Dr. MANOJ, N.
Professor in Organic Chemistry
Department of Applied Chemistry
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ACADEMIC RECORD

- ***Graduation (B.Sc.)***: **Chemistry**,
  1991, Mahatma Gandhi University, Kottayam, Kerala, India
- ***M.Sc. degree***:
  1993, M. Sc. in Organic Chemistry.
  Title of the M. Sc. Thesis: A Study of 2,4,6-triphenypyrylium cation sensitized photo-oxygenation reactions of a few furan derivatives
  Supervisor: Dr. K. R. Gopoidas, Scientist, National Institute for Interdisciplinary Science & Technology(NIIST) (Formerly Regional Research Laboratory) (CSIR) Industrial Estate, Trivandrum - 695019
- ***Ph.D. degree***: **Chemistry** (October **1999**) Mahatma Gandhi University, Kottayam, Kerala, India
  "Photoinduced Electron Transfer: Design and Study of New Sensitizers to Control Back Electron Transfer"
  Ph.D. advisor: Dr. K. R. Gopoidas, Scientist, National Institute for Interdisciplinary Science & Technology(NIIST) (Formerly Regional Research Laboratory) (CSIR) Industrial Estate, Trivandrum - 695019

SCIENTIFIC OR PROFESSIONAL POSITIONS

- **Post-Doctoral Research Fellow: May 1999 – February 2000**
  Post-Doctoral Research Fellow with Extended Senior Research Fellowship (CSIR) at the Photochemistry Research Unit, National Institute for Interdisciplinary Science & Technology (CSIR-NIIST), Thiruvananthapuram

-Post – Doctoral Research Associate: March 2000 – December 2001
Post - doctoral research associate in the research group of Prof. Hermenegildo Garcia at the Departamento de Quimica, Universidad Politecnica de Valencia, Valencia, Spain.

-Post – Doctoral Research Associate: January 2002 – September 2006
Post - doctoral research associate in the research group of Prof. Dr. André M. Braun and Prof. Dr. Esther Oliveros at the Chair of Environmental Analysis and Techniques (Lehrstuhl für Umweltmesstechnik), Engler-Bunte Institute, University of Karlsruhe, Germany.

-Reader in Organic Chemistry, Department of Applied Chemistry, CUSAT : October 2006-October 2009

-Associate Professor in Organic Chemistry, Department of Applied Chemistry, CUSAT : October 2009-January 2016

-Professor in Organic Chemistry, Department of Applied Chemistry, CUSAT : February 2016 to date

-Head of the Department: May 2013 – May, 2016; June 2022 – September 2022
-Professor and Coordinator, Centre for Integrated Studies, CUSAT, June 2022 – to date
-Professor and Coordinator, RUSA, CUSAT, August 2019 – to date
-Professor -in-Charge and Director, CUSATECH FOUNDATION, a Section 8 Company @ CUSAT for promotion of Innovation, Entrepreneurship and Employability, August 2019 – to date
-Controller of Examinations, CUSAT (Additional Charge) January 2024 – to date

THESIS SUPERVISED

-**Ph. D**.:
Awarded – 7
Ongoing – 8
-**M.Phil.**:
Awarded – 13

PROJECTS (COMPLETED and Ongoing)

1. Synthesis and Study of New Organocatalysts for Asymmetric Michael Addition Reactions, UGC, ₹1,303,600/- (2015-2018) – Principal Investigator
2. UGC-SAP Infrastructure and Research Grant, ₹7,100,000 (2010 – 2015) – Deputy Coordinator.
3. Exploring the Human Gut Microbe and Metabolites in Health and Parkinson's Disease- A Window to the Gut Microbiota-Brain Axis Alterations in Parkinson's Disease, ICMR, ₹1,200,000/- (2019-2022)

PROJECTS (ONGOING)

1. Novel Heterocyclic Hole Transporting Materials (HTM) for Perovskite Solar Cell Applications, GITA-DST (Indo-Taiwan), ₹2,287,500/- (2020-2024) – Principal Investigator (Ongoing).
2. Development of functional Materials/systems for artificial photosynthesis, MHRD-RUSA, ₹1,78,55,900/- (March 2023-) – Co- Principal Investigator.

