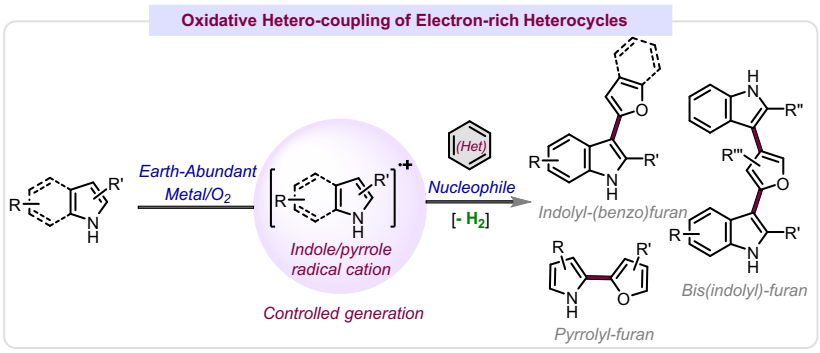
Dr. Rishikesh Narayan[a,b]

[a]School of Chemical and Materials Sciences (SCMS), IIT Goa, Farmagudi, Ponda, Goa-403401, India

[b]School of Interdisciplinary Life Sciences (SILS), IIT Goa, Farmagudi, Ponda, Goa-403401, India

Classical Pd-catalyzed cross-coupling reactions such as Suzuki, Heck, Sonogashira coupling etc. have remained the cornerstone of biaryl synthesis for more than half a century.[1] However, with the contemporary focus firmly on imbibing sustainability in chemical processes, there have been extensive efforts to obviate the limitations of cross-couplings, primarily their need for pre-functionalized substrates, by carrying out direct oxidation of ubiquitous C-H bonds in substrates to form the C-C bonds. These reactions, broadly known as oxidative coupling or cross-dehydrogenative coupling have emerged as a sustainable alternative to traditional cross-coupling reactions due to their better step- and atom-economy.[2,3] Despite significant advances, oxidative *heterocoupling* of two *different* heterocycles to obtain heterobiaryls remains a major challenge due to their formidable competing homocoupling reactions. In the light of these lacunae, we set an objective to explore the oxidative heterocoupling of two different heterocycles with chemoselective generation of a particular heterocyclic radical cation and its trapping with a second neutral heterocycle as the operative mechanism for oxidative C_{sp2} - C_{sp2} bond formation in heterobiaryl synthesis. In our pursuit, we are inspired by the *oxidoreductase* family of enzymes to use biocompatible, earth-abundant metals such as Fe, Cu etc. under aerobic conditions in achieving chemoselective oxidation.[4]

In this talk, an overview of our efforts in establishing the reaction conditions for the chemoselective generation of highly reactive indole and pyrrole radical cations and their subsequent coupling with other heterocycles such as furan, benzofuran, naphthol etc. will be presented. More specifically, the development of the first oxidative coupling of indoles with furans as well as benzofurans;[5-8] the first oxidative coupling of furans with 2-napthols;[9] and the first oxidative coupling of furans with highly reactive pyrroles[10] will be discussed.



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Dr. Siddharth Sharma is an Assistant Professor in the Department of Chemistry at the University College of Science, Mohanlal Sukhadia University, Udaipur, Rajasthan. He earned his PhD from CSIR-CDRI (Lucknow), with the degree awarded by JNU-New Delhi. Upon graduation, he worked as a post-doctoral fellow Dong-Pyo Kim lab @ POSTech, South Korea for 2 years. Further he worked as DST INSPIRE Faculty at Guru Nanak Dev University, Amritsar. He has received awards, such as the ISCB Young Scientist Award in 2023 and the two time CDRI Research Award in 2010-2011 for best publications. His research interests focused on isocyanide based cascade cyclization, electro-organic synthesis and post Ugi cyclization reaction. Dr. Sharma has secured research grants from UGC, SERB and DST. He has published 50 research papers.

Merging Post-Ugi Cylization Reactions with Electrochemical Organic Synthesis

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Mohanlal Sukhadia University (A State University), Udaipur, Rajasthan
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Isocyanides, known for their historical importance in the field of organic chemistry, have found applications in both academic research and industrial contexts. Among the various stable divalent carbon nucleophiles, isocyanides stand out due to their exceptional ability to form multiple bonds on the terminal carbon atom. However, the incorporation of isocyanides into diverse areas of organic chemistry offers an exciting opportunity to explore uncharted chemical territory and potentially discover novel lead compounds. Nevertheless, this pursuit remains a significant challenge. In this presentation, I will discuss our recent progress in merging isocyanide chemistry specially with focus on Ugi reaction with organic electrosynthesis, resulting in the synthesis of a wide range of medicinally valuable molecular frameworks.[1-13]

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Soumitra Maity did his bachelor's (2002) and master's (2004) from Calcutta University, Kolkata. He received his PhD from the Indian Association for the Cultivation of Science in Kolkata in 2010 under the supervision of Prof. Subrata Ghosh. Subsequently, he worked as a postdoctoral researcher in the research group of Prof. Nan Zheng at the University of Arkansas, USA (2010-2012) and in the research group of Prof. Thomas P. Maimone at the University of California, Berkeley, USA (2012-2013). In 2014, he joined CSIR-CSMCRI, Bhavnagar, as a DST-INSPIRE faculty member and later, in December, moved to IIT(ISM) Dhanbad as an Assistant Professor. Currently, he has been an associate professor at the same institute since April 2022. His research interest lies in radical-mediated reactions enabled by photoredox catalysis.

Awards/Achievements:

- Thieme Chemistry Journals Award 2025
- Fellow of the Indian Chemical Society
- INSPIRE Faculty Award, DST (2013)

Manipulating Reactivity Paradigms by Photocatalysis

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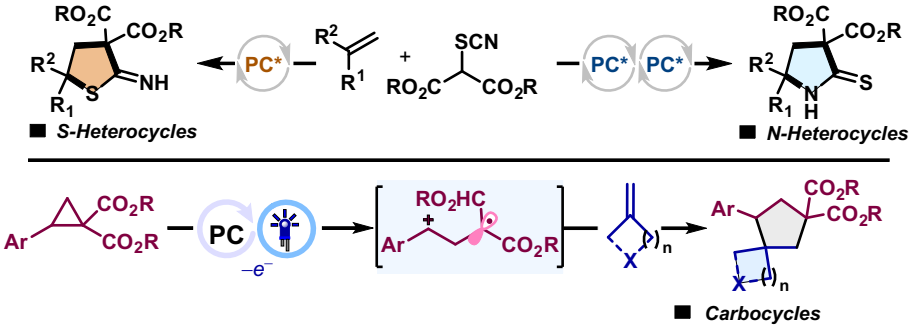
The world of synthetic organic chemistry is currently in the midst of a visible light-powered revolution. As the world jumps onto the photocatalytic bandwagon, new inroads into near-impossible transformations are revealed on a daily basis, redefining our understanding of organic synthesis. A major chunk of this new-age strategy focuses on light-induced alteration of the traditional reactivity patterns of molecules known since the days of yore. Here, we shall embark on a short journey describing two such classes of molecules, namely, Thiocyanomalonates and Donor-Acceptor Cyclopropanes whose fates were changed by harnessing the power of photocatalysis. While the ambident nature of thiocyanate was successfully tamed in the former case, the later describes a brand-new activation strategy for an old workhorse, unlocking hitherto unachievable cycloadditions.



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Dr. Mangala Phadte pursued Ph.D. research at Goa University, Goa, during 1996–2001, focusing on organic synthesis and characterization of novel triterpenes – Armatol G, H and I having a polyether skeleton and related molecules. She then worked as a Research Scientist at Nanu Pharma Research and Development Center, Goa (2001–2003), followed by roles in process research and development at Dai-ichi Karkaria Ltd, Hyderabad and Sanmar Speciality Chemicals Ltd, Chennai. Dr. Phadte subsequently served as Group Leader at Emcure Pharmaceuticals Ltd, Pune (2004–2006), where she led a team of 7–8 scientists and contributed to the development of scalable, patent non-infringing synthetic routes and industrially feasible processes, including successful pilot-plant implementation.

Dr. Phadte joined Syngenta in 2006 as a Team Leader and, rising through the ranks, progressed to a GL position in 2022. She currently heads Goa Research Chemistry, leading a 60-member team focused on new molecule synthesis across all three major agrochemical indications—weed control, insect control, and disease control. Her research interests include the synthesis of natural products and new heterocycles to identify novel active leads for agrochemical research.

Diversity-Oriented Total Synthesis of Waltherione Alkaloids

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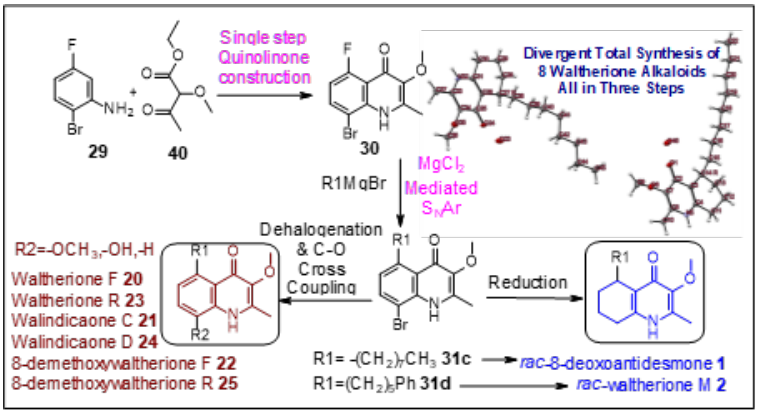
We report the first total syntheses of rac-8-deoxoantidesmone and rac-waltherione M, key members of the unexplored 5,6,7,8-tetrahydro-1H-quinolin-4-one waltherione (THQW) alkaloid family[1,2]. The synthesis follows a diversity-oriented, common-intermediate strategy built around 8-bromo-5-fluoro-3-methoxy-2-methyl-1H-quinolin-4-one, which is prepared in a single step from 2-bromo-5-fluoroaniline and ethyl 2-methoxy-3-oxobutanoate. Structural diversification is achieved through an $MgCl_2$-mediated SNAr reaction with alkyl Grignard reagents to install C-5 alkyl substituents, furnishing 8-bromo-3-methoxy-2-methyl-5-alkyl-1H-quinolin-4-ones. These intermediates enable access to *rac*-8-deoxoantidesmone, *rac*-waltherione M, waltherione R, 8-demethoxywaltherione F, 8-demethoxywaltherione R, walindicaone C, and walindicaone D, and support a concise three-step synthesis of waltherione F[3,4]. Overall, this modular route provides rapid entry to THQW natural products and a platform for generating molecular diversity to support future biological studies.



