Prof. Pramod P. Pillai

Contact Information

Professor
Department of Chemistry
Indian Institute of Science Education and Research (IISER) Pune
Dr. Homi Bhabha Road, Pashan
Pune - 411 008, India
Email: pramod.pillai@iiserpune.ac.in
Phone: +91-20-2590-8252; Cell: +91-9673752050
Fax: +91-20-2586-5315
www.iiserpune.ac.in/~pramod

Education

Ph. D., 2008
National Institute for Interdisciplinary Science and Technology (NIIST-CSIR), Trivandrum, India

M.Sc. Chemistry, 2004
Mahatma Gandhi University, Kottayam, India

B. Sc. Industrial Chemistry, 2001
Mahatma Gandhi University, Kottayam, India

Research interests

Physical Chemistry; Material Chemistry; Nanomaterials; Light-Matter Interactions at Nanoscale; Photochemistry and Photophysics; Self-assembly

Research Experience/ Employment History

Professor — **2024 - present**
Indian Institute of Science Education and Research Pune, India

Associate Professor — **2019 – 2024**
Indian Institute of Science Education and Research Pune, India

Assistant Professor — **2014 - 2019**
Indian Institute of Science Education and Research Pune, India

- Sustainability in chemical synthesis using light and nanomaterials
- Ligand 'gated' photochemistry and photophysics with hybrid nanomaterials
- Controlling the thermodynamics of self-assembly at nanoscale
- Extracting hot charge carriers and heat from plasmonic materials

Postdoctoral research — **2011 - 2014**
Northwestern University, Illinois, U. S. A
Advisor: Prof. Bartosz A. Grzybowski

- Fabricated novel electrically bistable devices based on metal-polymer nanocomposite with controllable dielectric breakdown.
- Developed a general strategy to self-assemble colloids and nanomaterials, by modulating magnetic fields at the micron-scale.
- Designed and developed new family of mixed charge nanomaterials with unique chemical (stability, self-assembly etc.) and biological (antimicrobial, cellular uptake etc.) properties.

Postdoctoral research **2008 - 2010**
Technical University, Dortmund, Germany
Advisor: Prof. Christof M. Niemeyer

- Incorporated semiconductor nanomaterials into colloidal silica nanospheres for cell imaging studies.
- Bio-functionalized luminescent colloidal silica beads for DNA hybridization studies.
- Designed and studied energy transfer process between luminescent silica beads and fluorescent proteins.

Ph. D. research **2004 - 2008**
NIIST, Trivandrum, India
Advisor: Prof. K. George Thomas

- Published first report on the covalent functionalization of ruthenium trisbipyridine chromophores on gold nanoparticles and tuned their optoelectronic properties.
- Improved the electron accepting properties of single-walled carbon nanotubes through covalent functionalization of metal nanoparticles.
- For the first time, experimentally demonstrated the existence of edge effect in gold nanorods.
- Controlled the plasmon coupling in dimers of gold nanorods using aromatic and alkyl dithiols.

Awards

- Awarded the Renewed Research Fellowship under the *Alexander von Humboldt fellowship* Alumni Program in 2019.
- Awarded the prestigious *Alexander von Humboldt fellowship* in November 2008.
- *Best poster award* in February 2008 for the All India Chemistry Symposium conducted by the Chemical Research Society of India (CRSI).
- Qualified the prestigious all India *CSIR-JRF/NET* exam of the Council of Scientific and Industrial Research, Government of India in June 2003.
- Qualified Graduate Aptitude Test in Engineering (*GATE*) in 2006.
- University *second rank* for M.Sc. and *first rank* (Topper) for B.Sc.

