Curriculum Vitae of Prof. M. Sankar

1.	**Name**	:	Dr. M. Sankar
2.	**Designation**	:	Professor
3.	**Affiliation**	:	Department of Chemistry Indian Institute of Technology Roorkee Roorkee 247667 Uttarakhand
4.	**Academic Qualifications**	:	
			PhD in Inorganic Chemistry, **IIT Madras**, **2005** CGPA 8.5 in Coursework
			MSc in Chemistry, School of Chemistry, **Madurai Kamaraj University**, **2001**, First Class with University Rank
			BSc in Chemistry, **University of Madras**, **1999**, First Class
5.	**Teaching/Research/ Professional Experience**	:	
	<Employer>, <Post Held>,<From>,<To>, <Nature of Duties>		
	1		IIT Roorkee, **Professor**, From 10th Aug 2020 – till date, Teaching and Research
	2		IIT Roorkee, **Associate Professor**, 2015-2020, Teaching and Research
	3		University of North Texas and University of Houston, **Visiting Professor**, May-July 2018, Teaching and Research
	4		University of North Texas, **BASE Fellow**, May-Aug 2018, Teaching and Research
	5		IIT Roorkee, **Assistant Professor**, 2011-2015, Teaching and Research
	6		University of Tsukuba, Tsukuba, Japan, **JSPS Fellow**, 2009-2011, Research
	7		University of Rennes1, Rennes, France, **CNRS Research Fellow**, 2008-2009, Research
	8		University of Bourgogne, Dijon, France, **EDIGE Postdoctoral Fellow**, 2007-2008, Research
	9		Tel-Aviv University, Tel-Aviv, Israel, **Postdoctoral Researcher**, 2005-2007, Research
	10		IIT Madras, **CSIR - Senior Research Fellow**, 2004-2005, Research
	11		IIT Madras, **CSIR - Junior Research Fellow**, 2001-2004, Research

5.	**Award and Honors**	:		
	1.	**Qualified in the Graduate Aptitude Test in Engineering (GATE)** through national wide held on February 2001 organized by Indian Institute of Technology Kanpur (IITK).		
	2.	Qualified in Council of Scientific and Industrial Research-National Eligibility Test (CSIR-NET) **for research program organized by CSIR New Delhi held during July 2001.**		
	3.	**Recipient of State Level Scholarship from Tamil Nadu State Government**, India from June 1993 to June 1996 for four years after qualifying Talent exam.		
	4.	**Recipient of Israel-US binational scheme fellowship** during 2005-2007		
	5.	**Recipient of EDIGE merit postdoctoral fellowship from Bourgogne Regional Council** for foreign researchers during 2007-2008.		
	6.	**Recipient of merit fellowship from French National Centre for Scientific Research (CNRS)** during 2008-2009		
	7.	**Recipient of the Japan Society for Promotion of Sciences (JSPS) Fellowship** for foreign scholars during 2009-2011**.**		
	8.	**'MRSC' Conferred by the Royal Society of Chemistry, Cambridge, UK** in 2017.		
	9.	**Selected for** Outstanding Young Researcher Award **(with Institute Research Fellowship) from IIT Roorkee in 2017.**		
	10.	**Selected for Bhaskara Advanced Solar Energy (BASE) Fellowship for the year 2018** to work at the University of North Texas, Denton, TX, USA.		
	11.	**Worked as a Visiting Professor at the University of North Texas** and the **University of Houston** from May to July 2019.		
	12.	**'FRSC' Conferred by the Royal Society of Chemistry, Cambridge, UK in 2020**.		
	13.	Recipient of **the Outstanding Teacher Award by IIT Roorkee in 2021**.		
	14.	Recipient of **the Chemical Research Society of India (CRSI) Bronze Medal for the year 2023**.		
6.	**Research Guidance**	:	**15** (completed) + **12** (Ongoing)	
(i)	**Doctoral Thesis**	:	**15** (**Co-supervisor**: **Nil** in all cases)	
	<Name of Student>, <Title>,<Year>,<Co-supervisor (if any)> (Degree awarded only)			
	1	**Ravi Kumar**, Synthesis and Applications of *β*- and *Meso*-Substituted Porphyrins, 2015. **Current Position**: **Asst. Professor**, **NIT Srinagar**, Jammu & Kashmir.		
	2	**Mandeep Kaur Chahal**, Design of Porphyrinoids and 1,8-Naphthyridine Hosts for Fluoride, Cyanide and Picric Acid Sensing, 2017. **Current Position**: **Lecturer**, **University of Kent**, Canterbury, UK.		

	3	**Nitika Grover**, *β*-Substituted 'Push-Pull' Porphyrinoids: Synthesis, Photophysical and Electrochemical Redox Properties, 2017. **Current Position**: **Asst. Professor**, **BITS Pilani**, Pilani Campus, Rajasthan.
	4	**Pinky Yadav**, Synthesis and Applications of Functionalized Corroles and Porphyrins, 2017. **Current Position**: **Inspire Faculty**, **IIT Delhi**, New Delhi
	5	**Nivedita Chaudhri**, *β*-Functionalized Chlorins and Porphyrins: Synthesis, Spectral and Redox Properties, 2018. **Current Position**: **Assistant Professor**, **GNDU**, Amritsar, Punjab.
	6	**Kamal Prakash**, Functionalized Porphyrins and Their Application in DSSC, Electrocatalysis and Anion Sensing, 2018. **Current Position**: **NPDF**, **IIT Indore**
	7	**Tawseef Ahmad Dar**, Diverse Functionalized Porphyrins for Catalytic, EET and Sensor Applications, 2018. **Current Position**: **Assistant Professor**, **Univ. of Kashmir**, Jammu & Kashmir.
	8	**Pinky Rathi**, Synthesis of Meso/*β*-Functionalized Porphyrins and Their Application in Anion Sensing, Nonlinear Optics (NLO) and Complexation with Fullerenes, 2019. **Current Position**: **Assistant Professor**, **SIET**, Haryana.
	9	**Sandeep Kumar,** *Meso/β*-Functionalized Porphyrins and Chlorins: Synthesis, Spectral and Electrochemical Redox Properties and Their Utilization in NLO, Catalysis and Sensing, 2022. **Current Position**: **PDF**, Université de Versailles St Quentin en Yvelines (UVSQ), Paris, France.
	10	**Renu Kumari Rohal,** Unsymmetrical *β*-Functionalized Porphyrns: Synthesis, Spectral, and Electrochemical Redox Properties, and Their Utilization in Nonlinear Optics, 2022. **Current Position**: **PDF**, **IIT Delhi**, New Delhi.
	11	**Inderpal,** Synthesis, Spectral and Electrochemical Redox Properties of *Meso*/*β*-Functionalized Corroles for Sensing, NLO and Catalytic Applications, 2022. **Current Position**: **CNRS Postdoc**, **University of Rennes1**, **Rennes**, France.
	12	**Soni Kumari,** Synthesis, Spectral and Electrochemical Redox Properties of *β*-Functionalized Porphyrins and Their Utilization in Nonlinear Optics and Catalysis, 2024.
	13	**Amir Sohel Bulbul,** Facile Synthesis, Structural, Spectral and Electrochemical Studies of π-extended NIR Absorbing Porphyrins and Their Utilization in Nonlinear Optics and Electrocatalysis, 2024. **Current Position**: **Assistant Professor**, **CBR University**, Bengaluru, Karnataka.
	14	**Mohammad Tasleem,** Porphyrins-Carbon Nanotubes Conjugates: Synthesis, Characterization and Their Applications, 2024. **Current Position**: **PDF**, **IIT Ropar**, Ropar, Punjab.
	15	**Pradeep Singh Thakur,** Porphyrin-based Nanomaterials for Advanced Applications, 2025.