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Anupam Bandyopadhyay pursued his Ph.D. in peptide foldamers at IISER Pune in 2013. To gain greater proficiency in chemical biology and high-throughput peptide library screening, he joined Boston College as a postdoctoral fellow in 2013 and later joined MIT as a postdoctoral associate in 2016. He returned to India in 2018 for a short bridging postdoc position at NCBS-TIFR, and since January 2019, he has been an Assistant Professor at the Indian Institute of Technology, Ropar, India. His Lab is fascinated by developing mild and sustainable chemistry for peptide modification, thereby applying for cancer therapeutics, boronopeptide for antibacterial agents, and developing boronic acid-mediated biorthogonal tools for disease-related biomolecule recognition.

Selected Publications:

1. Chatterjee, S., Chowdhury, A., Verma, N., Basa, S., Tripathi, N. M., Gour, V., Rai, V.*, **Bandyopadhyay, A.*** *Nature Commun*, **2026**, *17*, 454.
2. Tripathi, N. M., Das, B. K., Chowdhury, A., Gour, V., **Bandyopadhyay, A.*** *JACS Au,* **2025***, 5,* 802-810.
3. Das, B. K., Chowdhury, A., Chatterjee, S., Tripathi, N. M., Pati, B., Dutta, S., and **Bandyopadhyay, A.*** *Chem. Sci.,* **2024**, *15,*13688-13698.
4. Chatterjee, S., and A. **Bandyopadhyay, A.*** *Org. Lett.* **2023**, *25*, 2223–2227.
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Awards and Honors:

- Thieme Chemistry Journals Awardee, 01/2026
- Member of Editorial Advisory Board, 'Journal of Peptide Science', Wiley - 09/2025
- Regional Editor of Protein and Peptide Letters, & Current Protein and Peptide Science, Bentham Science. 2025
- Young Scientist Award by the Indian Peptide Society, 02/2025.
- Ramanujan Fellowship, DST-SERB 08/2018.

Sequential Boronic Acid Bioconjugation enables Site-selective Modification of Peptides and Potential Bacterial Imaging

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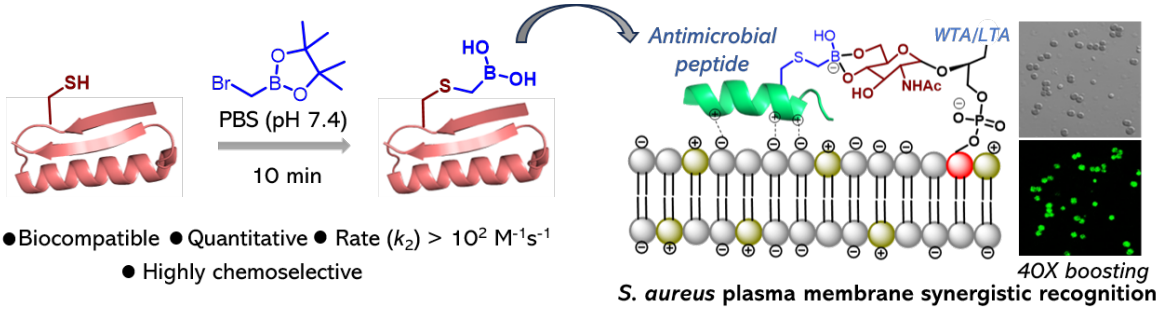
Chemical modifications of peptides and proteins have emerged as indispensable tools in chemical biology to address numerous limitations in peptide and protein research, especially for the functional modulation of proteins and the development of peptide drugs[1]. In this context, peptide and protein engineering with boronic acid (BA) has manifested attractive applications in drug discovery, supramolecular chemistry, and chemical biology[2-5], recently. Motivated by this notion, we develop an efficient methodology for boron incorporation into peptides and proteins via chemoselective bioconjugation of cysteine residues under catalyst-, additive-, and metal-free conditions. By harnessing the optimal S_N2 displacement profile of bromomethyl boronate, we establish a methodology that enables the selective incorporation of methylboronic acid into various peptides, including bioactive constructs, as well as proteins with rapid kinetics (>10^2 $M^{-1}s^{-1}$) and excellent conversions at physiological pH.[6] The method also leverages rapid access to bivalent boron conjugates, which, when applied to a clinically used antimicrobial peptide UBI (29-41), augment its binding efficacy (40-fold) via dynamic covalent conjugation of the diols on bacterial surface glycans, mainly wall teichoic acid (and thus lipoteichoic acid)[6]. Notably, bis-boronated UBI exhibits selective staining of *S. aureus* over gram-negative bacteria and mammalian cells, alongside a 14-fold increase in serum half-life compared to native UBI.



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6. *Nature Commun.*, **2026**, *17*, 454.

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Dr. Vinod Chaudhari is a drug discovery scientist with over 20 years of research experience spanning academia and the pharmaceutical industry. He earned his Ph.D. in Organic Chemistry from the University of Pune and completed his postdoctoral research at CNRS/Université Joseph Fourier, Grenoble, France. At CSIR-IMTECH, his research focuses on the discovery of novel small-molecule therapeutics for antimicrobial resistance (AMR), infectious diseases, tuberculosis, and viral infections. His laboratory integrates medicinal chemistry, chemical biology, and translational research to design, synthesize, and optimize lead molecules with the potential to progress toward clinical development. His research interests also include PROTACs, ADCs, total synthesis, development of novel synthetic methodologies, and late-stage molecular modification. Dr. Chaudhari is an inventor/co-inventor of >60 patents, several of which have been granted internationally, including in the US, and he has published numerous research articles in leading international journals. Prior to joining CSIR-IMTECH, he held research positions at Lupin ltd, Aurigene Discovery, and Zydus Research Centre, where he contributed to multidisciplinary drug discovery programs that advanced multiple preclinical and clinical candidates. His contributions have helped progress three novel compounds into clinical development.

Discovery of MBLs Inhibitors to Tackle Multidrug Resistant Bacterial Infections

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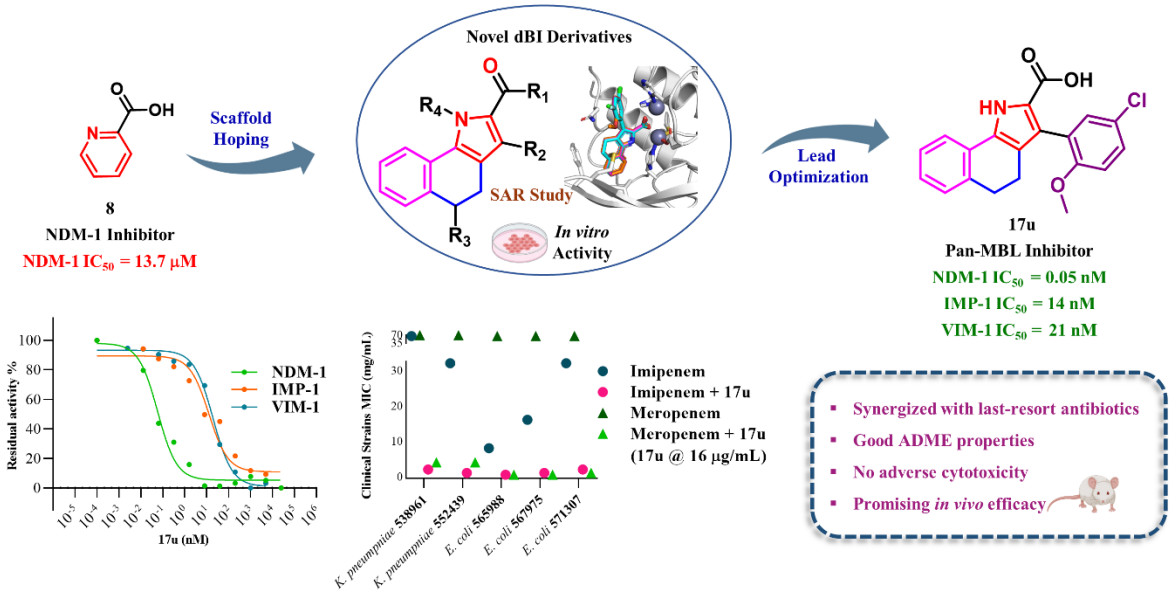
The discovery of metallo-β-lactamase (MBL) inhibitors is crucial in the fight against bacterial infections following the emergence and rapid spread of New Delhi metallo-β-lactamase-1 (NDM-1), as well as clinically relevant Verona integrin-encoded metallo-β-lactamase (VIM), and Imipenemase (IMP). The situation is alarming as there are insufficient antibiotics in the pipeline to combat critical multidrug-resistant infections. We have discovered novel dihydrobenzo-indole (dBI) derivatives as a new class of potent metallo-β-lactamase inhibitors (MBLIs) by applying scaffold hopping, conformation constrained, and substituent-decorating strategies. Among them, compound VC-IMT-120 exhibited the best inhibitory activity against MBLs with acceptable physicochemical, ADME and pharmacokinetics properties. Lead compound IMT-VC-120 exhibited remarkable enhancement of carbapenems' effectiveness against a range of MBL-producing clinical strains. This efficacy extended to *in vivo* settings when combined with the imipenem antibiotic, significantly reducing the bacterial load in a thigh infection model. Consequently, it qualifies as a prime candidate for further development as an MBLI.



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3. P. Dhiman, A. Patwa, A. B. Narayanan, A. Saini, A. Pundir, M. Dhole and V. D. Chaudhari; *European Journal of Medicinal Chemistry, 2026, 301, 118220*
4. P. Dhiman, S. Das, A. B. Narayanan, A. M. Kanhed, K. G. Thakur and V. D. Chaudhari; *Journal of Medicinal Chemistry, 2026, In press.*
5. Substituted Tricyclic Heterocyclic Compounds as Metallo-□-Lactamase Inhibitors. *Chaudhari, et. al*; *IN2021/11024755, WO2022/254464A1, US2024/0279176, JP2024/520130A, BR112023/ 025328A2, EP4347595A1.*

Syngenta Session

Chairpersons: T. Punniyamurthy and Rajib Goswami

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Masahiro Terada was born in Tokyo in 1964. He graduated from Department of Applied Chemistry, Tokyo Institute of Technology in 1986 and completed his Ph.D. degree in 1993 from Tokyo Institute of Technology. During his Ph.D. study, he was appointed as an assistant professor at Tokyo Institute of Technology (1989-2001). He worked as a postdoctoral fellow at Harvard University in 1999-2000 and moved to Tohoku University as an associate professor in 2001. He has been a Professor of Chemistry at the Graduate School of Science, Tohoku University since 2006 and has been appointed to the Dean of Graduate School of Science and Faculty of Science from April 2017 to March 2023. He is the recipient of: The Chemical Society of Japan Award for Creative Work (2008), Mukaiyama Award (2010), Daiichi-Sankyo Award for Medicinal Organic Chemistry (2011), The Nagoya Silver Medal (2012), Molecular Chirality Award 2015 (2015), and Synthetic Organic Chemistry Award, Japan (2017), Science and Technology, Research Category, the Commendation for Science and Technology by the MEXT Japan (2024). His research interests are the development of useful synthetic methodologies based on the design of novel chiral Brønsted acid and base catalysts as well as the utilization of transition metal catalysts.