Sponsored R&D Projects

- SERB/EMR/2015/001561 (2016 – 2018): Interdigitated Metal-Semiconductor Nanowires as a Platform for Plasmon Sensitized Light Harvesting Devices, 41.9 lakhs (INR)
- DST/ SR/NM/NS-1014/2017 (2018 – 2020): Charge Transport and Mechanical Motion in One Dimensional Nanomaterials: Towards Ultrasensitive Detection and Mechanochemistry, 79.6 lakhs (INR)
- SERB/CRG/2019/003960 (2021-2023): Surface Ligand Directed Catalysis: Outplaying Ligand Poisoning in Metal and Semiconductor Nanoparticle Catalyzed Reactions, 29.1 lakhs (INR)
- MoE/STARS/2023-0195 (2023-2026): Photochemistry with Plasmonic Materials: Taking the Heat Out of Plasmons for Translational Chemical Transformations, 40.0 lakhs (INR)
- SERB/CRG/2023/001711 (2024-2027): Photocatalysis Beyond the Band Gap: Accessing the Higher Redox Levels in Quantum Dots Using Light and Potential, 53.0 lakhs (INR)

Degrees Awarded

07 Ph.D. and 16 MS theses

Academic Activities

- Editorial Board Member of ChemNanoMat
- Reviewer for several scientific journals including JACS, Angewandte Chemie, Chem. Sci., Advanced Materials, Science Advances, ACS Catalysis, ACS Nano, Chemistry of Materials, JPCL, JPC, Langmuir, Journal of Organic Chemistry, ACS Applied Materials & Interfaces, ACS Applied Nanomaterials, ACS Applied Biomaterials, Energy & Fuels, ACS Macroletters, ACS Applied Energy Materials, Crystal Growth and Design, Small, Advanced Optical Materials, ChemPhysChem, Chemistry Select, Nanoscale, RSC Sustainability, Journal of Material Chemistry B, Journal of Colloid and Interface Science, PCCP, ChemSusChem, Communications Chemistry, Journal of Photochemistry & Photobiology A: Chemistry, Results in Physics, Dyes and Pigments, Photochemistry and Photobiology, Journal of Chemical Physics, Next Materials, Chirality.
- Member of American Chemical Society (ACS)
- Lifetime member of Chemical Research Society of India (CRSI)

Publications

1) Ammonia Synthesis with Visible Light and Quantum Dots. Jain, V.; Tyagi, S.; Roy, P.; **Pillai, P. P.** *J. Am. Chem. Soc.* **2024**, *146*, 32356–32365.

2) Plasmon-Powered Chemistry with Visible-Light Active Copper Nanoparticles. Tyagi, S.; Kashyap, R. K.; Dhankhar, A.; **Pillai, P. P.** *Chem. Sci.* **2024**, *15*, 16997-17006.

3) Photocatalytic Regeneration of Reactive Cofactors with InP Quantum Dots for the Continuous Chemical Synthesis. Chakraborty, I. N.; Jain, V.; Roy, P.; Kumar, P.; Vinod, C. P; **Pillai, P. P.** *ACS Catal.* **2024**, *14*, 5167–5176.

4) Plasmonic Nanoparticles Boost Solar-to-Electricity Generation at Ambient Conditions. Kashyap, R. K.; **Pillai, P. P.** *Nano Lett.* **2024**, *24*, 5585–5592.

5) Plasmonic Antenna-Reactor Photocatalysts based on Anisotropic Gold-Rhodium Superstructures for Biological Cofactor Regeneration. Dhankhar, A.; **Pillai, P. P.** *Chem. Mater.* **2024,** *36*, 10227-10237.

6) Cyclic(Alkyl)(Amino)Carbene Stabilized Gold Nanoparticles for Selective CO_2 Reduction. Ghosh, M.; Saha, P.; Roy, S.; Barman, S.; **Pillai. P. P.;*** Dey, A.;* Khan. S.* *ACS Catal.* **2024**, *14*, 7011–7019.

7) Electrostatics Enable Resonance Energy Transfer in All-InP Quantum Dot Containing Donor–Acceptor Assembly. Roy, P.; Sury, A. S.; **Pillai, P. P.** *Appl. Phys. Lett.* **2024**, *124*, 222104.

8) Metal-Semiconductor Heterojunction Accelerates the Plasmonically Powered Photoregeneration of Biological Cofactors. Deepak, N.; Jain, V.; **Pillai, P. P.** *Photochemistry and Photobiology* **2024**, (*Early View)* (DOI:10.1111/php.13937).