LIST OF PUBLICATIONS

1. R Lakshmi, M Rasheed, OC Parvathy, J Jose, N Manoj, P Gopinath, AIE Luminogen-Rhodamine 6G FRET pair based light harvester and Hg2+ chemosensor for real life applications, 2024, 110209, https://doi.org/10.1016/j.microc.2024.110209 (in Press)
2. PK Vineetha, C Govind, V Karunakaran, N Manoj, Ultrafast excited state relaxation dynamics of pyran-based D–π–A systems: solvent polarity controls the triplet state, *Phys. Chem. Chem. Phys.* **2024**, *26*, 5479-5488.
3. Jith C Janardhanan, Nisha T Padmanabhan, PJ Jandas, Nabendu V Nayar, Narayanapillai Manoj, Suresh C Pillai, Honey John, Directed morphology engineering of 2D MoS2 nanosheets to 1D nanoscrolls with enhanced hydrogen evolution and specific capacitance,

Journal of Colloid and Interface Science, **2023**, *652*, 240-249. https://doi.org/10.1016/j.jcis.2023.08.077

4. Lakshmi Srinivasan, N. Manoj, Pramod Gopinath, Plasmonic nature of graphene quantum dots-an alternative to noble metal plasmonics, *AIP Conf. Proc*. **2023**, *2783*, 050007, https://doi.org/10.1063/5.0158565
5. J. R. Haritha, Kurias K. Markose, Kiran James, T. R. Midhun, N. Manoj, M. K. Jayaraj, Synthesis of Indolocarbazole[3,2-b] derivatives and their application as hole selective layer in silicon hetero-junction solar cells, *AIP Conf. Proc*. **2023**, *2783*, 040008, https://doi.org/10.1063/5.0158415
6. Dhanu Treasa Mathew, N. Manoj, K. J. Saji, Honey John, Triboelectric nanogenerator based on industrial oriented lightweight Nylon-6,6 film, *AIP Conf. Proc*. **2023**, *2783*, 040006 https://doi.org/10.1063/5.0158594
7. A Ajayakumar, K James, OC Parvathy, PK Vineetha, M Rasheed, N Manoj, Aggregation induced emission properties of bipodal pyran based Donor-œÄ-acceptor system, *AIP Conf. Proc*. **2023**, *2783*, 030004, https://doi.org/10.1063/5.0158414
8. A Aswathy, PK Vineetha, V Kandathil, J Jose, SG Bhat, N Manoj, A Simple Live Cell Imaging "Turn-On" Fluorescence Probe for the Selective and Sensitive Detection of Aqueous Hg2+ Ions, *J. Fluorescence*, **2023** https://doi.org/10.1007/s10895-023-03390-1
9. Liz Hannah George, Sreedharan Prathapan, Narayanapillai Manoj, Prasanth Rathinam, Salbi Aadithya, GS Sailaja, A long-lived photoluminescent silver nanocluster-infused silver terephthalate metal organic framework with antibacterial and biofilm inhibition activity: a high functional resource, *J. Mater. Chem. C*, **2023**,*11*, 7772-7781.
10. Vishal Kandathil, Narayanapillai Manoj, Advances in CO2 utilization employing anisotropic nanomaterials as catalysts: a review, *Front. Chem.* **2023**, *11*:1175132., doi: 10.3389/fchem.2023.1175132
11. D Treasa Mathew, V KV, NV Nayar, N Manoj, KJ Saji, SC Pillai, H John, Surface Area Enhanced Nylon-6, 6 Nanofiber Engineered Triboelectric Nanogenerator for Self-Powered Seat Monitoring Applications, *ACS Sustainable Chemistry & Engineering* **2022**, *10 (43)*, 14126-14135.
12. K James, JC Janardhanan, K Kala, S Mathai, N Manoj, A facile Michael addition reaction of β-diketones to nitrostyrenes: Alkylamino substituted triazine as an efficient organocatalyst, Indian Journal of Chemistry, 2022, *61*, DOI: 10.56042/ijc.v61i12.69447
13. Vineetha, P. K.; Krishnan, A., Aswathy, A.; Kala, K.; James, K.; Parvathy, O. C.; Manoj, N. Pyran Based Bipodal D-π-A Systems: Colorimetric and Ratiometric Sensing of Mercury; Experimental and Theoretical Approach, *New J. Chem*., **2021**, *45*, 15780-15788.
14. Sirajunnisa, P. George, L.H., Manoj, N., Prathapan, S., Sailaja G. S. Lawsone derived Zn (ii) and Fe (iii) metal organic frameworks with pH dependent emission for controlled drug delivery *New J. Chem*., **2021**, *45*, 14589-14597.
15. Parvathy, O. C.; Aswathy, A.; James, K.; Kala, K.; Ragi, T. M.; Manoj N. A Molecular chameleon: Fluorometric to Pb^{2+}, Fluorescent Ratiometric to Hg^{2+} and Colorimetric to Ag^{+} ions, *Journal of Photochemistry and Photobiology A: Chemistry* **2021, 407, 113050** (https://doi.org/10.1016/j.jphotochem.2020.113050)
16. Seena, S.; Aswathy, A.; Manoj, N. Synthesis, Characterization and Singlet Oxygen Generation Studies of Surface-Tethered Triazatriangulenium Cations. *Materials Today Proceedings*, **2020**, *33 (2)*, 1238 - 1245 https://doi.org/10.1016/j.matpr.2020.03.487