Selected Recent Publications:

1. DFT Calculation-Assisted Virtual Screening to Refine Chiral Phosphoric Acid-Catalyzed Allylboration Enabling Organocatalytic Synthesis of Tetrafibricin C21–C40 Fragment" Umemiya, S.; Hirata, T.; Terada, M. *JACS Au* **2026**, *6*, 2827–2836.
2. Electrochemical and photocatalytic generation of *cis*-olefin-bridged carbodication for umpolung [4+1] cycloaddition, Matsuyama, H.; Yokoyama, K.; Sato, T.; Terada, M.; Jin, T. *Nat. Commun*. **2026**, *17*, Article number: 2270.
3. Nanoporous Gold Catalyzed Borylation of C(sp^3)−O Bonds in Dialkyl Ethers and Mechanistic Elucidation, Zhao, Y.; Lacroix, C.; Sato, T.; Terada, M.; Jin, T, *ACS Catal.* **2025**, 15, 13118–13126.
4. Scalable Total Synthesis of Bastimolide A Enabled by Asymmetric Allylborations Catalyzed by Chiral Brønsted Acids, Umemiya, S.; Shinagawa, N.; Fujimoto, A.; Terada, M. *JACS Au,* **2025**, *5,* 3052–3057.
5. Chiral Brønsted Acid-catalysed Enantioselective Allylboration of Sterically Hindered Aldehydes Enabled by Multiple Hydrogen Bonding Interactions, Umemiya, S.; Osaka, S.; Shinagawa, N.; Hirata, T.; Terada, M. *Chem. Sci.* **2025**, *16*, 3865-3871.

Enantioselective Catalysis by Higher Order Organosuperbase

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The development of new molecular catalysts is one of the keys for paving the way to novel transformations. In the field of chiral Brønsted base catalysis, which is one of the most fundamental and environmentally benign methodologies for the direct synthesis of enantioenriched compounds, a long-standing issue is the expansion of the scope of pronucleophiles that are applicable to the enantioselective reactions. Recently, chiral uncharged organobases with higher basicity than tertiary amines, such as chiral guanidines, P1-phosphazenes, and cyclopentenimines, have also emerged as efficient chiral Brønsted base catalysts. However, the insufficient basicity of these chiral organobases limits the scope of pronucleophiles to highly acidic compounds, such as β-dicarbonyl compounds and nitroalkanes, which restricts the viable enantioselective molecular transformations that are available under chiral Brønsted base catalysis. Therefore, the development of a new generation of chiral Brønsted base catalysts that can overcome the intrinsic limitations of pronucleophiles is highly desirable. In this context, our research program has been focusing on the development of much stronger chiral organobases, namely, chiral higher order organosuperbases. In this presentation, three types of chiral higher order organosuperbase catalysts are introduced as shown in Figure 1. 1) chiral bis(guanidino)iminophosphorane **1** possesses a C_2 symmetrical structure,[1] 2) chiral cooperative binary base catalyst **2** consists of two different organobase functionalities,[2] and 3) chiral ureates **3** having a cooperative function of ureate and phenoxide Schiff base units.[3,4]

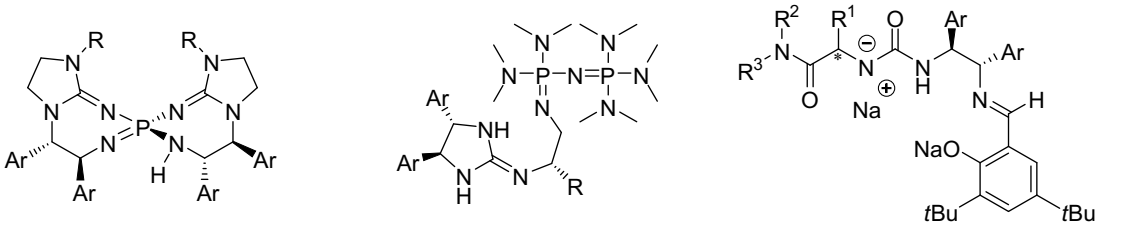

Figure 1. Chiral higher order organosuperbase catalysts developed.

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Donor-Acceptor Cyclopropanes: Magical Rings of Organic Chemistry

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Due to the high strain energy, three-membered rings tend to exhibit high reactivity. However, cyclopropane itself is kinetically quite inert. The introduction of a donor substituent facilitates reactions of cyclopropane with various electrophiles, while the introduction of an acceptor group accelerates the opening of the small ring by nucleophilic reagents. If both a donor and an acceptor are bonded to a single carbon atom of cyclopropane, the substrate exhibits low reactivity. However, if substituents with opposite electron demands are bound to vicinal carbon atoms, then such molecules (they are called donor-acceptor, DA, cyclopropanes) "acquire magical reactivity". They react with nucleophiles, electrophiles, and radicals, affording either acyclic or new cyclic molecules. Furthermore, they form products of formal (m+n)-cycloaddition in reactions with dipolarophiles, 1,3-dipoles, 1,3-dienes and other unsaturated substrates. The cycloadducts obtained can contain not only three, but also two, four, or five non-hydrogen atoms of the starting cyclopropane. Sometimes the corresponding reactions proceed without additional activation, but more often, the target transformations are achieved with high selectivity using various “magical objects,” most often Lewis or Broensted acids, although other activators can also be used.

This lecture will present the most interesting results of our group's study of the transformations of DA cyclopropanes.

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Mahiuddin Baidya studied chemistry at the Indian Institute of Technology Kanpur (IIT Kanpur), India. He obtained his Ph.D. in 2009 from Ludwig-Maximilians-Universität München (LMU Munich), Germany, under the supervision of Prof. Herbert Mayr. He subsequently carried out postdoctoral research with Prof. Hisashi Yamamoto at the University of Chicago, USA, and at the Molecular Catalyst Research Center, Chubu University, Japan, supported by a JSPS Fellowship. In 2014, he joined the Department of Chemistry at the Indian Institute of Technology Madras (IIT Madras) as an Assistant Professor and was promoted to Professor in 2022.

His research focuses on the development of new concepts in transition-metal catalysis, organocatalysis, and visible-light photocatalysis for organic synthesis, as well as the synthesis of bioactive natural products and drug candidates. As an independent researcher at IIT Madras, he has published more than 100 research articles in leading peer-reviewed international journals.

He is the recipient of several prestigious awards, including the INSA Young Scientist Medal (2017), NASI Young Scientist Platinum Jubilee Award (2017), IIT Madras Institute Research and Development Award (IRDA, 2018), Dr. A. V. Rama Rao (AVRA) Young Scientist Award (2021), Merck Young Scientist Award (2021), Chirantan Rasayan Sanstha (CRS) Bronze Medal (2023), and the CRSI Bronze Medal (2025). He became an Associate of the Indian Academy of Sciences (IASc) in 2017 and recently received the Best Teacher Award (Chemistry) from IIT Madras. He has served as a member of the Early Career Advisory Board of *ACS Catalysis* and currently serves on the International Advisory Board of *Chemistry – An Asian Journal*.

Transition Metal Catalysis towards C–H and C–C Bond Activation: From Biaryl Frameworks to Biorelevant Scaffolds

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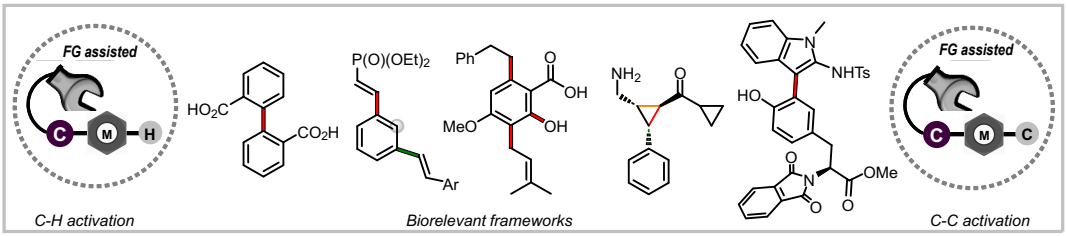
Sustainable synthetic strategies leveraging simple feedstocks to generate molecular complexity are central in contemporary organic chemistry. In this context, transition metal-catalyzed regio- and stereoselective functionalization of otherwise inert C–H and C–C bonds shows great promise. We have investigated the use of native functional groups such as carboxylic acids, amides, free amines, and alcohols as versatile directing groups for various position-selective reactions, including olefination, annulation, and dimerization, utilizing flexible ruthenium and cobalt catalysts. Additionally, we have developed methods for C–H ruthenation-enabled decarboxylative hydroarylation of alkenes, facilitating formal *meta*- and *para*-functionalization, as well as one-pot deformylative arene functionalization with carbenes, which yields unsymmetrical biaryldiols and heterobiaryl amino alcohols. Recently, we have also advanced a Wacker-type reaction using a nucleopalladation strategy that enables diverse functionalization of unactivated olefins. Notably, these strategies have been explored in enantioselective fashion, particularly under sustainable cobalt catalysis, and have broad applications in the synthesis and late-stage functionalization of bioactive molecules. This presentation will provide an overview of recent advancements from our laboratory in transition-metal-catalyzed activation of C–H and C–C bonds in arenes and olefins, and their enantioselective variants.



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Dr. Guru Brahamam Ramani received his M.Sc. and Ph.D. (2013) from the School of Chemistry, University of Hyderabad, under the supervision of Prof. Mariappan Periasamy. He pursued postdoctoral studies (September 2013 − January 2017) in the field of asymmetric organocatalysis at Prof. Kwunmin Chen's research group, Dept. of Chemistry, National Taiwan Normal University, Taipei, Taiwan. Then he moved to Prof. Berit Olofsson's research group to work on the hypervalent iodine(III) reagents as a Wenner Gren postdoctoral fellow (March 2017 – February 2019) at the Dept. of Organic Chemistry, Stockholm University, Stockholm, Sweden. He spent a short time at Syngene International Ltd., Bangalore, in 2019. He joined as an assistant professor at the Dept. of chemistry, IIT Jammu in October 2019 and has been an associate professor since February 2026. His research interests include asymmetric catalysis, carbene and nitrene transfer reactions, alkyne/allene chemistry, hypervalent iodine chemistry, and organoboranes.