9) Visible Light-Mediated Quantum Dot Photocatalysis Enables Olefination Reactions at Room Temperature. Chakraborty, I. N.; Roy, P.; **Pillai, P. P.** *ACS Catal.* **2023**, *13*, 7331–7338.

10) Blue-Emitting InP Quantum Dots Participate in an Efficient Resonance Energy Transfer Process in Water. Roy, P.; Virmani, M.; **Pillai, P. P.** *Chem. Sci.* **2023** 14, 5167–5176.

11) Plasmon Enabled Claisen Rearrangement. Kashyap, R. K.; Tyagi, S.; **Pillai, P. P.** *Chem. Comm.* **2023**, *59*, 13293–13296.

12) Thermoplasmonics Enable the Coupling of Light into the Solvent-Mediated Self-Assembly of Gold Nanoparticles. Roy, S.; Kashyap, R. K.; **Pillai, P. P.** *J. Phys. Chem. C* **2023**, *127*, 10355–10365.

13) Deciphering the Role of Light Excitation Attributes in Plasmonic Photocatalysis: The Case of Nicotinamide Cofactor Regeneration. Jain.; V.; Chakraborty, I. N.; Raj, R. B.; **Pillai, P. P.** *J. Phys. Chem. C* **2023**, *127*, 5153-5161.

14) What Triggers the Dynamic Self-Assembly of Molecules and Materials? Roy, S.; **Pillai, P. P.** *Langmuir* **2023**, *39,* 12967–12974.

15) Enhancing the Photocatalytic Regeneration of Nicotinamide Cofactors with Surface Engineered Plasmonic Antenna-Reactor System. Dhankhar, A.; Jain, V.; Chakraborty, I. N.; **Pillai, P. P.** *J. Photochem. Photobiol. A: Chem.* **2023**, *437*, 114472.

16) Resonance Energy Transfer in Electrostatically Assembled Donor-Acceptor System Based on Blue-Emitting InP Quantum Dots. Roy, P.; Sury, A. S; **Pillai, P. P.** *Chem. Phys. Impact* **2023**, *7*, 100334.

17) Electrostatically Directed Long-Range Self-Assembly of Nucleotides with Cationic Nanoparticles To Form Multifunctional Bioplasmonic Networks. Roy, S.; Adury, V. S. S.; Rao, A.; Roy, S.; Mukherjee, A.; **Pillai, P. P.** *Angew. Chem. Int. Ed.* **2022**, *61*, e202203924.

18) When Design Meets Function: The Prodigious Role of Surface Ligands in Regulating Nanoparticle Chemistry. Jain, V.; Roy, S.; Roy, P.; **Pillai, P. P.** *Chem. Mater.* **2022**, *34*, 7579-7597.

19) Insights into the Utilization and Quantification of Thermoplasmonic Properties in Gold Nanorod Arrays. Kashyap, R. K.; Dwivedi, I.; Roy, S. Roy, S.; Rao, A.; Subramaniam, C. **Pillai, P. P.** *Chem. Mater.* **2022**, *34*, 7369–7378.

20) Nanoparticle Self-Assembly: From Design Principles to Complex Matter to Functional Materials. Rao, A.; Roy, S.; Jain, V.; **Pillai, P. P.** *ACS Appl. Mater. Interfaces* **2022**, DOI: 10.1021/acsami.2c05378.

21) Plasmonic Photocatalysis: Activating Chemical Bonds through Light and Plasmon. Jain, V.; Kashyap, R. K.; **Pillai, P. P.** *Adv. Optical Mater.* **2022**, *10*, 2200463.

22) Effect of Nanoparticle Size on Plasmonic Heat-Driven Organic Transformation. Kashyap, R. K.; Parammal, M. J.; **Pillai, P. P.** ChemNanoMat **2022**, e202200252.

23) The Unconventional Role of Surface Ligands in Dictating the Light Harvesting Properties of Quantum Dots. Chakraborty, I. N.; Roy, P.; Rao, A.; Devatha, G.; Roy, S.; **Pillai, P. P.** *J. Mater. Chem. A* **2021**, *9,* 7422-7457.

24) Temporal Changes in Interparticle Interactions Drive the Formation of Transiently Stable Nanoparticle Precipitates. Rao, A.; Roy, S.; **Pillai, P. P.** *Langmuir* **2021**, *37*, 1843–1849.