(ii)	**Masters' Thesis**	:	**38 (Completed)** + 04 (Ongoing)
	<Name of Student>, <Title>, <Year>,<Co-supervisor (if any)> (Degree awarded only)		
		List of M. Tech Students guided: 13 (Project duration: One year)	
	1	**Richa Yadav**, Synthesis and Catalytic Applications of Metalloporphyrins, 2012	
	2	**Amit Kumar**, Synthesis of Novel Porphyrin Derivatives *via* Pd Catalyzed Coupling Reactions, 2013.	
	3	**Amit Kumar**, Synthesis of Novel A_3B Porphyrins for DSSC Applications, 2014.	
	4	**Amit Singh Rajput**, Doping Effect in Multiferroic $YMnO_3$, 2014.	
	5	**Bijjam Madhusudhan,** Porphyrin Structures for Material and Biomedical Applications, 2015.	
	6	**Amit Saxena**, Detection of Toxic Ions by Electron Deficient Metalloporphyrinoids, 2016.	
	7	**Upasana Sah**, Synthesis and Applications of β-Functionalized Porphyrinoids and Porphyrin Appended CNTs, 2017.	
	8	**Gaurav**, Synthesis of β-Functionalized Metalloporphyrins and Their Applications, 2018.	
	9	**Ankit Sharma**, Synthesis and NLO Studies of Arylaminoporphyrins, 2019.	
	10	**R. Abinaya**, Porphyrinoid Incorporated Biocompatible Nanogels for Medicinal Applications, 2020.	
	11	**Ritin Kamboj**, Synthesis and Characterization of Functionalized Porphyrins and Biodegradable Polymers, 2020.	
	12	**Dinesh Suwalka**, Synthesis and Characterization of β-Octasubstituted Corroles and Their Metal Complexes, 2021.	
	13	**Antara Srivastava**, Porphyrin Appended Nanomaterials and Their Electrocatalytic and Sensing Applications, 2024.	
		List of M. Sc Students guided: 25 (Project duration: One/two semester(s))	
	14	**Rupa Mukherjee**, Synthesis and Functionalization of A_3 Corroles and Their Cu(III) Complexes, 2012.	
	15	**Bhupinder**, Synthesis of Studies on Various Cyanoporphyrins, 2013.	
	16	**Anagh Mukherjee**, Synthesis and Studies on Boronic Esters Appended Porphyrins, 2014.	
	17	**Mohina Gidwani**, Synthesis and Studies on β-substituted Porphyrins, 2015.	
	18	**Kumari Anshul**, Syntheses and Studies of Asymmetrically β-Substituted Porphyrins through Michael Addition Reactions, 2016	

	19	**Simran Preet**, Synthesis, Spectral and Electrochemical Studies of β/*meso*-Substituted Corroles, 2016.
	20	**Shweta Manchanda**, Synthesis of *β*-Functionalized "Push-Pull" Zn(II) Porphyrins for DSSC Applications, 2017.
	21	**Mandeep**, Synthesis of π-Extended Porphyrins and Their Properties, 2018.
	22	**Ekta**, *β*-Functionalized 'Push-Pull' Porphyrins: Synthesis, Photophysical and Electrochemical Redox Properties, 2019.
	23	**Aayushi Gupta**, Synthesis and Spectral Studies of Extended π-Conjugated Benzoporphyrins, 2019.
	24	**Divyansh Dhiman**, *β*-Disubstituted Silver Corroles: Regioselective Synthesis, Structural, Spectral and Electrochemical Redox Properties, 2020.
	25	**Piyush Gupta**, *Meso*-Functionalized Phenothiazinyl porphyrins: Synthesis, Photophysical and Electrochemical Properties, 2020.
	26	**Tavleen Manchanda**, Development of Carboxy Dodecaphenylporphyrin based Nanochannels as Hosts for Various Electron Donors, 2020.
	27	**Narendra Kumar**, Synthesis and Characterization of Functionalized Porphyrins and Their Metal Complexes, 2021.
	28	**Saransh Negi**, Selective Synthesis and Characterization of 2,3,17-Trisubstituted Metalloporphyrins, 2021.
	29	**Sourabh Kumar**, Synthesis of Porphyrinic Metal-Organic Framework Solids for Materials Applications, 2021.
	30	**Neeraj Kumar**, Synthesis, Spectral, Electrochemical Redox Properties of β-Functionalized Porphyrins and Their Metal Complexes, 2022.
	31	**Siddharth S**, *β*-Cyanoporphyrins: Synthesis, Spectral, Electrochemical Redox properties and its Catalytic applications, 2022.
	32	**Ram Ratan Kaswan**, Synthesis of β-Substituted Molybdenum Corroles for Catalytic Applications, 2022 (Integrated MSc, One year project).
	33	**Dimpel**, Synthesis, Spectral and Electrochemical Properties of Functionalized Porphyrins and Their Electrocatalytic ORR Activity, 2023 (One year project).
	34	**Komal**, Synthesis, Spectral and Electrochemical Studies of *β*-Functionalized π-Extended Porphyrins and Their Utilization in Sensing, 2023 (One year project).
	35	**Deepak**, Synthesis of β-Functionalized Water-soluble Porphyrins and Corroles for Biological Applications, 2024 (One year project).
	36	**Himani**, Exploring Highly Distorted Persubstituted Triphenylamine bearing Porphyrin for distinct applications: Catalysis and Host-guest chemistry, 2024 (One year project).