Synthetic Versatility of Alkynyl Hydrazone and Diazo Compounds

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Hydrazone and diazo compounds serve as versatile precursors for a wide range of synthetic transformations in modern organic synthesis. The reactivity of alkynyl hydrazone carboxylates and their diazo analogues is investigated towards obtaining diverse scaffolds.[1] The decomposition of unprotected alkynyl hydrazones has provided allenoates, dihaloallenoates, dihaloenoates, bromoenyne, and tricyclic azepine scaffolds under metal-free conditions.[2] While, decomposition of alkynyl diazo compounds on transition metals facilitated the alkynyl carbene insertion into alkenes, Si–H , N–H, O–H bonds, and allyl/propargyl sulphides where the alkyne group is intact.[1,3] However, a simultaneous functionalization of alkyne and diazo groups offers a unique synthetic platform that could facilitate molecular scaffolds with increased complexity. In this context, a dual functionalization of alkynyl diazoacetates is addressed through alkynyl carbene insertion into functionalized anilines, followed by [2+2] cycloaddition to obtain indoline-fused cyclobutanes.[4] In contrast, subjecting them to thermal conditions under catalyst-free conditions has delivered a divergent benzo[*b*]azepine scaffold.[5] Furthermore, a [4+2] cycloaddition reaction of furan-tethered propargylamines has furnished medicinally important phenanthridine core.[6] Alternatively, alkynyl diazoacetates under metal-free photochemical conditions has delivered π-enriched conjugated dienynals and dienynones with excellent stereoselectivity.[7] Overall, the research theme highlights the synthetic versatility of alkynyl hydrazones and diazoacetates and provides efficient access to a diverse range of densely functionalized scaffolds.

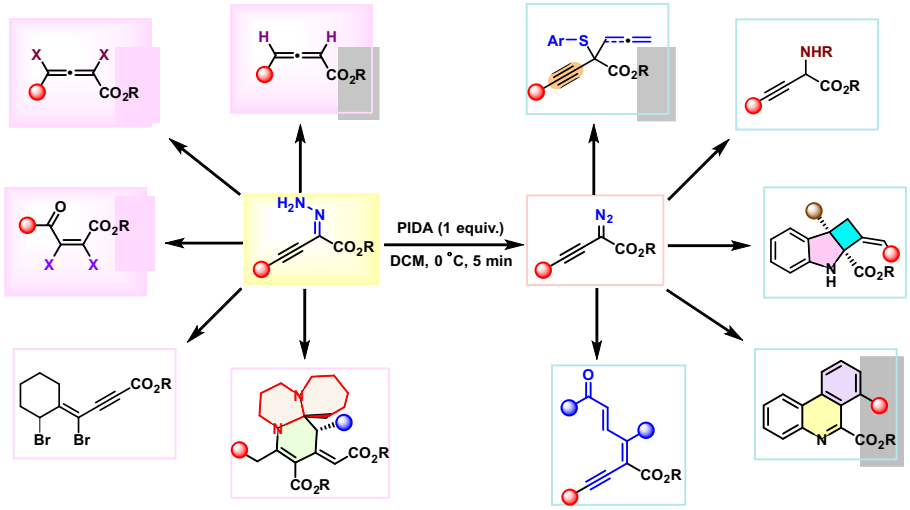

Figure 1: Versatile Reactivity of Alkynyl Hydrazone and Diazo Compounds

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Sun Pharma Session

Chairperson: Namrata Rastogi

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Professor

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Yoshiharu Iwabuchi received his Ph.D. in pharmaceutical sciences from Tohoku University in 1991 under the supervision of Professors Seiichi Takano and Kunio Ogasawara. He then conducted postdoctoral research with Professor K. C. Nicolaou at The Scripps Research Institute. After working as a researcher at the Protein Engineering Research Institute and the Biomolecular Engineering Research Institute, he was appointed Associate Professor at Nagasaki University in 1997, where he worked with Professor Susumi Hatakeyama. In 2002, he returned to Tohoku University as Professor at the Graduate School of Pharmaceutical Sciences. His research focuses on the development of organocatalysts and synthetic methodologies, the total synthesis of biologically active natural products, and the skeletal editing of terpenoids to explore natural-product-like chemical space. His honors include the Eisai Award in Synthetic Organic Chemistry, Japan, and the Pharmaceutical Society of Japan Award for Divisional Scientific Promotion (2012).

Diversity-Oriented Terpenoid Synthesis through Peripheral Decoration and Skeletal Remodeling

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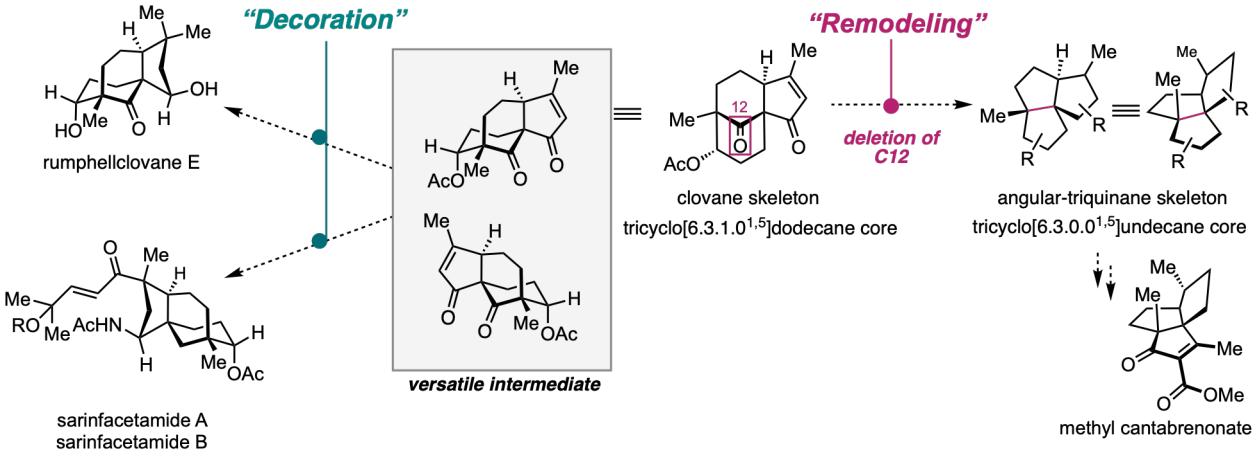
Naturally occurring terpenoids are valuable sources of bioactive small molecules and occupy structurally complex, three-dimensional chemical space.[1] To access their diversity efficiently, we developed a strategy in which a single polycyclic intermediate serves as a platform for both peripheral decoration and skeletal remodeling. We selected clovane-type terpenoids, characterized by a tricyclo[6.3.1.0^{1},^{5}]dodecane core, and angular-triquinane terpenoids, characterized by a tricyclo[6.3.0.0^{1},^{5}]undecane core, as structurally related target families. Comparison of these frameworks suggested that the angular-triquinane skeleton can be regarded as the formal one-carbon-deleted counterpart of the clovane skeleton.

Accordingly, a suitably functionalized clovane-type intermediate was synthesized in five steps from either enantiomer of dihydrocarvone, with a domino Michael-aldol reaction as the key step.[2] Peripheral modification enabled the enantiocontrolled total syntheses of rumphellclovane E and sarinfacetamides A and B.[3] In a complementary remodeling pathway, activation of a β-hydroxy oxime induced a Beckmann fragmentationsemipinacol rearrangement cascade to furnish a diquinane aldehyde. Subsequent intramolecular alkylation and decyanation effected ring closure with formal deletion of the bridging methylene, providing an angulartriquinane scaffold that was elaborated into four natural products.[4]



Scheme 1: Peripheral decoration and skeletal remodeling of a common clovane-type intermediate.

These results demonstrate that a terpenoid scaffold need not be treated as an immutable synthetic endpoint, but can instead serve as an editable molecular platform. The integration of peripheral decoration with atomdeleting skeletal remodeling provides unified access to distinct terpenoid families and expands the naturalproduct-like chemical space accessible through synthesis.

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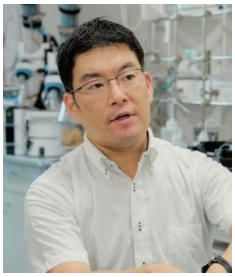

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Shinichiro Fuse received his B. Eng. degree in 2000 from the Tokyo Institute of Technology. He obtained his Ph.D. in 2005 from the Graduate School of Science and Engineering, Tokyo Institute of Technology, under the supervision of Prof. Takashi Takahashi and Prof. Takayuki Doi. He then worked as a researcher at ChemGenesis Incorporated (2005–2006) before moving to Harvard University, where he carried out postdoctoral research with Prof. Daniel E. Kahne (2006–2008). In 2008, he joined the Graduate School of Science and Engineering, Tokyo Institute of Technology, as an Assistant Professor. He was promoted to Associate Professor in 2015 at the Chemical Resources Laboratory. Since 2019, he has been a Professor at the Graduate School of Pharmaceutical Sciences, Nagoya University. His research interests include synthetic organic chemistry, flow chemistry, and peptide chemistry.

Selected Awards :

2025 SSOCJ Tosoh Award for Environment and Energy 2025

2021 The Award of Ohsumi Life Science Research Society for Young Scientist

2017 Asian Core Program/Advance Research Network Lectureship Award

2017 Tokyo Tech Challenging Research Award

2016 Incentive Award in Synthetic Organic Chemistry, Japan 2010 Tokyo Tech Young Investigator Engineering Award.

2008 (Nissan Chemical Industries, LTD.) Award in Synthetic Organic Chemistry, Japan 2006 Young Scientist's Research Award in Natural Product Chemistry

Innovations in Peptide Synthesis Driven by Microflow Synthesis Technology

Shinichiro Fuse

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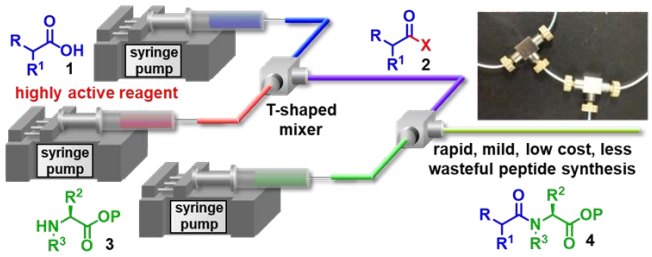
Peptides have become increasingly important as drugs and drug candidates. However, the conventional chemical peptide synthesis usually requires the use of an excess amount of expensive coupling agents and additives, making the process both expensive and wasteful. We have demonstrated microflow peptide synthesis using less wasteful, inexpensive, and highly active reagents.[1-7] By leveraging microflow technology, side reactions caused by highly reactive intermediates were suppressed. Our synthetic approach is based on the rapid and strong activation of carboxylic acid **1** with the highly active reagent. Undesired reactions of highly electrophilic **2** were suppressed by precise control of the residence time of **2** and reaction temperature enabled by the microflow technologies. The electrophile **2** was reacted with nucleophile **3,** affording the desired peptide **4**. This approach was useful not only for step-by-step peptide chain elongation[1,2,4] but also for macrolactamization[5,7] and one-flow multicomponent coupling.[3,6,7] Microflow technologies not only enabled the development of less wasteful and low-cost synthetic processes for peptides but also gave us valuable insights into rapid reactions that can not be easily analyzed by conventional batch techniques.