25) Electrostatically Driven Multielectron Transfer for the Photocatalytic Regeneration of Nicotinamide Cofactor. Roy, S.; Jain, V.; Kashyap, R. K.; Rao, A.; **Pillai, P. P.** *ACS Catal.* **2020**, *10*, 5522–5528.

26) Multicolor Luminescent Patterning via Photoregulation of Electron and Energy Transfer Processes in Quantum Dots. Devatha, G.; Roy, P.; Rao, A.; Roy, S.; **Pillai, P. P.** *J. Phys. Chem. Lett.* **2020**, *11*, 4099–4106.

27) Electrostatically Driven Resonance Energy Transfer in an All-Quantum Dot Based Donor–Acceptor System. Roy, P.; Devatha, G.; Roy, S.; Rao, A.; **Pillai, P. P.** *J. Phys. Chem. Lett.* **2020**, *11*, 5354–5360.

28) Accelerated Reduction of 4-Nitrophenol: Bridging Interaction Outplays Reducing Power in the Model Nanoparticle-Catalyzed Reaction. Shirin, S.; Roy, S.; Rao, A.; **Pillai, P. P.** *J. Phys. Chem. C* **2020**, *124*, 19157–19165.

29) Förster Resonance Energy Transfer Regulated Multicolor Photopatterning from Single Quantum Dot Nanohybrid Films. Devatha, G.; Rao, A.; Roy, S.; **Pillai, P. P.** *ACS Energy Lett.* **2019**, *4*, 1710–1716.

30) InP/ZnS Quantum Dots as Efficient Visible-Light Photocatalysts for Redox and Carbon−Carbon Coupling Reactions. Chakraborty, I. N.; Roy, S.; Devatha, G.; Rao, A.; **Pillai, P. P.** *Chem. Mater.* **2019**, *31*, 2258–2262.

31) Turn-On Selectivity in Inherently Nonselective Gold Nanoparticles for Pb^{2+} Detection by Preferential Breaking of Interparticle Interactions. Rao, A.; Kumar, G. S.; Roy, S.; Rajesh, A. T.; Devatha, G.; **Pillai, P. P.** *ACS Appl. Nano Mater.* **2019,** *2*, 5625–5633.

32) Photoluminescence Quenching in Self-Assembled $CsPbBr_3$ Quantum Dots on Few-Layer Black Phosphorus Sheets. Muduli, S.; Pandey, P.; Devatha, G.; Babar, R.; Kothari, D. C.; Kabir, M.;* **Pillai, P. P.;*** Ogale. S.* *Angew. Chem. Int. Ed.* **2018**, *57, 7682–7686.*

33) Precise Nanoparticle–Reactant Interaction Outplays Ligand Poisoning in Visible–Light Photocatalysis. Roy, S.; Roy, S.; Rao, A.; Devatha, G.; **Pillai, P. P.** *Chem. Mater.* **2018**, *30*, 8415–8419.

34) Electrostatically Regulated Photoinduced Electron Transfer in "Cationic" Eco-friendly CuInS2/ZnS Quantum Dots in Water. Xavier, J. A. M.; Devatha, G.; Roy, S.; Rao, A.; **Pillai, P. P.** *J. Mater. Chem. A*. **2018**, *6*, 22248-2224.

35) Revealing the Role of Electrostatics in Gold Nanoparticle Catalyzed Reduction of Charged Substrates. Roy, S.; Rao, A.; Devatha, G.; **Pillai, P. P.** *ACS Catal.* **2017**, *8*, 3879-3884.

36) Electrostatically Driven Resonance Energy Transfer in "Cationic" Biocompatible Indium Phosphide Quantum Dots. Devatha, G.; Roy, S.; Rao, A.; Mallick, A.; Basu, S.; **Pillai, P. P.** *Chem. Sci.* **2017**, *7*, 7141-7145.

37) Trapping, Manipulation, and Crystallization of Live Cells using Magnetofluidic Tweezers. Timonen, J. V. I.; Raimondo, C.; Pilans, D.; **Pillai, P. P.;** Grzybowski, B. A. *Nanoscale Horiz.* **2017***, 2,* 50-54.