	38	**Isha Jain**, Efficient Hole Transfer Dynamics between Cesium Lead Bromide Perovskite Nanocrystals and *Meso*-Functionalized Porphyrin Acceptor, 2024 (One year project).
7.	**Sponsored Projects** :	**Rs. 226 Lakhs** as **PI**
	(a)	**As PI (Rs. 226 Lakhs, 09** (Completed) + **02** (Ongoing))
	<Title>, <Sponsoring Agency>, <Amount>, <Duration>,< (completed)/(ongoing)>	
	1	Synthesis of Zn(II) complexes of Carboxylic acid Substituted Porphyrins for Dye-Sensitized Solar Cells (DSSC) Applications, SRIC, IIT Roorkee, 4.75 Lakhs, 2012-2015, Completed.
	2	Photophysical and Photovoltaic Properties of Novel Porphyrin-Fullerenes Host-Guest Assemblies, Council for Scientific and Industrial Research (CSIR), New Delhi, 25.80 Lakhs, 2012-2015, Completed. No. CSR-682-CMD.
	3	Synthesis of Electron Donors appended Carboxyphenyl Substituted Porphyrin Zn(II) complexes (D-π-A) for DSSC Applications, Science and Engineering Research Board (SERB), New Delhi, 27.6 Lakhs, 2013-2016, Completed. No. SER-735-CMD.
	4	Porphyrin-based Novel Donor-π-Linker-Acceptor Systems for DSSC Applications, Board of Research for Nuclear Sciences (BRNS), Department of Atomic Energy, Mumbai, 23.785 Lakhs, 2013-2016, Completed. No. DAE-702-CMD.
	5	Synthesis of Novel Metalloporphyrins for Dye-sensitized Solar Cell (DSSC) and Homogenous/Heterogeneous Catalytic Applications, Science and Engineering Research Board (SERB), New Delhi, 19.20 Lakhs, 2017-2018, Completed under N-PDF and I worked as Mentor for this project. No. SER-1038-CMD.
	6	Synthesis and Studies on Prophyrin Novel Donor-Acceptor systems for Artificial Photosynthesis and Photovoltaic Applications, 9.09 Lakhs, 2018, For BASE availing Fellowship from IUSSTF and DST, New Delhi. No. IUS-1200-CMD.
	7	Synthesis of Nolvel β-Functionalized Porphyrins for Dye-Sensitized Solar Cell (DSSC), Nonlinear Optics (NLO) and Anion Sensing Applications, Science and Engineering Research Board (SERB), New Delhi, 31.80 Lakhs, 2017-2020, Completed. No. SER-1109-CMD.
	8	Synthesis of π-Extended Corroles, Chlorins and Porphyrins for Anion Sensing, Catalysis, Nonlinear Optical and Solar Cell Applications, Science and Engineering Research Board (SERB), New Delhi, 54 Lakhs, 2020-2023, Completed, No. SER-1625-CMD.
	9	High-end Workshop on Solar Cells (Theory + Hands-on Training) was conducted during 18th to 24th July 2022. The workshop was sponsored (Rs. 5

		Lakhs) by SERB under Accelerate Vigyan Scheme. Completed, No. Workshop-112-CMD.		
	10	Synthesis of *Meso* and/or *β*-Functionalized Porphyrins for Solar Cell and Catalytic Applications, Council of Scientific and Industrial Research (CSIR), New Delhi, 10 Lakhs, 2021-2025. Ongoing, No. CSR-1814-CMD.		
	11	Synthesis, Reactivity and Catalytic Activity of Vanadium, Molybdenum and V-Mo Mixed-metal Complexes of Polydentate Ligands, Anusandhan National Research Foundation (ANRF), New Delhi, 10.05 Lakhs, 2024-2027. Completed, No. ANR-2518-CMD.		
	(b)	**SMILE Projects: as PI (01, 4.51 Crores) and as co-PI (04, Rs. 13.256 Crores)**		
	1	Funded by SRIC under SMILE Scheme, IIT Roorkee for the purchase of the following equipment Stopped-flow Spectrofluorometer - 80 Lakhs Integrated Analyzer with High Temperature Vacuum Furnace - 40 Lakhs Low Resolution Mass Spectrometer - 90 Lakhs Time Resolved Fluorescence and Sum Frequency Generation Spectroscopy - 561.6 Lakhs		
	2	**Working as a Co-PI for the FIST Project funded by DST (2019-2024)** Proposal ID: TPN/19773; SRIC Entry: DST-1384-CMD Aim: To strengthen the postgraduate teaching and research facilities in the department Equipment sanctioned: (i) 500 MHz NMR and (ii) Single Crystal XRD Total amount sanctioned: **5.94 Crores**		
	3	Working as PI for the **MALDI TOF/TOF Mass Spectrometer** Developing Mass Spectrometric Laboratory for wide variety of samples SRIC Entry: SMILE-28-2022 Total amount sanctioned: **4.51 Crores**		
8.	**Consultancy Projects**	:	01 (Worked as one of the PI for the cement analysis and quality control lab, we had a project worth 55 lakhs to help construction consultancies to improve the quality of building materials, especially cement samples)	
9.	**Patents Filed/Awarded**	:	01 (Patent on Low-cost Sensors for the Naked-eye and Selective Detection of Cyanide Ions in Drinking Water is submitted for approval in progress)	
10.	**List of Publications** Please provide WoS	:	WoS Research ID: X-5941-2019 Scopus ID: 6701530390 *h*-index 28; *i*10-index 86; citations 2838	

	Researcher ID & Scopus ID		
(i)	**Journals**	:	**150**
	Total no of publications: 150; after joining IITR: 125; Citations: 2838; *h*-index 28; *i*10-index 86 (Q1 = 91; Q2 = 41; Q3 = 17; Q4 = 01) (ACS - 33, RSC - 42, Wiley - 19, Elsevier -17, World Scientific publishers - 18, IUCr – 13, Springer - 2, ECS - 1, Thieme - 1)		
	Citations since 2020: 1790; *h*-index 21; *i*10-index 66 **Journal Articles published from 2017 to Jan 2025: 102 (Q1 = 67; Q2 = 30; Q3 = 04; Q4 = 01)**		
Q1	1.	P. K. Thakur, and **M. Sankar***, 'Fe-porphyrin-derived carbon nanofiber-based nanozymes: enhanced peroxidase-like activity for ultrasensitive glucose and ascorbic acid sensing' ***Mater. Adv*. 2025**, *6*, 2356-2364.	
Q1	2.	P. K. Thakur, V. Singh, V. Ganesan, and **M. Sankar***, 'Porphyrin-Based Covalent Organic Framework Encapsulating Multiwalled Carbon Nanotubes: A High-Performance Electrocatalyst for Oxygen Reduction Reaction' ***Langmuir* 2025**, *41*, DOI: 10.1021/acs.langmuir.5c00359.	
Q1	3.	V. Bhardwaj, and **M. Sankar***, 'Synthesis, Spectral, and Electrochemical Studies of Electron-Deficient Nitrile Porphyrins and the Utilization in Selective Cyanide Sensing' Dalton ***Trans*. 2025**, *54*, 5406-5418.	
Q1	4.	A. S. Bulbul, J. Mogilipuri, S. V. Rao, and **M. Sankar***, 'Meso-β, β–β' trifused porphyrins: synthesis, spectral, electrochemical and DFT studies and their femtosecond third-order nonlinear optical properties' ***Dalton Trans*. 2025**, *54*, 3679-3694.	
Q1	5.	N. Rana, S. Kumari and M. Sankar* 'Effect of Protonation-Induced Distortions on the Spectral Properties and Electronic Structure of Octaphenylporphyrins through UV-Vis and VT-NMR Spectral, Electrochemical and *Ab Initio* Studies' ***Chem. Asian J*. 2024**, *19*, e202400719.	
Q1	6.	A. S. Bulbul, R. Jangra, A. Kuriakose, J. N. Acharyya, G. V. Prakash and M. Sankar* '*Meso-β* Monofused Porphyrins: Synthesis, Structural, Spectral, Electrochemical and DFT Studies and Their Efficient Third-Order Nonlinear Optical Properties' ***Chem. Eur. J*. 2024**, *30*, e202403473.	
Q1	7.	R. Kumar, P. K. Chaudhary, R. Prasad and M. Sankar* 'Utilization of Tin(IV) Complex of N-Confused Porphyrin for Antiproliferative Activity and Antimicrobial Photodynamic Chemotherapy' ***Chem. Asian J*. 2024**, *19*, e202401027.	
Q1	8.	M. Tasleem, I. Ahmad and **M. Sankar*** 'Porphyrin-Based Covalent Organic Polymer Wrapped MWCNT Electrodes under Moderate Salt Concentration for	