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Dr. M. Bakthadoss received his M.Sc. degree from the University of Madras, Chennai, and his Ph.D. degree from the University of Hyderabad, under the guidance of Prof. Deevi Basavaiah. He carried out postdoctoral research at the University of Texas at San Antonio, USA, from 2002 to 2005. He started his independent research career in the Department of Organic Chemistry, University of Madras, as an Assistant Professor. In 2012, he moved to Pondicherry University (A Central University) as an Associate Professor, and he was elevated to Professor (2015) in the Department of Chemistry, Pondicherry University. He currently serves as Head of the Department of Chemistry at Pondicherry University.

His research interests include stereoselective organic synthesis, cycloaddition reactions, the synthesis of biologically active molecules, C–H activation, domino/cascade reactions, and asymmetric synthesis. He has successfully supervised 14 PhDs and 10 M.Phil. students, and over 80 M.Sc. students have completed their research projects under his guidance. He has published more than 100 papers in international scientific journals. He has completed 9 independent major research projects as Principal Investigator from various funding agencies such as DST, ANRF, CSIR, and UGC.

In recognition of his outstanding scientific contributions, Dr. M. Bakthadoss was awarded the DST Young Scientist Grant Award in 2006. He was elected as a Fellow of the Academy of Sciences, Chennai (FASCh) in 2021 and received the Bronze Medal from the Chemical Research Society of India (CRSI) in 2022. In 2026, he was elected as a Fellow of the Royal Society of Chemistry (FRSC). He also serves as an Editorial Board Member of Nature Scientific Reports.

Palladium-Catalyzed *meta*-C–H Functionalization of Aromatics

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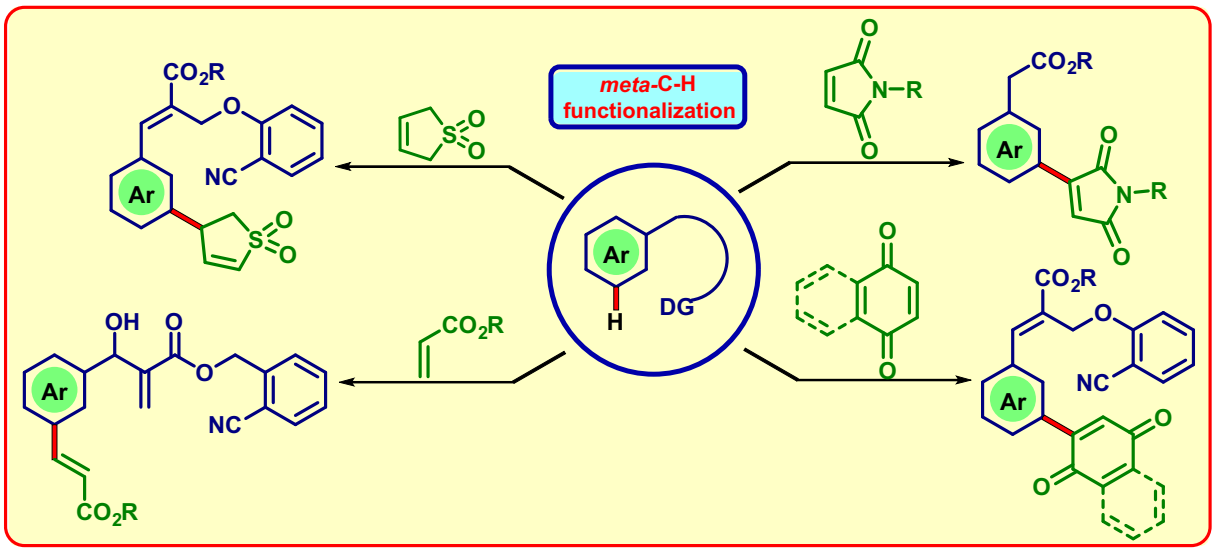
Metal-catalysed, directing-group-assisted C–H activation has emerged as a powerful strategy for the selective functionalization of inert C–H bonds, enabling the rapid synthesis of structurally diverse and pharmaceutically relevant molecules.[1,2] Towards this goal, a novel nitrile-directed meta-C–H functionalization of α-substituted cinnamates was developed by employing naphthoquinones, benzoquinones, maleimides, and sulfolene as new coupling partners, thereby significantly expanding the scope of distal C–H functionalization.[3] The presentation will also highlight the first nitrile-directed meta-C–H functionalization of Baylis–Hillman adducts, providing an efficient strategy for the selective diversification of these synthetically versatile scaffolds.[4] In addition, palladium-catalysed direct meta-C–H functionalization of aryl acetic esters will also be highlighted as a streamlined and atom-economical approach to distal C–H activation.[5]



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Panacea Biotech Session

Chairperson: S. Srivatsan

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Dr Daniel Priebbenow completed his PhD in 2011 on the topic of Palladium-Catalyzed Domino Reactions at Deakin University in Geelong, Australia under the supervision of A/Prof Fred Pfeffer (Deakin University) and A/Prof Scott Stewart (University of Western Australia). Dan then spent two years as an Alexander von Humboldt Postdoctoral Fellow at RWTH Aachen University in Aachen, Germany with Prof. Carsten Bolm. In 2014, Dan returned to Melbourne, Australia where he spent several years as a Research Fellow within the Australian Translational Medicinal Chemistry Facility (ATMCF) at Monash University's Institute of Pharmaceutical Sciences.

In 2020, Dan began his independent career as an ARC DECRA Fellow at the University of Melbourne before returning to the Monash Institute of Pharmaceutical Sciences in 2022, where he is currently a Senior Lecturer in Chemistry. Dan's contributions have been recognised through recent awards including the Athel Beckwith Medal (2022) and Organometallic Chemistry Award (2025) from the Royal Australian Chemical Institute. The Priebbenow Group's current research focuses on fundamental reaction discovery employing transition-metal catalysis and synthetic photochemistry, through to applications in medicinal chemistry and chemical biology, with an emphasis on developing novel catalytic systems for the synthesis of functional small molecules.

Advances in C–H Functionalisation: New Catalytic Strategies for Chemical Synthesis

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The site selective C-H functionalisation of arenes, alkenes and alkanes via transition-metal catalysis is an increasingly useful strategy in chemical synthesis with wide ranging applications across natural product synthesis, material sciences, and drug discovery.[1] Within this field, the use of structurally modified cyclopentadienyl ligands in Group-9 metal complexes has recently been explored as a means to influence both the reactivity and selectivity of C-H functionalisation processes. For example, incorporation of electron-withdrawing substituents alters the electronic nature of the metal complex which can lead to accelerated catalytic activity, while the inclusion of bulky substituents can influence both chemo- and regio-selectivity.[2]

The outcomes of our recent studies into the impact of electronic and steric variations within cyclopentadienyl ligands on catalytic activity in Group-9 metal catalysed C-H functionalisation reactions will be discussed. This includes the discovery of Group-9 metal catalysed site selective C(sp^3)-C bond forming processes in addition to new catalytic strategies for the amination of C(sp^3)-H bonds via both inner- and outer-sphere nitrene transfer mechanisms.[4]

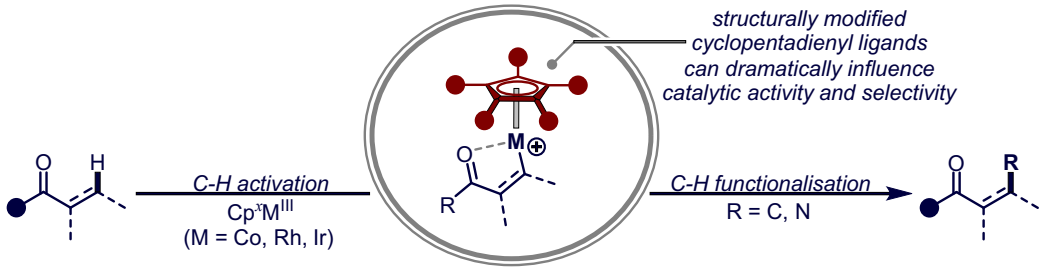

Figure 1. Structurally modified cyclopentadienyl ligands in Group-9 metal catalysed C-H functionalisation can enhance catalytic activity and selectivity.

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Masanori Shigeno is a Professor at Tohoku University. He received his B.Sc. (2005) and Ph.D. (2009) degrees from Kyoto University under the supervision of Professor Masahiro Murakami. In 2009, he joined the group of Professor Masahiko Yamaguchi at Tohoku University as an Assistant Professor. In 2012, he worked with Professor Ivan Huc at the Université de Bordeaux as a Visiting Assistant Professor for two months. He was promoted to Lecturer in the group of Professor Yoshinori Kondo in 2016 and then to Associate Professor in 2019. Since 2026, he has been Professor at Tohoku University. He also served as a PRESTO researcher of the Japan Science and Technology Agency (JST) from 2022 to 2026.

His research interests include the development of new organic transformations and functional organic materials with unique properties.

Reactive Brønsted Base System for Direct Molecular Transformation

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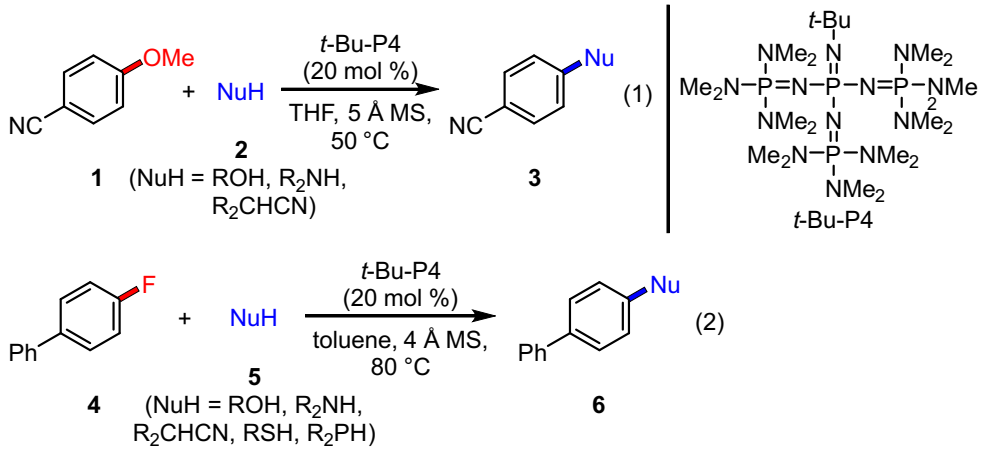
Direct molecular transformations of readily available C–H, C–O, and C–F bonds have attracted considerable attention from organic chemists because they offer potential advantages over reactions employing prefunctionalized bonds (e.g., C–halogen, C–B, and C–Si bonds) in terms of step and atom economy. Moreover, direct transformations of these robust chemical bonds are expected to expand retrosynthetic strategies and enable late-stage functionalization in organic synthesis. Our group has investigated such transformations using highly reactive Brønsted base systems. In particular, we developed *t*-Bu-P4-catalyzed C–OMe bond substitution reactions of methoxyarenes with alcohol, amine, and alkane nitrile nucleophiles (eq. 1).[1] Furthermore, we established C–F bond substitution reactions of both electron-deficient and electron-rich fluoroarenes with a variety of nucleophiles (eq. 2).[2] Notably, the latter transformations were found to proceed through a concerted nucleophilic substitution mechanism rather than the conventional two-step pathway involving a Meisenheimer intermediate. Details of these transformations will be presented.