38) Regulation of Interparticle Forces Reveals Controlled Aggregation in Charged Nanoparticles. Rao, A.; Roy, S.; Unnikrishnan, M.; Bhosale, S. S.; Devatha, G.; **Pillai, P. P.** *Chem. Mater.* **2016**, *28*, 2348-2355.

39) Engineering Gram Selectivity of Mixed-Charge Gold Nanoparticles by Tuning the Balance of Surface Charges. **Pillai, P. P.**; Kowalczyk, B.; Kandere-Grzybowska, K.; Borkowska, M.; Grzybowski, B. A. *Angew. Chem. Int. Ed.* **2016**, *55*, 8610-8614.

40) Electrostatic Titrations Reveal Surface Compositions of Mixed, On-Nanoparticle

Monolayers Comprising Positively and Negatively Charged Ligands. **Pillai, P. P.**; Kowalczyk, B.; Pudlo, W. J.; Grzybowski, B. A. *J. Phys. Chem. C* **2016**, *120*, 4139-4144.

41) Self-assembly of Like-Charged Nanoparticles into Microscopic Crystals. **Pillai, P. P.**; Kowalczyk, B.; Grzybowski, B. A. *Nanoscale* **2016**, 8, 157-161.

42) Synthesis of Toroidal Gold Nanoparticles Assisted by Soft Template. Yan, Y.; **Pillai, P. P.**; Timonen, J. V. I.; Emami, F. S.; Vahid, A.; Grzybowski, B. A. *Langmuir* **2014**, *30*, 9886-9890.

43) Mechanical Control of Surface Adsorption by Nanoscale Cracking. Zhuang, Q.; Warren, S. C.; Baytekin, B.; Demirörs. A. F.; **Pillai, P. P.**; Kowalczyk, B.; Grzybowski, B. A. *Adv. Mater.* **2014**, 26, 3667-3672

44) Colloidal Assembly Directed by Virtual Magnetic Moulds Demirörs. A. F.; **Pillai, P. P.**; Kowalczyk, B.; Grzybowski, B. A. *Nature* **2013**, *503*, 99-103.

45) Controlled pH Stability and Adjustable Cellular Uptake of Mixed-Charge Nanoparticles. **Pillai, P. P.**; Huda, S.; Kowalczyk, B.; Grzybowski, B. A. *J. Am. Chem. Soc.* **2013**, *135*, 6392-6395.

46) Nanostructural Anisotropy Underlies Anisotropic Electrical Bistability. **Pillai, P. P.**; Pacławski, K.; Kim, J.; Grzybowski, B. A. *Adv. Mater.* **2013**, *25*, 1623-1628.

47) Gold Nanoparticle-Functionalized Carbon Nanotubes for Light-Induced Electron Transfer Process. **Pramod, P.**; Soumya, C. C.; Thomas, K. G. *J. Phys. Chem. Lett.* **2011**, *2*, 775-781.

48) Quantum Dot-Encoded Silica Nanospheres for Nucleic Acid Hybridization. **Pillai, P. P.**; Reisewitz, S.; Schroeder, H.; Niemeyer, C. M. *Small* **2010**, *6*, 2130-2134.

49) Organic Nanomaterials: Morphological Control for Charge Stabilization and Charge Transport. **Pramod, P.**; Thomas, K. G.; George, M. V. *Chem. Asian J.* **2009**, *4*, 806- 823.

50) Plasmon Coupling in Dimers of Au Nanorods. **Pramod, P.**; Thomas, K. G. *Adv. Mater.* **2008**, *20,* 4300–4305.

51) Preferential Functionalization of Au nanorods Through Electrostatic Interactions. **Pramod, P.**; Joseph, S. T. S.; Thomas, K. G. *J. Am. Chem. Soc.* **2007**, *129*, 6712-6713.

52) Interaction of thiol derivative of Ru(II)trisbipyridyl complex with gold nanorods. Morphological changes and excited state interactions. Jebb, M.; Sudeep, P. K.; **Pramod, P.**; Thomas, K. G; Kamat, P. V. *J. Phys. Chem. B* **2007**, *111*, 6839-6844.