		Super-Stable Aqueous Sodium-Ion Intercalated Sustainable Supercapacitor' ***Small* 2024**, 2409580.
Q1	9.	I. Yadav, D. Dhiman and **M. Sankar*** 'Recent Advances in the Functionalization of Formyl and Acroleyl Appended Corroles' ***Chem. Commun***. **2024**, *60*, 13456-13467 (*Highlighted in the cover page of the journal*).
Q1	10.	R. Kumar, V. Prakash and **M. Sankar*** 'Synthesis of Vanadyl Complexes of N-Confused Porphyrins and Their *Bromoperoxidase*-like Catalytic Activity' ***Inorg. Chem.* 2024**, *63*, 12506–12515.
Q1	11.	S. Kumar, A. Patter and **M. Sankar*** 'Enhanced Catalytic Activity of Binuclear Oxidovanadium(IV) Bisbenzimidazole Linked Porphyrin Dimer for the Generation of Biologically Active 3,4-Dihydropyrimidinones and Their Corresponding Thiones' ***Inorg. Chem.* 2024**, *63*, 11102–11112.
Q1	12.	M. Tasleem, V. Singh, A. Bansal, V. Ganesan and **M. Sankar*** 'Electrocatalysis Using Cobalt Porphyrin Covalently Linkedwith Multi-Walled Carbon Nanotubes: Hydrazine Sensingand Hydrazine-Assisted Green Hydrogen Synthesis' ***Small* 2024**, 2401273.
Q1	13.	F. D'Souza, M. Sankar and coworkers 'Electrocatalytic Dinitrogen Reduction to Ammonia Using Easily Reducible N-Fused Cobalt Porphyrins' ***Chem. Eur. J.* 2024**, *30*, e202402610 (*Highlighted in the cover page of the journal*).
Q3	14.	M. Tasleem, P. Chaudhry, R. Prasad and **M. Sankar*** 'Synthesis and Characterization of Porphyrin-MWCNT Nanohybrid and its Utilization as an Antimicrobial Agent against *S. aureus* and *E. coli*' ***J. Porphyrins Phthalocyanines* 2024**, *28*, 308-317.
Q3	15.	S. Kumari, V. Prakash, M. R. Maurya and **M. Sankar*** 'The Synthesis of Highly Nonplanar Oxidovanadium(IV) Porphyrins as Robust Catalysts for Oxidative Bromination of Phenols in Aqueous Medium' ***J. Porphyrins Phthalocyanines* 2024**, *28*, 225-235.
Q1	16.	A. S. Bulbul, V. Rathour, V. Ganesan and **M. Sankar*** 'π-Extended nonplanar cobalt porphyrins immobilized on MWCNTs as efficient electrocatalysts for selective oxygen reduction reaction' ***Chem. Commun***. **2024**, *60*, 3146-3149 (*Selected for the cover page illustration*).
Q2	17.	M. R. Maurya, V. Prakash and **M. Sankar*** '*Trans*-Dioxidomolybdenum(VI) Porphyrins and their Catalytic Activity Mimicking Oxidative Bromination' ***Eur. J. Inorg. Chem.* 2024**, *27*, e202400001.
Q2	18.	S. Kumari, V. Prakash, Siddharth S, M. R. Maurya and **M. Sankar*** 'Synthesis, Structural and Redox Properties of Vanadyl *β*-Cyanoporphyrin and its

		Utilization as Efficient Catalyst for Epoxidation of Olefins and Oxidative Bromination of Phenol' ***Eur. J. Inorg. Chem.* 2024,** *27*, e202300718.
Q2	19.	M. R. Maurya, V. Prakash F. Avecilla and **M. Sankar*** 'Facile Synthesis of *β*-Brominated Manganese Porphyrins and their Catalytic Potentials for *Haloperoxidases*-Like Activity' ***Eur. J. Inorg. Chem.* 2024**, *27*, e202300708.
Q2	20.	A. K. Deval and **M. Sankar*** 'Structural, photophysical, and electrochemical redox properties of *meso*-tetrakis(pentafluorophenyl)porphyrins' ***J. Porphyrins Phthalocyanines* 2024**, *28*, 87-106.
Q1	21.	A. Shukla, S. Kumari, **M. Sankar**, M. S. Nair 'Insights into the Mechanism of Binding of Doxorubicin and a Chlorin Compound with 22-mer c-Myc G Quadruplex' ***BBA-Gen. Sub.* 2023, 1867**, 130482.
Q1	22.	I. Yadav and **M. Sankar*** 'Panchromatic and Perturbed Absorption Spectral Features and Multiredox Properties of Dicyanovinyl- and Dicyanobutadienyl-Appended Cobalt Corroles' ***Inorg. Chem.* 2023**, *62*, 19956–19970.
Q2	23.	I. Yadav, V. Prakash, R. R. Kaswan, M. R. Maurya and **M. Sankar*** 'Highly Efficient *β*-Functionalized Oxidomolybdenum(V) Corroles for Catalytic Oxidative Bromination of Phenols at Room Temperature' ***Eur. J. Inorg. Chem.* 2023**, *26*, e202300459.
Q2	24.	M. R. Maurya, V. Prakash, I. Yadav and **M. Sankar*** 'Effect of *para*-Substituents on meso-Functionalized Oxidovanadium(IV) Porphyrins as Catalysts for Oxygen Atom Transfer Mediated Oxidation of Benzoin to Benzil under Mild Conditions' ***Eur. J. Inorg. Chem.* 2023**, *26*, e202300374.
Q1	25.	M. Shanu, J. N. Acharyya**, M. Sankar*** and G. V. Prakash, Enhanced Femtosecond Nonlinearities and Multiphoton Absorptions in Discrete Bands of Porphyrins, ***Inorg. Chem.* 2023**, *63*, 12895-12094.
Q1	26.	I. Yadav, J. K. Sharma, **M. Sankar*** and F. D'Souza, Symmetrically Functionalized Copper and Silver Corrole-Bis-Tetracyanobutadiene Push-Pull Conjugates: Efficient Population of Triplet States *via* Charge Transfer, ***Chem. Eur. J.* 2023**, *29*, e202301341 (*Highlighted in the cover page of the journal*).
Q1	27.	R. K. Rohal, D. Banerjee, T. Manchanda, V. Bhardwaj, S. V. Rao, and **M. Sankar***, Synthesis and the Spectral, Electrochemical, and Nonlinear Optical Properties of *β*-Dicyanovinyl-Appended 'Push-Pull' Porphyrins, ***Dalton Trans*. 2023**, *52*, 5523-5533.
Q1	28.	S. Kumari, I. Yadav, M. Shanu, J. N. Acharyya, G. V. Prakash, and **M. Sankar***, Push–pull octaphenylporphyrins with mixed substituents pattern: Synthesis,