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AVRA Session

Chairperson: Santanu Mukherjee

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Dr. Arindam Talukdar is a trained Medicinal Chemist with more than 20 years of research experience. He obtained his Master's degree in Pharmaceutical Chemistry from Panjab University Chandigarh and PhD degree in Chemistry from the National Chemical Laboratory (NCL), Pune. He was trained in the state-of-the-art carbohydrate synthesis and multi-step synthesis of natural products of biological importance. I played a key role in the stereoselective process design and development of an antiasthmatic drug candidate CMI-977 (Phase 2 Clinical trial) and it's an aza-analogue, which is now developed by Millennium Pharmaceuticals Inc. CA, USA. After completion of graduate study, Dr. Talukdar did two postdoctoral research at The Ohio State University and at Purdue University, USA in various aspect of medicinal chemistry. Thereafter, in 2010 I started working in the industry as a Senior Research Scientist at Albany Molecular Research Inc, Singapore, where along with OncoTherapy Science (OTS), Inc. Japan, he was one of the inventors to put a first in-class epigenetic target molecule. Dr. Talukdar joined CSIR-Indian Institute of Chemical Biology (IICB) in January 2013 and currently, his position is Scientist F. His research lab aims to answer fundamental questions at the interface of chemistry and biology to perform rational design, synthesis and validation of novel chemical entities to unravel the molecular mechanism and develop a potential treatment for human diseases. He has a network of collaborations within IICB and other research laboratories in India and internationally.

Organic Chemistry Beyond Synthesis: Engineering New Biological Functions through Molecular Design

Dr. Arindam Talukdar
CSIR-Indian Institute of Chemical Biology (IICB), Kolkata

Organic chemistry has traditionally contributed to drug discovery through the synthesis and optimization of bioactive molecules. Increasingly, however, its greatest impact lies in engineering new biological functions through rational molecular design, thereby enabling therapeutic mechanisms beyond conventional structure-activity relationship (SAR) optimization. This lecture will present three examples developed in my laboratory to illustrate how carefully orchestrated subtle chemical changes at specific molecular positions can transform the biological behaviour of small molecules and establish new therapeutic paradigms.

The first example demonstrates a unique chemical principle in endosomal Toll-like receptor 7 (TLR7) modulation, where a *single-point* structural modification converts an agonist into an antagonist while retaining the same molecular scaffold, establishing a functional agonist-antagonist switch for developing dual TLR7/TLR9 antagonists against autoimmune diseases. The second example describes a deconstruction–reconstruction strategy in which the clinically approved drug Bazedoxifene was transformed into a structurally distinct "bird-shaped" scaffold, creating a new class of broad-spectrum antiviral molecules with potent activity against multiple SARS-CoV-2 variants. Finally, the rational integration of two pharmacophores into a single molecular framework generated dual chimeric ASK1-PPARγ modulators, enabling simultaneous regulation of stress kinase signalling and metabolic homeostasis to treat metabolic dysfunction-associated steatotic liver disease. These studies demonstrate that subtle, strategically positioned chemical modifications can create fundamentally different biological functions.

Organic chemistry not merely as the science of making molecules, but as a discipline capable of reprogramming biological systems through molecular design.

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Education

2010-2014	PhD University of Regensburg, Germany Adviser: Prof. Burkhard Koenig
2008-2010	MSc Indian Institute of Technology Madras, India Thesis Adviser: Prof. S. Sankararaman
2004-2007	BSc Sri Krishnadevaraya University, Anantapur

Professional Experience

Since 2021	Assistant Professor Department of Organic Chemistry, IISc Bangalore
2018-2021	Marie-Curie Research Fellow University of Bristol, UK, Adviser: Prof. Varinder K. Aggarwal
2014-2018	Postdoctoral Research Associate EPFL, Switzerland, Adviser: Prof. Jerome Waser

Awards & Fellowships

2026	Dr. Rajagoplan Research Excellence Award from IISc
2025	INSA Young Associate
2025	Rising Stars in Organic Chemistry by Thieme
2025	Early Career Advisory Board Member of Science of Synthesis
2024	Thieme Chemistry Journals Award
2024	Editorial Advisory Board Member of Tetrahedron & Tetrahedron Letters
2023	IISc Award for Excellence in Teaching
2023	Infosys Young Investigator Award
2022	Early Career International Advisory Board of Helvetica Chimica Acta

The Carbene Face of [1.1.1]Propellane

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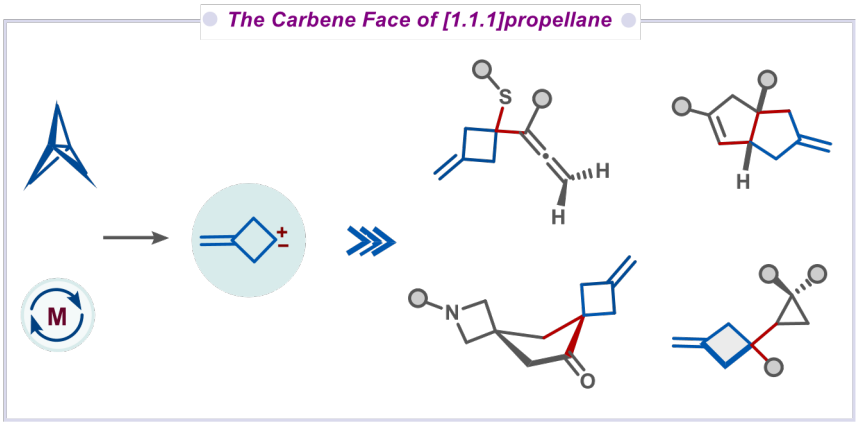
Carbene chemistry is a cornerstone of modern organic synthesis, underpinning transformations such as X–H insertions (X = C, Si, N, O, etc.), cyclopropanation, ylide formation, and 1,2-migration. Carbenes are typically generated from diazo compounds via metal catalysis or photolysis. By contrast, their generation through C–C bond activation presents unique opportunities for skeletal diversification but remains challenging due to the intrinsic inertness of C–C bonds and the lack of favorable metal-carbon interactions. Ring strain in small-ring systems has emerged as an effective strategy for overcoming these challenges and promoting C–C bond activation. In this lecture, I will present our use of the strain energy of [1.1.1]propellane to access carbene intermediates for applications including [2,3]-sigmatropic rearrangements,[1] skeletal editing of ketones,[2] dyotropic rearrangements,[3] and peripheral editing of cyclopropanes.[4]



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Dr. Gopal Rao Session

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Education

1984 B.S. The University of Tokyo, Graduate School of Science
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1992 Ph.D. The University of Tokyo, Graduate School of Science
Research adviser: Prof. Koichi Narasaka
1994-1996 Postdoct at Harvard University, Research adviser: Prof. E. J. Corey

Academic Background

1987-1998 Assistant Professor
(The University of Tokyo, Graduate School of Science)
1998-2006 Associate Professor
(Tokyo University of Science, Faculty of Engineering)
2006-2012 Professor (Tokyo University of Science, Faculty of Engineering)
2012-present Professor (Tohoku University, Graduate School of Science)

Award

1998 Incentive Award in Synthetic Organic Chemistry, Japan 1998
2008 SSOCJ Daiichi-Sankyo Award for Medicinal Organic Chemistry
2010 The Chemical Society of Japan Award for Creative Work for 2010
2011 JSPS 2011 Award for Excellence
2011 NOVARTIS Chemistry Lectureship Award
2011 Oppolzer Lecture (University of Geneva)
2012 Inoue Prize for Science
2021 The 21th Green and Sustainable Chemistry Award, Award by the Ministry of Education, Culture, Sports, Science and Technology
2022 The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Awards for Science and Technology, Research Category
2024 The Ichimura Prize in Science for Excellent Achievement
2025 Research Award of the Alexander Von Humboldt Foundation, Germany

Research interest: Organic synthesis. Development of new synthetic methods using organocatalysis. Synthesis of biologically active natural products.

Organocatalysis for the Efficient Synthesis of Biologically Active Molecules

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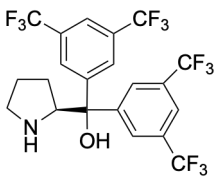
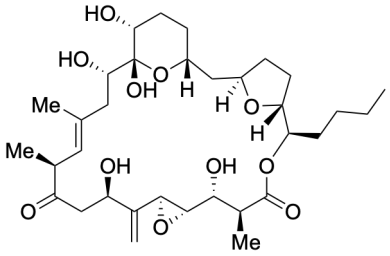
Organocatalysts are environmentally benign catalysts that have emerged as powerful tools in modern organic synthesis. Our group[1] and Jørgensen's group[2] independently discovered that diphenylprolinol silyl ethers serve as highly effective organocatalysts, operating via enamine and iminium ion activation modes. Furthermore, our group developed diarylprolinol catalysts, which enable efficient cross-aldol reactions between two different aldehydes with high stereocontrol.[3] These advances have significantly expanded the scope of asymmetric organocatalysis and its application to complex molecule synthesis.

Macrolides, particularly amphidinolides isolated from marine dinoflagellates, represent a class of structurally intricate natural products with remarkable cytotoxic activity. Amphidinolide N is one of the most potent members of this family (IC_{50} < 0.1 nM); however, its extremely low natural abundance, instability, and the discontinuation of production by the source organism have hindered detailed structural and biological studies. The structure was initially proposed by Kobayashi,[4] and later revised by Tsuda in 2021.[5]

The highly functionalized structure of amphidinolide N, containing 13 stereocenters and multiple sensitive functionalities, poses a formidable challenge for total synthesis. Although several partial syntheses have been reported, only limited success has been achieved in constructing the complete macrocyclic framework. Our group previously accomplished the total synthesis of a 7,10-epimer based on Kobayashi's originally proposed structure, utilizing key organocatalytic transformations.