17. Vineetha, P. K.; Aswathy, A.; Kala, K.; James, K.; Parvathy, O. C.; Manoj, N. Comparison of DSSC efficiencies in a series of D-π-A systems having heterocyclic based anchoring group, *Materials Today Proceedings*, **2020**, *33 (2)*, 1257 - 1262 https://doi.org/10.1016/j.matpr.2020.03.494
18. Recent Advances in the Transition Metal Catalyzed Synthesis of Indazoles, Janardhanan, J.; Bhaskaran, R.P.; Praveen, V.K.; Manoj, N.; Babu, B. *Asian Journal of Organic Chemistry.,* **2020**, *9*,1410-1431. 10.1002/ajoc.202000300.
19. Rani Mathew, Anju Mohan, Raina Francis, Manoj, N. Experimental investigations on the effect of non-polar and polar aprotic solvents on the reaction between furan-2-methanamine and dimethyl acetylenedicarboxylate, *Chemical Data Collections.,* **2020,** *28*, 100397.
20. Vineetha, PK.;Aswathy, A.;Shiju, K.; Chandrasekharan, K.; Manoj, N. Structure–property correlations of the nonlinear optical properties of a few bipodal D–π–A molecules – an experimental and theoretical approach, *New J. Chem.,* **2020,** *44,* 6142-6150.
21. Janardhanan, J.; James, K.; Puthuvakkal, A.; Bhaskaran, P.; Suresh, C.H.; Praveen, V.K.; Manoj, N.; Babu, B. Synthesis of hybrid polycycles containing fused hydroxy benzofuran and 1H-indazoles via a domino cyclization reaction, *New J. Chem.,* **2019,** *43*, 10166 – 10175.
22. Janardhanan, J.; Mishra, R.; Das, G.; Sini, S.; Jayamurthy, P.; Suresh, C.; Praveen, V.; Manoj, N.; Babu, B. Functionalizable 1H-Indazoles by Palladium Catalyzed Aza-Nenitzescu Reaction: Pharmacophores to Donor-Acceptor Type Multi-Luminescent Fluorophores *Asian Journal of Organic Chemistry* **2018**, *7*, 2094-2104.
23. Kala, K.; Vineetha, P. K., Manoj, N.A Simple Cost Effective Carbazole-Thiobarbituric acid Conjugate as Ratiometric Fluorescent Probe for Detection of Mercury (II) ions in Aqueous Medium. *New J. Chem.,* **2017***,41,* 5176-5181.
24. Suma, C. S.; Maheshkumar M. V.; Manoj, N. "Oxa-Bridged Donor-Acceptor Systems Containing Triazine Core for Dye Sensitized Solar Cell Application" *The Chemist*, **2017**, *90*,23-29.
25. Vineetha, P. K.; Ajina, C.; Manoj, N. Investigations on the optical limiting properties of a pyran dye in different solvents., *Proceedings of the International Conference on Materials for the Millennium*, **2016**, *1*, 227-229.
26. Kiran, J.; Parvathy, O. C.; Jith, C. J.; Manoj, N. Synthesis and study of Perylenebisimide based fluoroionophores, *Proceedings of the International Conference on Materials for the Millennium*, **2016**, *1*, 285-288.
27. Seena, S.; Manoj, N. Determination of singlet oxygen quantum yield of a water soluble triangulenium salt. *Proceedings of the International Conference on Materials for the Millennium*, **2016**, *1*, 289-292.
28. Aswathy, A; Vineetha, P. K.; Kala, K.; Manoj, N. Pyran-pyramidine conjugate for heavy metal ion detection., . *Proceedings of the International Conference on Materials for the Millennium*, **2016**, *2*, 401-403.
29. Kala, K.; Parvathy, O. C.; Manoj, N. Colorimetric detection of Hg (II) ions using a simple barbituric acid based sensor, . *Proceedings of the International Conference on Materials for the Millennium*, **2016**, *2*, 404-406.
30. Suma, C. S., Manoj, N. Thiobarbituric acid dyes for dye sensitized solar cell application, *Proceedings of the International Conference on Materials for the Millennium*, **2016**, *2*, 684-686.