53) Photochemistry of Ruthenium Trisbipyridine Functionalized on Gold Nanoparticles. **Pramod, P.**; Sudeep, P. K.; Thomas, K. G.; Kamat, P. V. *J. Phys. Chem. B* **2006**, *110,* 20737-20741.

54) Gold Nanorods to Nanochains: Mechanistic Investigations on their Longitudinal Assembly Using α,ω-Alkanedithiols and Interplasmon Coupling. Joseph, S. T. S.; Ipe, B. I.; **Pramod, P.**; Thomas, K. G. *J. Phys. Chem. B* **2006**, *110*, 150-157.

Patents filed

1) Plasmonic Solar Thermoelectric Generator, Indian Patent Filed on 24 July 2024 (No. 202321058513)
2) Process For Synthesizing Ammonia with Semiconductor Nanoparticles and Visible Light, Indian Provisional Patent Filed on 19 July 2024 (No. 202421055371)

Selected Talks & Presentations

1) Plasmonic Heaters for Solar Energy Utilization; in Photonics for Energy, Sensing, and Education (PESE-2025), IIT Gandhinagar, 16-17 January 2025.
2) Harnessing Light-Matter Interactions for Sustainable Chemical Synthesis; National Seminar on Innovations in Chemistry: Light-Matter Dynamics, Computational Insights & Energy Solutions, RSN Arts and Science College, Kerala, 10 January 2025.
3) Ligand-Directed Ammonia Synthesis Using Visible Light and Quantum Dots; In Conference on Advances in Catalysis for Energy and Environment (CACEE - 2024), TIFR Mumbai, 16-20 December 2024.
4) Ligand-Directed Synthesis of Ammonia Using Visible Light and Quantum Dots; In International Symposium on Dynamic Exciton (ISDyEx), IISER Thiruvananthapuram, 14-15 December 2024
5) Plasmonic Heaters for Solar Energy Utilization; In International Conference on Advanced Energy Materials and Interfaces 2024 (AEMI 24), IISER Pune, 09-10 December 2024
6) Ligands as Gatekeepers in Quantum Dot Photocatalysis; In ChemSymphoria 2024, IISER Pune, 02-03 December 2024
7) Chemistry with Thermoplasmonics; In Advances in Functional Solids: Fundamental and Applications (AFS 2024), IIT Kharagpur, 09-12 November 2024
8) Visible Light Photocatalysis with Quantum Dots; In Physical Chemistry Symposium: SoPhyC – 2024, IIT Bombay, 22-25 October 2024
9) Light-Matter Interactions Leading to Chemical Change; In 21st International Conference on Laser Optics (ICLO 2024), St. Petersburg, Russia, 01-05 July 2024.
10) Light-Matter Interactions Leading to Chemical Change; Catalysis and Renewable Energy Towards Meeting Sustainable Development Goals (SDG), NCL Pune, 26 June 2024.
11) Visible Light Photocatalysis with Quantum Dots; In Emerging Trends in Photodynamics and Photochemistry (ETPP 2024), IISER Mohali, 26-28 March 2024
12) Plasmonically Active Self-Assembled Nanostructures; In Emerging Trends in Supramolecular Science and Technology (ETSST 2024), SRM University, Andhra Pradesh, 07-08 March 2024
13) Light-Matter Interactions at Nanoscale Leading to Chemical Change; In Advances in Nanomaterials and Molecules: From Spectroscopy to Bioimaging (NaMoSBio), IISER Kolkata, 12-14 January 2024.
14) The Impact of Surface Ligands in Regulating Nanoparticle Chemistry; In CompFlu-2023, IIT Madras Kolkata, 18-20 December 2023.
15) Chemistry with Thermoplasmonics; In Fluorescence Chemical Society – Satellite Meeting on ATOS Materials in Focus, Shimla, 15-17 December 2023.
16) Light-Matter Interactions at Nanoscale Leading to Chemical Change; In Department of Chemistry, Sacred Heart College, Kochi, 08 December 2023.
17) Light-Matter Interactions at Nanoscale Leading to Chemical Change; In Department of Chemistry, CUSAT, Kochi, 07 December 2023.