		redox, ultrafast dynamics and nonlinear optical studies, ***Dyes and Pigments*** **2023**, *217*, 111416.
Q1	29.	I. Yadav, W. R. Osterloh, K. M. Kadish and **M. Sankar***, Synthesis, Spectral, Redox, and Sensing Studies of β-Dicyanovinyl-Appended Corroles and Their Metal Complexes, ***Inorg. Chem.*** **2023**, *63*, 7738-7752.
Q1	30.	I. Yadav, V. Prakash, M. R. Maurya and **M. Sankar***, Oxido-Molybdenum(V) Corroles as Robust Catalysts for Oxidative Bromination and Selective Epoxidation Reactions in Aqueous Media under Mild Conditions, ***Inorg. Chem.*** **2023**, *63*, 5292-5301.
Q3	31.	P. Rathi, K. Prakash and **M. Sankar***, β-Functionalized Palladium(II) Porphyrins: Facile Synthesis, Structural, Spectral, and Electrochemical Redox Properties, ***J. Porphyrins Phthalocyanines*** **2023**, *27*, 201-208 (***Invited Article on the occasion of 70th Birthday of Prof. Tomas Torres***).
Q1	32.	M. R. Maurya, V. Prakash, F. Avecilla and **M. Sankar***, Facile Synthesis of β-Tetracyano Vanadyl Porphyrin from Its Tetrabromo Analogue and Its Excellent Catalytic Activity for Bromination and Epoxidation Reactions, ***ACS Omega*** **2023**, *8*, 6391-6401.
Q2	33.	M. R. Maurya, V. Prakash, I. Yadav and **M. Sankar***, Effect of para-Substituents on Meso-Functionalized Oxidovanadium(IV) Porphyrins as Catalysts for Oxygen Atom Transfer Mediated Oxidation of Benzoin to Benzil under Mild Conditions, ***Eur. J. Inorg. Chem.*** **2023**, e202300374.
Q1	34.	M. Tasleem, V. Singh, V. Ganesan and **M. Sankar*,** Co(II) Porphyrin-MWCNT Nanoconjugate as an Efficient and Durable Electrocatalyst for Oxygen Reduction Reaction, ***Langmuir*** **2023**, *39*, 8075-8082.
Q1	35.	Yadav, M. Shanu, J. N. Acharyya, G. V. Prakash, and **M. Sankar***, Ultrafast Dynamics and Strong Two-Photon Absorption Properties of Nonplanar β-Functionalized "Push−Pull" Copper Corroles with a Mixed Substituent Pattern, ***Inorg. Chem.*** **2022**, *61*, 9968-9982.
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Q2	121.	J. Michalak, K. P. Birin, **M. Sankar**, E. Ranyuk, Y. Y. Enakieva, Y. G. Gorbunova, C. Sterna, A. Lemeune and R. Guilard, "Synthesis of porphyrin-*bis*(polyazamacrocycle) triads *via* Suzuki coupling reaction", ***J. Porphyrins Phthalocyanines*****, 2014,** *18*, 35-48.
Q2	122.	O. Mongin, **M. Sankar**, M. Charlot, M. Youssef and M. Blanchard-Desce, "Strong enhancement of two-photon absorption properties in synergic 'semi-disconnected' multiporphyrin assemblies designed for combined imaging and photodynamic therapy", ***Tetrahedron Lett.*** **2013**, *54*, 6474-6478.
Q1	123.	T. Ishizuka, **M. Sankar** and T. Kojima, "Control of the spatial arrangements of supramolecular networks based on saddle-distorted porphyrins by

		intermolecular hydrogen bonding", ***Dalton Trans.*** **2013**, *42*, 16073-16079.
Q1	124.	T. Ishizuka, **M. Sankar**, Y. Yamada, S. Fukuzumi and T. Kojima, "Porphyrin Nanochannels reinforced by hydrogen bonding", ***Chem. Commun.*** **2012**, *48*, 6481-6483.
Q2	125.	**M. Sankar**, T. Ishizuka, Z. Wang, T. Ma, M. Shiro and T. Kojima, "Synthesis, Structure and Physicochemical Properties of a Saddle-Distorted Porphyrin with a Peripheral Carboxyl Group", ***J. Porphyrins Phthalocyanines*** **2011,** *15*, 421-432 (***Invited Article on the occasion of 60th Birthday of Prof. John A. Shelnutt***).
Q1	126.	A. Lemeune, C. Morkos, **M. Sankar** and R. Guilard, "Synthesis of amino-pyridine phosphonates *via* palladium catalyzed coupling reaction using pyridylbromide and diethylphosphite", ***Synthesis*** **2008**, 1575-1579.
Q1	127.	**M. Sankar**, S. Lipstman and I. Goldberg, "Rational Design of Supramolecular Chirality in Porphyrin Assemblies. The Halogen Bond Case", ***Chem. Commun.*** **2008**, 1777-1779**.**
Q1	128.	S. Lipstman, **M. Sankar** and I. Goldberg, "Supramolecular reactivity of porphyrins with mixed iodophenyl and pyridyl *meso*-substituents", ***Cryst. Growth Des.*** **2008**, *8*, 1682-1688.
Q1	129.	**M. Sankar,** S. Lipstman, S. George, and I. Goldberg, "Porphyrin Framework Solids. Synthesis and Structure of Hybrid Coordination Polymers of Tetra(*m*/*p*-carboxyphenyl) porphyrins and Lanthanide Bridging Ions", ***Inorg. Chem.*** **2007**, *46*, 5544-5554.
Q1	130.	S. Lipstman, **M. Sankar**, S. George and I. Goldberg, "Framework coordination polymers of tetra(4-carboxyphenyl)porphyrin and lanthanide ions in crystalline solids", ***Dalton Trans.*** **2007**, 3273-3281.
Q1	131.	S. George, S. Lipstman, **M. Sankar** and I. Goldberg, "Porphyrin network solids: examples of supramolecular isomerism, noncentrosymmetric architectures and competing solvation", ***CrystEngComm.*** **2006**, *8*, 417-424.
Q1	132.	I. Goldberg, **M. Sankar**, S. George and S. Lipstman, "Self-assembly of uniquely structured porphyrin network solids by charged N-H----Cl and N-H---O hydrogen bonds", ***CrystEngComm.*** **2006**, *8*, 784-787.
Q1	133.	S. Lipstman, **M. Sankar**, S. George and I. Goldberg, "The effects of strong Lewis-base reagents on supramolecular hydrogen bonding of *meso*-Tetra(carboxyphenyl) porphyrins", ***CrystEngComm.*** **2006**, *8*, 601-607 (***Selected as hot article in the RSC website***).
Q1	134.	P. Bhyrappa, **M. Sankar** and B. Varghese, "Mixed substituted porphyrins:

		Structural and electrochemical redox properties", ***Inorg. Chem.*** **2006**, *45*, 4136-4149.
Q2	135.	P. Bhyrappa, **M. Sankar**, B. Varghese and P. Bhavana "*Meso*-Tetrathienylporphyrins: steady-state emission and structural properties", ***J. Chem. Sci.*** **2006**, *118*, 393-397.
Q2	136.	**M. Sankar**, P. Bhyrappa, B. Varghese, K. K. Praneeth, and G. Vaijayanthimala, "*Meso*-tetrakis(3´,5´-disubstitutedphenyl)porphyrins: Structural electrochemical redox and axial ligation properties", ***J. Porphyrins Phthalocyanines*** **2005**, *9*, 413-422.
Q2	137.	**M. Sankar**, C. Arunkumar, and P. Bhyrappa, "Unusual solvent dependent electronic absorption spectral properties of Ni(II) and Cu(II) perhaloporphyrins", ***J. Porphyrins Phthalocyanines*** **2004**, *8*, 1343-1355.
		Structural Communications on Symmetrical and Unsymmetrical Porphyrinic Networks:
Q3	138.	**M. Sankar**, S. Lipstman and I. Goldberg, "Borylated porphyrins: 5,10,15,20-tetrakis(5,5- dimethyl-1,3,2-dioxaborinan-2-yl)porphyrin nitrobenzene disolvate", ***Acta Crystallogr.*** **2008**, *C64*, o117-o119 (***Selected for Cover Page Illustration***).
Q3	139.	**M. Sankar**, S. Lipstman and I. Goldberg, "Hydrogen-bonded assemblies of 20-(4- pyridyl)porphyrin-5^4,10^4,15^4-tribenzoic acid with dimethyl sulfoxide and 4-acetylpyridine in their dimethyl sulfoxide and tetrahydrofuran solvates", ***Acta Crystallogr.*** **2007**, *C63*, o395-o399.
Q3	140.	S. Lipstman, **M. Sankar** and I. Goldberg, "The nature of supramolecular interactions in tetrakis(4-iodophenyl)porphyrin and its zinc(II) complex", ***Acta Crystallogr.*** **2007**, *C63*, m300-m303.
Q3	141.	S. Lipstman, **M. Sankar** and I. Goldberg, "Interwoven hydrogen-bonded network assembly and supramolecular isomerism of *meso*-5,10,15,20-tetrakis(4-carboxy- phenyl)porphyrin as its dimethylformamide solvate", ***Acta Crystallogr.*** **2007**, *C63*, o371- o373.
Q3	142.	**M. Sankar**, S. Liptsman and I. Goldberg, "Clathrate solvates of tetrakis(4-methoxy carbonylphenyl)porphyrin and its zinc(II)-pyridine complex, in which the porphyrin host structures are stabilized by porphyrin-porphyrin stacking and C-H---O attractions" ***Acta Crystallogr.*** **2006**, *C62*, m140-m143.
Q3	143.	**M. Sankar**, S. Lipstman and I. Goldberg, "Supramolecular assembly of (methanol)[5-(4'-pyridyl-10,15,20-tris(4'-cyanophenyl)porphyrinato]zinc(II) by intermolecular hydrogen bonding and weak coordination" ***Acta***

		***Crystallogr.* 2006**, *C62*, m477-m479.
Q3	144.	**M. Sankar**, S. Lipstman and I. Goldberg, "Poly[[[*m*-5,10,15,20-tetrakis(4-methoxy carbonylphenyl)porphyrinato(2-)]zinc(II)] N,N'-dimethylacetamide disolvate]", ***Acta Crystallogr.* 2006**, *C62*, m495-m497.
Q3	145.	S. Lipstman, **M. Sankar** and I. Goldberg, "Hydrogen-bonded supramolecular arrays of aqua[5-(4'-carboxyphenyl)-10,15,20-triphenylporphyrinato]zinc(II) in crystals of its nitrobenzene disolvate", ***Acta Crystallogr.* 2006**, *C62*, m538-m540.
Q3	146.	**M. Sankar**, S. Liptsman and I. Goldberg, "A nitrobenzene and dimethyl-formamide clathrate of (pyridine)[5,10,15-tris(4-cyanophenyl)-20-(2-quinolyl)porphyrinato] zinc(II)", ***Acta Crystallogr.* 2006**, *E62*, m753-m756.
Q3	147.	S. Lipstman, **M. Sankar** and I. Goldberg, "Tetrakis(3'-chlorophenyl) porphyrinato) zinc(II)", ***Acta Crystallogr.* 2006**, *E62*, m782-m784.
Q3	148.	S. Lipstman, **M. Sankar** and I. Goldberg, "[(DMA) (tetraphenylporphyrinato)] zinc(II)", ***Acta Crystallogr.* 2006**, *E62*, m2330-m2332.
Q3	149.	**M. Sankar** and I. Goldberg, "On C-H---O interactions in 3,5-dinitro-benzaldehyde", ***Acta Crystallogr.* 2006**, *E62*, o5842-o5844.
Q3	150.	**M. Sankar** and I. Goldberg, "Supramolecular assembly of diethyl 5-carboxybenzene 1,3- dicarboxylate", ***Acta Crystallogr.* 2006**, *E62*, o5878-o5880.
(ii)	**Presentation in the International/National Conferences**:	
	<Author(s)>, <Title>, <name of Conference>,< page Nos)>, <Date & Year>, <Conference venue>	
	Invited Lectures at the International/National Conferences and Workshops: 52	
	1.	**M. Sankar**, Invited Lecture delivered on 'Synthesis of π-Extended Porphyrins and Their Applications in Sensing, NLO and Catalysis' in the 21st International Conference on Modern Trends in Inorganic Chemistry (MTIC-XXI) which was held at IIT Kharagpur, Kharagpur, West Bengal during Dec 14-17, 2024.
	2.	R. Kumar and **M. Sankar***, Invited Lecture delivered on 'Synthesis of N-Confused Porphyrin Metal Complexes and Their Applications in Catalysis and PDT' presentation at the 13th International Conference on Porphyrins and Phthalocyanines (ICPP-13) held at Sunny Buffalo, NY, USA held during June 23-28, 2024. Chaired a session also.
	3.	**M. Sankar,** Invited Lecture delivered on 'π-Extended Metallocorroles: Synthesis, Spectral and Redox Properties and Their Utilization in Sensing, Nonlinear Optics (NLO) and Catalysis' presentation at the International Conference on Luminescent Materials: From Fundamentals to Applications (ICLMFA-2024)