In this work, building on our expertise in organocatalysis and lessons from previous studies, we report the total synthesis of amphidinolide N based on Tsuda's revised structure. This study highlights the power of organocatalytic strategies in tackling structurally complex natural products and contributes to the definitive structural elucidation of this elusive molecule.





Amphidinolide N proposed by Tsuda

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Prof. Ghorai obtained his B. Sc. (Hons.) from University of Calcutta (1989), M.Sc. from IIT Kharagpur (1991), and Ph.D. from NCL, Pune (1998) with Prof. Ganesh Pandey. He worked as a postdoctoral research associate with Prof. Michael Schmittel at University of Wuerzburg Germany (1998–2000), as Alexander von Humboldt fellow at University of Siegen (2000–2001), and as postdoctoral fellow with Prof. JoAnne Stubbe at MIT, USA (2001–2002). He joined the Department of Chemistry, IIT Kanpur as an assistant professor (2002). He became an associate professor in 2007, full professor in 2012 and HAG-professor in 2019. He was USV Chair Professor and N. C. Nigam Chair Professor at IIT Kanpur. He is a Fellow of National Academy of Sciences (FNASc.), Fellow of Academy of Sciences (FASc) and Fellow of West Bengal Academy of Science and Technology (WAST). He received Dr. S. Rajappa Award and Agharkar Birth Centenary Gold Medal. His research interests are S_N2-type ring opening transformation of small ring aza-hetero- and carbacycles, asymmetric synthesis involving Memory of Chirality, Chiral Pool, Dynamic Kinetic Resolution (DKR), dianion chemistry, domino reaction and material chemistry.

Asymmetric Synthesis of Bioactive Compounds *via* ROC/DROC/DKR

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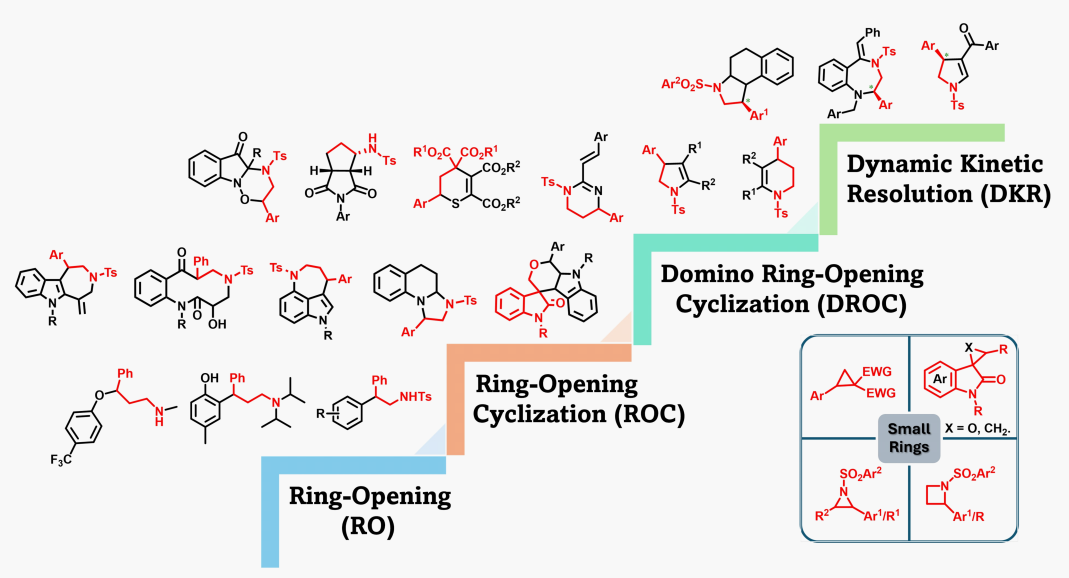
Dynamic kinetic resolution (DKR) offers a powerful platform to convert racemic precursors into highly enantioenriched products with theoretical yields up to 100% and 100% ee, making it an ideal strategy for the asymmetric synthesis of complex bioactive heterocycles. Lewis acid catalyzed S_N2-type ring-opening reactions of activated aziridines and azetidines, followed by domino ring-opening cyclization (DROC) or ring-opening cyclization (ROC) sequences, to access diverse array of nonracemic N/O-heterocyclic scaffolds of medicinal relevance, including benzodiazepines, hexahydroimidazoquinolines, tetrahydroazepinoindoles, and related frameworks have been developed and demonstrated by us from enantiopure starting aziridines/azetidines and from racemic substrates employing DKR processes. These protocols can be seamlessly integrated with downstream annulation and oxidation cascades to deliver higher-order architectures such as azepino[4,5-*b*]indoles and benzo[*f*]diazecine-2,8(1*H*,3*H*)diones, those ten-membered diazecine products exhibit promising anti-cancer activity against cervical (HeLa) and brain (U87MG) cancer cell lines. The presentation will highlight the evolution of this DKR-centric strategy from mechanistic understanding and stereocontrol to gram-scale synthesis and biological evaluation, emphasizing its potential for the streamlined construction of pharmaceutically important heterocycles for human health and development.



Scheme 1. Recent advances in small-ring Aza-/Oxa-Heterocycles via ROC/DROC/DKR.

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Cipla Session

Chairpersons: S. S. V. Ramasastry and Alakesh Bisai

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Prof. Pradeep Singh obtained his BSc (1994), MSc (1996), and PhD (2001) from the University of Madras. He was a postdoctoral fellow at the University of Cincinnati, USA, and the University of Leeds, UK, before joining IIT Kharagpur in 2007.

His research interests include developing one- and two-photon-responsive fluorescent Photoremovable Protecting Groups (PRPGs) that operate in the visible and NIR regions, and exploring their applications in photoresponsive DDSs for cancer treatment, NIR-responsive donors for gasotransmitters, functional group photolithography, and the controlled release of agrochemicals.

Prof. Singh is a recipient of the Dr S. S. Deshpande Award (2023), the CRSI bronze medal (2020), the SERB Distinguished Investigator Award (2018), the Top Teaching Feedback Award (2015, 2017, and 2018), a Member of the National Academy of Sciences (2018), and an Associate of the Indian Academy of Sciences (2009), etc. He is also a Fellow of the Royal Society of Chemistry (FRSC). He has so far guided 25 PhD students and published more than 150 papers in highly reputed journals. He has delivered several invited lectures in India and abroad, with the most noteworthy at Gordon Research Conferences, NOST, and Asian Photochemistry.

Wavelength-Selective Monochromophoric Photoremovable Protecting Groups for Tuning Soft Matter Material Properties

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The impactful application of photoremovable protecting groups (PRPGs) to release small bioactive molecules has gained attention for enabling non-invasive, spatiotemporal control of uncaging with light.[1] However, UV irradiation is harmful in therapeutic use. Shifting to visible or near-infrared light within the biological window offers deeper penetration, minimal phototoxicity, lower autofluorescence, and reduced scattering. Our group reports gradual modifications of visible- to NIR- responsive PRPGs via one- and two-photon activation and their biological applications.

Notably, wavelength-selective deprotection of different groups has emerged as a key research focus, achieved mainly through linker-based bichromophoric systems or mixtures of photoresponsive protecting groups (PRPGs) responsive to distinct wavelengths.[2-5] Here, we present the first wavelength-selective monochromophoric system based on a hydroxanthene moiety, enabling the selective release of two different functions under 450 nm and 600 nm light. Mechanistic studies using ^{1}H NMR, UV–vis, and fluorescence spectroscopy revealed an initial proton-coupled electron transfer, followed by an electron transfer-based arylmethyl-type photorelease. The effectiveness of xanthene-based wavelength-selective PRPGs was demonstrated in multistep microparticle degradation and dual-colour polymer chain tuning, opening opportunities for designing advanced photoreactive, wavelength-controlled systems for soft matter materials.

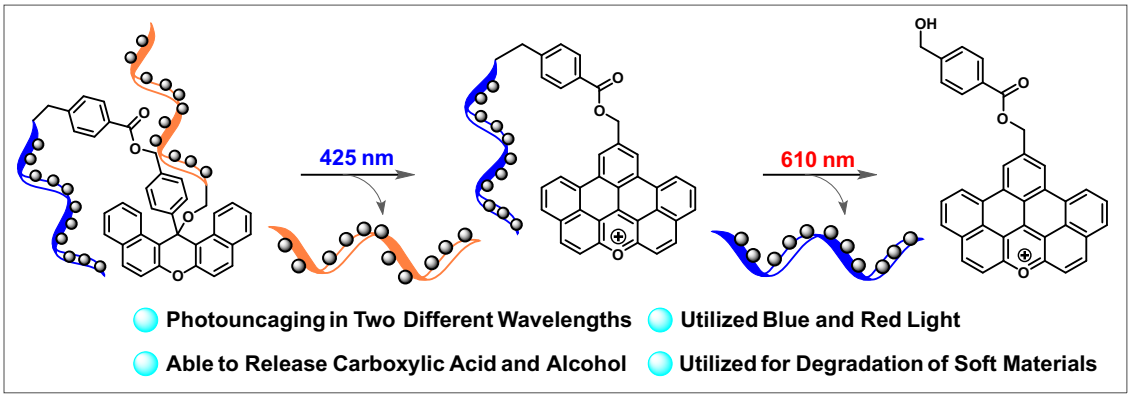

Figure 1: Dual-wavelength light-responsive uncaging of distinct functional groups.

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Cyril Bressy graduated from the University of Lyon in France. He obtained in 2004 a PhD under the guidance of Prof. Olivier Piva, working on domino reaction involving metathesis steps, in the same university. Then he moved to Toronto, Canada for a first postdoctoral experience in the group of Prof. Mark Lautens working a variant of the Catellani reaction involving several C-H functionalization. Back to France, he did a second postdoctoral experience in the group of Prof. Janine Cossy at ESPCI in Paris working on the total synthesis of pironetin.

In 2006, he was appointed as *Maître de Conférences* (Assistant Professor) at the Aix Marseille University (AMU). In 2012, he obtained an *Habilitation à Diriger des Recherches* (HDR) becoming Associate Professor. In 2015, he was promoted Full Professor of Chemistry at AMU.

His research interest is focused on the development of new synthetic methodologies involving desymmetrization, kinetic resolution, organocatalyzed transformations, acylation reactions with applications in total synthesis. More recently, he developed a new axis of research with the compartmentalized multicatalysis.