31. Kala, K.; Manoj, N. A Carbazole Based "Turn on" Fluorescent Sensor for Selective Detection of Hg^{2+} in an Aqueous Medium. *RSC Advances,* **2016**, *6*, 22615-22619. DOI: 10.1039/C5RA27530J.
32. Manju, T.; Manoj, N.; Gejo, J. L.; Braun, A. M.; Oliveros, E., Micellar control of the photooxidation pathways of 10-methyl phenothiazine: electron versus energy transfer mechanisms, *Photochemical & Photobiological Sciences*, **2014,** *13*, 1744-1755.
33. Manju, T.; Manoj, N.; Braun, A. M.; Oliveros, E., Self sensitized photooxidation of N-methyl phenothiazine: acidity control of the competition between electron and energy transfer mechanisms.*Photochemical & Photobiological Sciences* **2012,** *11* (11), 1744-1755.
34. Parui, P. P.; Manoj, N.; Banerjee, S.; Chowdhury, M., Specific spin-correlation dependent magnetic field effects on radical pairs photo-generated by electron transfer from biphenyl to phenyl-pyrilium salts in micelle. *Chemical Physics Letters* **2009,** *479* (1-3), 70-75.
35. Cantau, C.; Pigot, T.; Manoj, N.; Oliveros, E.; Lacombe, S., Singlet oxygen in microporous silica xerogel: Quantum yield and oxidation at the gas-solid interface. *Chemphyschem* **2007,** *8* (16), 2344-2353.
36. Manoj, N.; Ajayakumar, G.; Gopidas, K. R.; Suresh, C. H., Structure absorption spectra correlation in a series of 2,6-dimethyl-4-arylpyrylium salts. *Journal of Physical Chemistry A* **2006,** *110* (39), 11338-11345.
37. Gejo, J. L.; Manoj, N.; Sumalekshmy, S.; Glieman, H.; Schimmel, T.; Woerner, M.; Braun, A. M., Vacuum-ultraviolet photochemically initiated modification of polystyrene surfaces: morphological changes and mechanistic investigations. *Photochemical & Photobiological Sciences***2006,** *5* (10), 948-954.
38. Alvaro, M.; Carbonell, E.; Garcia, H.; Lamaza, C.; Pillai, M. N., Ship-in-a-bottle synthesis of 2,4,6-triphenylthiapyrylium cations encapsulated in zeolites Y and beta: a novel robust photocatalyst. *Photochemical & Photobiological Sciences* **2004,** *3* (2), 189-193.
39. Parui, P. P.; Manoj, N.; Nath, D. N.; Chowdhury, M., Comparative studies of magnetic field effect on radical pairs photogenerated by electron transfer from biphenyl to derivatives of phenyl pyrilium salt and to corresponding thio salts. *Journal of Physical Chemistry A* **2004,** *108* (2), 275-280.
40. Alvaro, M.; Carbonell, E.; Domenech, A.; Fornes, V.; Garcia, H.; Narayana, M., Ship-in-a-bottle synthesis of a large guest occupying two Y zeolite neighbour supercages: Characterisation and photocatalytic activity of the encapsulated bipyrylium ion. *Chemphyschem* **2003,** *4* (5), 483-487.
41. Casades, I.; Alvaro, M.; Garcia, H.; Pillai, M. N., Photochemistry of anils in NaY zeolite. *European Journal of Organic Chemistry* **2002,** (13), 2074-2079.
42. Casades, I.; Alvaro, M.; Garcia, H.; Pillai, M. N., Modified mesoporous MCM-41 as hosts for photochromic spirobenzopyrans. *Photochemical & Photobiological Sciences* **2002,** *1* (3), 219-223.
43. Alvaro, M.; Ferrer, B.; Garcia, H.; Narayana, M., Screening of an ionic liquid as medium for photochemical reactions. *Chemical Physics Letters***2002,** *362* (5-6), 435-440.
44. Sanjuan, A.; Pillai, M. N.; Alvaro, M.; Garcia, H., Topological quenching of 2,4,6-triphenylpyrylium tetrafluoborate in anionic micelles. *Chemical Physics Letters* **2001,** *341* (1-2), 153-160.
45. Manoj, N.; Gopidas, K. R., Photophysical and electron-transfer properties of a few 2,6-dimethyl-4-arylpyrylium derivatives. *Journal of Photochemistry and Photobiology a-Chemistry* **1999,** *127* (1-3), 31-37