		organized by Department of Chemistry, Guru Nanak Dev University (GNDU), Amritsar held during March 15-16, 2024.
	4.	**M. Sankar**, Invited Lecture delivered on 'π-Extended Metallocorroles: Synthesis and Spectral Properties and their Application in Sensing, NLO and Catalysis' organized by Department of Chemistry, Karunya University on 27th Feb 2024.
	5.	**M. Sankar**, Invited Lecture delivered on 'Synthesis of π-Extended Metallocorroles and their Utilization in Sensing, Nonlinear Optics and Catalysis' in Current Trends in Chemical Sciences organized by CRSI Madurai local chapter and School of Chemistry, Madurai Kamaraj University during 21st to 23rd Feb 2024.
	6.	**M. Sankar**, Invited Lecture delivered on 'Vanadyl Porphyrins as green catalysts for various organic transformations' organized by Department of Chemistry, Delhi University during 19th to 20th Jan 2024.
	7.	**M. Sankar**, Invited Lecture delivered on 'Synthesis of π-Extended Metallocorroles and their Utilization in Sensing, Nonlinear Optics and Catalysis' organized by Department of Chemistry, IIT Hyderabad during 9th to 11th Dec 2023.
	8.	**M. Sankar**, Invited Lecture delivered on 'Metalloporphyrins for Solar Cell, Sensing and Catalytic Applications' organized by Department of Chemistry, IISER Tirupati on 20th June 2023.
	9.	**M. Sankar**, Invited Lecture delivered on 'Metalloporphyrins for Solar Cell, Sensing and Catalytic Applications' organized by Department of Chemistry, Karunya University on 13th April 2023.
	10.	**M. Sankar**, Invited Lecture delivered on 'Metalloporphyrins for Energy and Environmental Applications' in the first international conference on Recent Trends in Chemical Sciences and Sustainable Energy organized by NIT Delhi during March 24-25, 2023.
	11.	**M. Sankar**, CRSI Bronze Medal Lecture delivered on 'π-Extended Porphyrins and Their Analogues: Synthesis, Spectral and Redox Properties and Their Application in Sensing, Nonlinear Optics and Catalysis' at the 30th National Symposium in Chemistry (NSC-30) organized by CRSI held at JNU, New Delhi during February 3-5, 2023.
	12.	**M. Sankar**, Invited Lecture delivered on 'Metalloporphyrins for Solar Cell, Sensing, NLO and Catalytic Applications' in the international conference on Symposium on Material Science towards New Horizons-2023 organized by RSC-IIT Indore during January 19-20, 2023.

	13.	**M. Sankar**, Invited Lecture delivered on 'π-Extended Porphyrins, Chlorins and Corroles: Synthesis, Spectral and Electrochemical Redox Properties and Their Application in Nonlinear Optics and Sensing' in the 19th International Conference on Modern Trends in Inorganic Chemistry (MTIC-XIX) which was held at BHU, Varanasi, UP during Dec 15-17, 2022.
	14.	**M. Sankar,** Invited Lecture delivered on 'π-Extended Porphyrins, Chlorins and Corroles: Synthesis, Spectral and Redox Properties and Their Applications International Conference on Recent Advances in Chemical Sciences (RACS-2022) during 10-11th November 2022 under the aegis of CRSI, Jammu & Kashmir Chapter.
	15.	**M. Sankar**, Invited Lecture delivered on 'Synthesis of *β*-Functionalized Porphyrins for Solar Cells, Sensing, Nonlinear Optics (NLO) and Catalytic Applications' in a Refresher Course in Chemistry for the University and College Teachers during October 07-20, 2022 organized by Bharathiar University, Coimbatore, Tamil Nadu.
	16.	**M. Sankar**, Invited Lecture delivered on 'Metals in Biology' in a Faculty Development Program (FDP) organized by Vellore Institute of Technology (VIT), Vellore on 14th September 2023.
	17.	**M. Sankar**, Invited Lecture delivered on 'Recent Developments of Porphyrin-based Solar Cells' at the high-end workshop on Solar Photovoltaics' organized by IIT Roorkee during July 18-24, 2023.
	18.	**M. Sankar**, 'π-Extended Porphyrinoids: Synthesis, Spectral and Electrochemical Redox Properties and Their Application in NLO and Sensing' presentation at the 12th International Conference on Porphyrins and Phthalocyanines (ICPP-12) held at Madrid, Spain held during July 10-15, 2022.
	19.	**M. Sankar**, 'Synthesis, Spectral and Electrochemical Redox Properties of π-Extended Chlorins and Porphyrins' presentation at the 11th International Conference on Porphyrins and Phthalocyanines (ICPP-11) virtual meeting organized from Houston, TX, USA held during June 28-July 03, 2021.
	20.	**M. Sankar**, 'Synthesis, Spectral and Electrochemical Properties of 'Push-pull' π Extended Porphyrinoids' an invited lecture delivered at 239th Electrochemical Society Virtual Meeting held at Chicago, IL, USA during May 30-June 05, 2021.
	21.	**M. Sankar**, 'Synthesis of *Meso*- and *β*-Functionalized Porphyrinoids for Solar Cell, Catalysis, Nonlinear Optics (NLO) and Anion Sensing Applications' an invited delivered at First International Conference on Frontiers in Chemical Sciences (ICFCS-2020) held at Karunya University, Coimbatore, India during March 04-05, 2020.

	22.	**M. Sankar**, 'Recyclable Porphyrin-based Colorimetric Chemosensors for the Detection of Toxic Anions and Explosives' an invited lecture presented at 3rd Asian CHIP held at Guru Nanak Dev University, Amiritsar, Punjab, India during November 06-09, 2019.
	23.	**M. Sankar**, 'Synthesis, Spectral and Electrochemical Redox Properties of Fused Porphyrins and Chlorins' an invited lecture presented at pre-Electrochemical Society (ECS) Symposium held at University of North Texas, Denton, TX, USA during May 24-25, 2019.
	24.	P. Rathi, **M. Sankar**,* S. Sairaman and F. D'Souza, 'Synthesis, Structural, Spectral and Electrochemical Redox Properties of N-Fused Porphyrins and Their Photoinduced Electron Transfer Studies with C_{60} Derivatives' an invited lecture presented at 235th Electrochemical Society (ECS) Meeting held at Dallas, TX, USA during May 26-30, 2019.
	25.	**M. Sankar,** '*β*-Functionalized Porphyrins, Chlorins and Corroles: Syntheses and Their Applications in Sensing, Catalysis and DSSCs' an invited talk presented at the Conference on Emerging Trends in Chemical Sciences - 2019 (ETCS-2019) held at University of Jammu, Jammu, India organized by Central University of Jammu during March 14-15, 2019.
	26.	**M. Sankar,** 'Synthesis and Applications of *Meso*- and *β*-Functionalized Porphyrinoids' an invited talk presented at the International Conference on Chemical Sciences and Nanometerials - 2019 (ICCSN-2019) held at VIT University, Vellore, India during March 7-9, 2019.
	27.	P. Yadav, **M. Sankar**,* X. Ke, L. Cong and K. M. Kadish 'Synthesis, Spectral and Electrochemical Properties of Highly Reducible π-Extended Copper Corroles' oral presentation at the 10th International Conference on Porphyrins and Phthalocyanines (ICPP-10) held at Munich, Germany during July 1-6, 2018.
	28.	**N. Grover, N. Chaudhri and** M. Sankar* 'Synthesis, Structural, Spectral and Intriguing Electrochemical Redox Properties of Difused-Chlorins and Porphyrins' **oral presentation at the 233rd Electrochemical Society (ECS) Meeting held at Seattle, USA during May 13-17, 2018.**
	29.	K. Prakash, R. Kumar and **M. Sankar*** 'DSSC and Electrocatalytic Applications of *β*- and *Meso*-Functionalized Porphyrins' invited oral presentation at the 5th Symposium on Biological Inorganic Chemistry (SABIC-5) held at Kolkata, India during January 7-11, 2017.