18) Solar Energy Conversion and Utilization with Nanomaterials; In International Conference on Green and XX, Maharajas College, Kerala, 05-06 December 2023.

19) Light-Matter Interactions at Nanoscale Leading to Chemical Change; In CSIRO, Newcastle, 04 December 2023.

20) Light-Matter Interactions with Surface Engineered Nanomaterials; In GICAN, Newcastle, 04 December 2023.

21) Visible-Light Photocatalysis with Surface Engineered Nanomaterials; In 12th Asian Photochemistry Conference (APC), Melbourne, 27 November - 01 December 2023

22) Thermoplasmonics: Taking the Heat Out from Plasmonic Nanostructures with Sunlight; In Advances in Heat Generation by Direct and Indirect Methods for Aerosol Production, ITC Life Science and Technology Centre, Bangalore, 20 March 2023.

23) Light-Matter Interactions with Surface Engineered Nanomaterial; In Innovations in Materials and Processing for Energy, Environment and Electronics (IMPEEE 2023), Marathwada Mitra Mandal's College of Engineering, Karvenagar, Pune, 08 February 2023.

24) 'Hot Carriers' and 'Hot Surfaces': The Two Faces of Plasmons in Chemical Transformations; In Conference on Advances in Catalysis for Energy and Environment (CACEE -2022), TIFR Mumbai, 31 October – 04 November 2022.

25) Surface Ligand Directed Light Harvesting with Nanomaterials; In National Conference on Recent Trends in Materials Science (NCMST 2021), Organized by INST Trivandrum, 29-31 December 2021.

26) Photochemistry and Photophysics with Surface Engineered Nanomaterials; In Workshop in Chemistry for PG Students & Teachers, Organized by Calicut Chemistry Collective, Kerala, Online Conference, 19 November 2021.

27) Multicolour Luminescent Patterning via Photoregulation of Electron and Energy Transfer Processes in Quantum Dots; In 11th Asian Photochemistry Conference (APC 2021), 01-04 November 2022.

28) Photochemistry and Photophysics with Surface Engineered Quantum Dots; In nanoGe: NCFun21. Fundamental Processes in Nanocrystals and 2D Materials, 21-22 October 2021.

29) Photochemistry and Photophysics with Surface Engineered Quantum Dots; In Covid-19 Lecture Series-Spring 2021, University of Miami, 27 February 2021.

30) Photophysics and Photopatterning with Surface Engineered Quantum Dots; In ChemSci2020, Leaders in the Field Symposium (RSC Sponsored Chemical Science Virtual Symposium) IISER Kolkata, 07 – 10 December 2020.

31) Surface Ligand Directed Catalysis by Nanomaterials; In Emerging Frontiers in Chemical Sciences (EFCS 2020), Farook College, Calicut, Kerala, 04 – 05 December 2020.

32) Ligand Directed Light Harvesting by Nanomaterials; In Departmental Talk in Chemical Sciences, TIFR Mumbai; 19 October 2020.

33) Ligand Directed Catalysis by Nanomaterials; In Virtual National Seminar on Catalysis and Photocatalysis for Clean Energy (CPCE 2020), NIT Jamshedpur, 09 – 10 October 2020.

34) Catalysis and Light Harvesting by Nanomaterials; In National Seminar on Frontiers in Materials and Chemical Sciences (NSFMC 20), Jain (deemed to be University),

Bangalore, Aug 31-04 Sept 2020.

35) Career in nanoscience: How BIG is Small; In Sree Narayana College, Kerala, 17 August 2020.

36) Ligand as a 'Gatekeeper' in Nanoparticle Catalyzed Reactions; In International Conference on Recent Trends in Catalysis 2020 (RTC 2020)" held at NIT Calicut, Kerala (India) February 26-29, 2020.

37) Surface Ligand Directed Light Harvesting by Nanoparticles; In International Conference on Ultrafast Spectroscopy (ICUS 2020)" held at IISER Thiruvananthapuram, Kerala (India) February 21-22, 2020.