Compartmentalized MultiCatalysis: Chirality as Probe & Separation of Enantiomers

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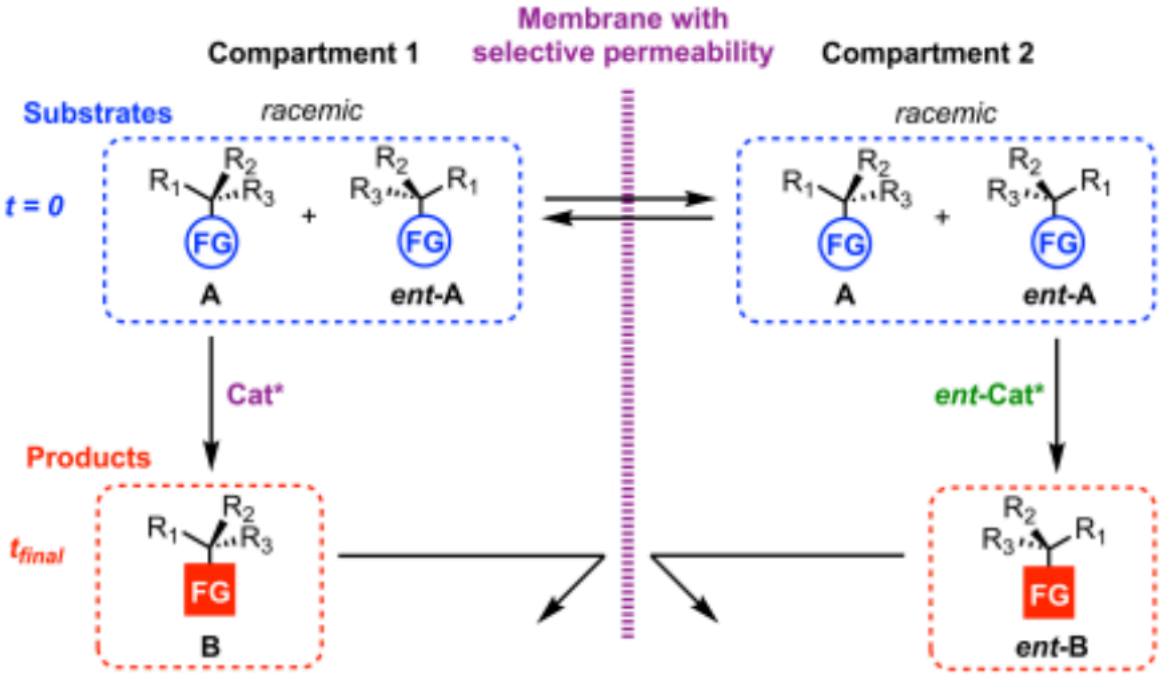
Life solves the problem of different reaction conditions by the compartmentalization of the catalytic systems. This solution opens new opportunities for the chemists using synthetic membranes to isolate the catalytic systems.

First, we were interested to study the diffusion of molecules through a semi-permeable membrane when no gradient of concentration does exist. Chirality was found to be helpful to be used as probe to study such systems.[1] A scale of diffusion energy depending on the structure of the solute was established providing fruitful lessons.

Based on these results, compartmentalized multicatalytic systems can be envisioned for different goals. In this presentation, a system where two catalysts of opposite configurations are working in each compartment leading to the physical separation of enantiomeric products starting from a racemic substrate. This is describing a case of compartmentalized parallel kinetic resolution (CPKR).



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Janakiram obtained his Ph.D. in synthetic organic chemistry from the CSIR-National Chemical Laboratory in 2015, under the mentorship of Dr. Ganesh Pandey. Following his doctoral studies, he pursued postdoctoral research at the University of Tromsø, Norway, working with Prof. Hopmann and Prof. Bayer. In 2019, he joined Emory University, Atlanta, USA, as a postdoc in the group of Prof. Huw M. L. Davies. Returning to India in 2020, he joined as a assistant professor at department of chemistry, IIT Delhi. Currently, he is an Associate Professor in the same department.

Dr. Janakiram's research focuses on ylide- and carbene-mediated transformations in organic synthesis and the total synthesis of natural products. He is a recipient of Merck Young Scientist Award (2025), Teaching Excellence Award at IIT Delhi (2022), Thieme Chemistry Journal Award (2020).

Vinyl Sulfoxonium Ylides: Unlocking New Opportunities in Organic Synthesis

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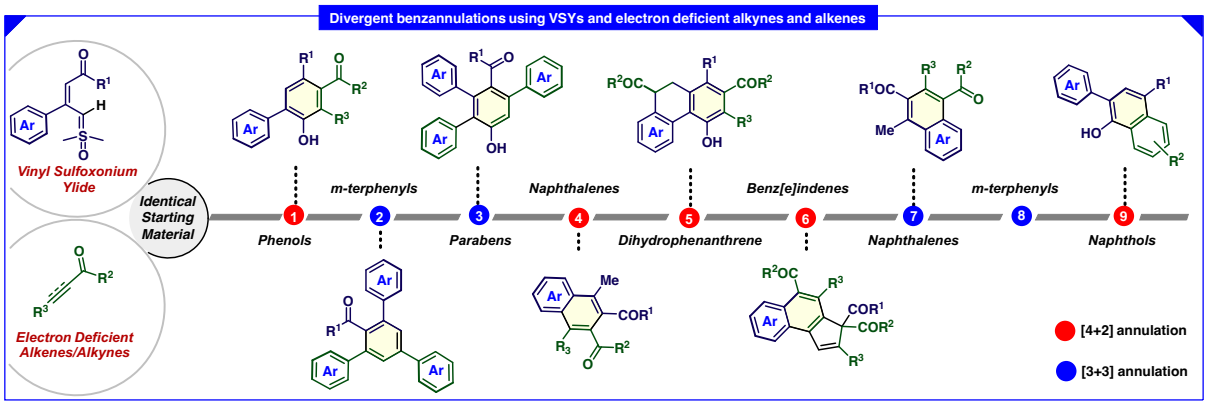
Vinyl sulfoxonium ylides (VSYs) have emerged as versatile synthetic intermediates, combining exceptional stability, ease of handling, and diverse reactivity. Their unique structural features allow them to serve as versatile one-, two-, three-, and four-carbon synthons, enabling a broad range of bond-forming transformations for the efficient synthesis of structurally complex molecules. These attributes have established VSYs as powerful building blocks in modern organic synthesis.

This talk will highlight recent advances in the chemistry of vinyl sulfoxonium ylides, focusing on their reactivity and synthetic potential. Particular emphasis will be placed on benzannulation reactions, where the annulative coupling of VSYs with electron-deficient alkenes and alkynes provides an efficient platform for constructing highly substituted aromatic frameworks (Scheme 1).[1-6] Reagent- and condition-controlled strategies including carbene-mediated, visible-light-driven, catalyst- and reagent-free, and Lewis acid-mediated processes enable divergent access to a diverse range of arene scaffolds under mild and sustainable conditions.



Scheme-1: Divergent benzannulations using vinyl sulfoxonium ylides and electron deficient alkynes and alkenes

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Dr. S. Adimurthy obtained his M.Sc. degrees in Chemistry from Bangalore University in1997 and Ph.D. degree in 2005 from Bhavnagar University, Gujarat India. He did his postdoctoral position at the University of Hohenheim, Stuttgart, Germany, (2007-2008) and 2015 at RWTH Aachen University, Germany. He has published over 125 papers and holds 6 international patents and 13 national patents to his credit. His research interest includes, eco-friendly halogenation, synthesis of bioactive heterocycles through C-H activation, Synthesis of Active Pharmaceutical Ingredients (API's), Agro intermediates, New methodology developments, etc.

Citations: 5975; h-index: 39;

Details of any awards/honors/membership

1. Environmental Leadership Award 2005 For the preparation of Biodiesel, Awarded by the Daimler Chrysler, Germany.
2. BOYSCAST Fellowship award for the year 2006-2007 awarded by Department of Science & Technology, Government of India, New Delhi.
3. Dr. VIKRAM SARABHAI Award for the Jatropha based Bio-diesel, for the year 2006-2007, awarded by the Gujarat Council of Science and Technology, Gujarat.
4. CSIR-Raman Research Fellowship award for the year 2014-15, awarded by Council of Scientific & Industrial Research, New Delhi. India.
5. Life Member of CHEMICAL RESEARCH SOCIETY OF INDIA (CRSI), IISc. Bangalore.
6. Elected as Associate Fellow, Gujarat Science Academy 2016.

Transannulation of Pyridotriazoles and Their Selective Functionalization

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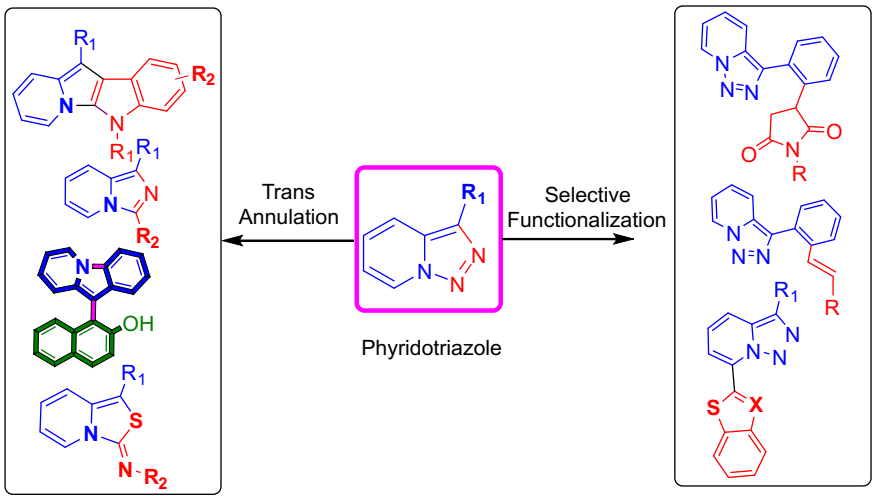
The catalytic transformations involving metal carbenes, generated directly from readily available pyridotriazoles has attracted enormous attention as they avoid the use of hazardous diazo compounds as starting substrates for carbene generation. In view of the advances on transition-metal-catalysed ring opening of pyridotriazole to construct trans annulated N-heterocycles, Rh(II) catalysis have emerged as a versatile and powerful approach in the past few decades. Although, Rh is an effective catalyst, for transannulation of pyridotriazoles under different conditions, it is very expensive for industrial applications. Achieving the same transformation with readily available metal catalysts such as palladium, copper, indium, cobalt and ruthenium is an attractive strategy in organic synthesis. In this talk, Cu, Id and Lewis acid catalyzed transannulation of pyridotriazoles with, amines, nitriles, amino acids, isothiocyanides and arenes will be discussed. Further regioselective functionalization of pyridotriazoles to access biological activities heterocycles will also be discussed under Ru and Pd catalytic conditions.



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