46. Manoj, N.; Gopidas, K. R., Inclusion complexation of a few pyrylium salts by beta-cyclodextrin studied by fluorescence, NMR and laser flash photolysis. *Physical Chemistry Chemical Physics* **1999,** *1* (11), 2743-2748.
47. Manoj, N.; Gopidas, K. R., Structure-photophysics correlation in a series of 2,6-dimethyl-4-arylpyrylium derivatives. *Chemical Physics Letters***1997,** *267* (5–6), 567-572.
48. Manoj, N.; Ajit Kumar, R.; Gopidas, K. R., Photophysical and electron transfer studies of a few 2,6-dimethyl-4-(alkylphenyl)pyrylium and thiopyrylium derivatives. *Journal of Photochemistry and Photobiology A: Chemistry* **1997,** *109* (2), 109-118.
49. Ilankumaran, P.; Manoj, N.; Chandrasekaran, S., Prop-2-ynyl as a protective group for carboxylic acids: a mild method for the highly selective deprotection of prop-2-ynyl esters using tetrathiomolybdate. *Chemical Communications* **1996,** 1957-1958
50. Manoj, N.; Gopidas, K. R., Triphenylpyrylium-salt-sensitized electron transfer oxygenation of furan derivatives. Product isolation, fluorescence quenching and laser flash photolysis studies. *Journal of Photochemistry and Photobiology A: Chemistry* **1995,** *85* (1–2), 53-61.

PROFESSIONAL AFFILIATIONS

- **Membership in Professional Bodies**

  - Chemical Research Society of India – Life member
  - Association of Chemistry Teachers – Life member
  - Swadeshi Science Movement – Life Member
  - Kerala Science and Technology Society – Life Member

- **Membership in Academic bodies**

  - Member, Senate, Cochin University of Science and Technology (CUSAT)
  - Member, Academic Council, Cochin University of Science and Technology (CUSAT)
  - Member, Board of Studies in Applied Chemistry, Cochin University of Science and Technology, Kochi, Kerala, Kerala
  - Chairman, Board of Studies in Chemical and Biological Sciences, Cochin University of Science and Technology, Kochi, Kerala
  - Member, Board of Studies in Applied Chemistry, Calicut University, Calicut, Kerala
  - Member, Board of Studies in Chemistry, Mahatma Gandhi University, Kottayam, Kerala
  - Member, Board of Studies in Chemistry, Assumption college (Autonomous), Changanasserry, Kerala; Sacred heart College, Ernakulam, Kerala
  - Resource Person, Indian National Chemistry Olympiad, HBCSE, Mumbai, 2017, 2018, 2019 and 2023

- **International Visits**

  - Visiting Fellow, Research Institute for Electronic Science (RIES), Hokkaido University, Japan,October,2018.
  - Observer, Indian Delegation,51stInternational Chemistry Olympiad, Paris, France July, 2019.

- Mentor, Indian Delegation, 55th International Chemistry Olympiad, Zurich, Switzerland, July 2023