38) Surface Ligand Directed Catalysis and Light Harvesting by Nanoparticles; In International Conference on Energy and Environment (ICEE 2k19)" held at T.K.M. College of Arts & Science, Kollam Kerala (India) December 12-14, 2019.

39) Surface Ligand Directed Catalysis and Light Harvesting by Nanoparticles; In Institut Charles Sadron (ICS) – CNRS at University of Strasbourg, Strasbourg, (France) June 18, 2019.

40) Crafting Advanced Nanoparticle Functions through Interplay of Forces and Interactions; In Institut de Science et d'Ingénierie Supramoléculaires (ISIS) at University of Strasbourg, Strasbourg, (France) June 17, 2019.

41) Regulation of Interparticle Interactions: In Search of Advanced Nanoparticle Functions; In Donostia International Physics Center (DIPC), San Sebastian, (Spain) June 13, 2019.

42) Transformations on the Surface of Nanoparticles: Not all Ligands are 'Poisonous' for Catalysis; In *Students Seminar Organized by SFB 838* at Westfälische Wilhelms-Universität (WWU, SFB 858), Muenster, (Germany) June 05, 2019.

43) Regulation of Interparticle Interactions: In Search of Advanced Nanoparticle Functions; In Westfälische Wilhelms-Universität (WWU), Muenster, (Germany) June 04, 2019.

44) Regulation of Interparticle Forces for Advanced Nanoparticle Functions: In Institute for Biological Interfaces 1(IBG-1) at Karlsruhe Institute of Technology (KIT), (Germany) May 15, 2019.

45) Regulation of Interparticle Forces for Advanced Nanoparticle Functions; In 1st Indian Materials Conclave and 30th Annual General Meeting of MRSI" held at IISc Bangalore, (India) February 12-15, 2019.

46) Regulation of Interparticle Forces for Advanced Nanoparticle Functions; In Humboldt Kolleg 2019" held at Kashid, Maharashtra, (India) 31st January – 02nd February 2019.

47) Regulation of Interparticle Forces for Advanced Nanoparticle Functions; In International Conference on Chemistry and Physics of Advanced Materials - III held at IISER Pune, (India) October 08-09, 2018.

48) Regulation of Interparticle Forces for Advanced Nanoparticle Functions; In Gordon Research Conference on Noble Metal Nanoparticles held at South Hadley, Boston, (U. S.A.) June 17-23, 2018.

49) Controlling the Interparticle Interactions for Advanced Nanoparticle Functions; In *International Conference on* Advanced Nanostructures (ICAN 2018) held at

Catholicate College, Kerala, (India) March 12-14, 2018.

50) Controlling the Interparticle Interactions for Advanced Nanoparticle Functions; In IISER-Weizmann Institute of Science scientific workshop held at IISER Pune, (India) January 18-19, 2018.

51) Exploring Nanoscience - How BIG is Small; As a resource person in Inspire Internship Camp held at Sacred Heart College, Kochi, Kerala, (India) January 09-13, 2018.

52) Crafting Advanced Nanoparticle Functions through Interplay of Forces; In Inter IISER & NISER Chemistry Meet (IINCM-2017) held at NIISER Bhubaneswar, Orrisa, (India) December 22-24, 2017

53) Crafting Advanced Nanoparticle Functions by Controlling Interparticle Interactions; In Humboldt Colloquium held at Bengaluru, (India) November 23–25, 2017

54) Crafting Advanced Nanoparticle Functions by Controlling Interparticle Interactions; In International Conference of Young Researchers in Advanced Materials (IUMRS-ICYRAM 2016) held at IISc Bangalore, (India) December 11-15, 2016

55) Coding Nanoparticle Functionalities by Tuning the Nanoscale Forces; In Gordon Research Conference on Noble Metal Nanoparticles held at South Hadley, Boston, (U. S.A.) June 19-25, 2016.

56) Regulation of Interparticle Interactions: In Search of Advanced Nanoparticle Functions; In Department of Chemistry, University of North Carolina at Chapel Hill, North Carolina, USA on June 17, 2016.

57) Regulation of Interparticle Interactions: In Search of Advanced Nanoparticle Functions: In Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana, USA on June 14, 2016.