	30.	**M. Sankar** 'Naked-eye Detection of Toxic Anions and Picric Acid using Porphyrinoid Chemosensors and their Reusability Studies' invited lecture at the 6th National Symposium on Advances in Chemical Sciences held at Guru Nanak Dev University, Amritsar during March 6-7, 2017.
	31.	M. K. Chahal, N. Chaudhri, K. Prakash, R. Kumar, N. Grover, P. Yadav and **M. Sankar*** 'Naked-eye Detection of Toxic Anions using Porphyrinoid Chemosensors and their Reusability Studies' invited oral presentation at the 9th International Conference on Porphyrins and Phthalocyanines (ICPP-9) held at Nanjing, China during July 3-8, 2016.
	32.	R. Kumar, N. Chaudhri, M. Chahal and **M. Sankar**,* 'Ratiometric and Colorimetric 'Naked-eye' Selective Detection of CN^- ions by Porphyrinic Chemosensors and their Reversibility Studies' oral presentation at 6th EuCheMS Conference on Nitrogen Ligands, September 13-17, 2015 at Beaune, France.
	33.	**M. Sankar**,* 'Asymmetric *β*-Substitution: An Inventive Path to Modulate Photo- physical and Electrochemical Redox Properties'. Invited Talk delivered at 16th Symposium on Modern Trends in Inorganic Chemistry (MTIC-XVI) held at Jadavpur University, Kolkata, India during December 3-5, 2015.
	34.	N. Grover, N. Chaudhri, R. Kumar, M. K. Chahal and **M. Sankar*** 'Synthesis and Applications of Asymmetric *β*- and *Meso*-Substituted Porphyrins' an invited talk delivered at Frontiers in Inorganic and Organometallics held at IIT Indore, Simrol, India during April 14-15, 2016.
	35.	R. Kumar, N. Chaudhri, M. Chahal and **M. Sankar**,* 'Ratiometric and Colorimetric 'Naked-eye' Selective Detection of CN^- ions by Porphyrinic Chemosensors and their Reversibility Studies' oral presentation at 6th EuCheMS Conference on Nitrogen Ligands, September 13-17, 2015 at Beaune, France.
	36.	R. Kumar, N. Grover, N. Chaudhri, K. Praksh & **M. Sankar*** 'Asymmetrically β-Substituted Porphyrins: Synthesis, Photophysical and Electrochemical Redox Properties' oral presentation at the 227th Electrochemical Society (ECS) meeting held at Chicago, USA during May 25-28, 2015.
	37.	T. Kojima, H. Kajii, **M. Sankar**, T. Ishizuka, H. Kotani, Y. Yamada and S. Fukuzumi 'Formation of Hydrogen-bonded Supramolecular Assemblies Based on Fucntionalised Saddle-distorted Porphyrins' oral presentation at the 227th Electrochemical Society (ECS) meeting held at Chicago, USA during May 25-28, 2015.

	38.	R. Kumar, N. Grover and **M. Sankar*** 'Synthesis and Studies on β-Substituted Novel Push-Pull Porphyrins' oral presentation at the 8th International Conference on Porphyrins and Phthalocyanines (ICPP-8) held at Istanbul, Turkey during June 22-27, 2014.
	39.	T. Kojima, **M. Sankar**, H. Kajii, and T. Ishizuka 'Supramolecular Assemblies of Saddle-Distorted Porphyrins with Intermolecular Hydrogen Bonding' oral presentation at the 8th International Conference on Porphyrins and Phthalocyanines (ICPP-8) held at Istanbul, Turkey during June 22-27, 2014.
	40.	**M. Sankar**, T. Ishizuka, T. Hasobe, K. Ohkubo, S. Fukuzumi and T. Kojima 'Supramolecular Assemblies Composed of Saddle-Distorted Porphyrins with Carboxyl Groups' was presented 221st Electrochemical Society (ECS) Meeting at Settle, Washington, USA during May 6-10, 2012.
	41.	**M. Sankar** 'Synthesis and Applications of Functionalized Porphyrins' invited lecture delivered in the workshop "Molecules & Materials Technology: Interface with R&D and Industries" held at NIT Kurukshetra, Kurukshetra during March 21-26, 2017.
	42.	**M. Sankar** 'Role of Porphyrinoids in Nanomedicine' invited lecture delivered in the workshop "Recent Advances in Nanomedicine: From Bench to Bedside" held at IIT Roorkee during June 4-8, 2012.
	43.	**M. Sankar** 'Theories of Coordination Compounds, VSEPR theory for predicting structures and Oxidizing and reducing action based on electrode potentials' guest lectures delivered in the workshop "Refresher Course for Chemistry Teachers" organized by Kendriya Vidyalaya Sangathan (KVS), MHRD, GoI held at KV No.2 BEG & C, Roorkee during December 23-31, 2019.
	44.	**M. Sankar** 'Synthesis of *Meso*- and *β*-Functionalized Porphyrins for Dye-Sensitized Solar Cell (DSSC), Nonlinear Optics (NLO), Catalysis and Anion Sensing' an invited lecture delivered at the Department of Chemistry, Pondicherry University, Puducherry on 26th September 2019.
		Invited Lectures in the National Webinars: 08
	45.	**M. Sankar,** '*β*-Functionalized Porphyrinoids: Synthesis and Their Application in DSSC, Sensing, Catalysis and Nonlinear Optics' an invited lecture delivered and served as resource person on 26.06.2020 in the One week Online Faculty Development Programme on "Recent Avenues in Chemical Sciences" organized by the Department of Chemistry, Saranathan College of Engineering (Affiliated to Anna University), Trichy, India during June 22-28, 2020.

	46.	**M. Sankar**, 'Functionalized Porphyrins for Solar Cell and Sensing Applications' an invited lecture delivered and served as resource person on 23.07.2020 in the One week Online Faculty Development Program organized by the Department of Chemistry, Mount Zion College of Engineering and Technology (Affiliated to Anna University), Chennai, India during July 21-26, 2020.
	47.	**M. Sankar**, 'Synthesis and Applications of Porphyrinoids' an invited lecture presented in 'Meet IIT Roorkee Chemistry Raising Stars' organised by Department of Chemistry, IIT Roorkee, Roorkee, India during Aug 03-05, 2020.
	48.	**M. Sankar,** '*β*-Functionalized Porphyrinoids: Facile Synthesis and Their Application in Solar Cells, Sensing, NLO and Catalysis' an invited lecture presented in the national conference on ***Recent Advances in Bis- and Tetra-Pyrrolic Molecular Materials*** organized by the Department of Chemistry, Central University of Kerala, Kozhicode, India during August 24-27, 2020.
	49.	**M. Sankar,** 'Functionalized Porphyrinoids for Material and Medicinal Applications' an invited lecture delivered in the Faculty Development Programme on Materials Science and Nanotechnology 2020 organized by the Department of Chemistry, B.S. Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai, India during Aug. 03-17, 2020.
	50.	**M. Sankar,** '*β*- and *Meso*-Functionalized Porphyrinoids for Material and Medicinal Applications' an invited lecture delivered in the Faculty Development Programme on Chemistry of Advanced Functional Materials (CAFM-2020) organized by the Department of Chemistry, NIT Srinagar, Jammu and Kashmir, India during Aug. 03-17, 2020.
	51.	**M. Sankar,** 'Facile synthesis of Functionalized Metalloporphyrinoids and Their Application in Solar Cell, Anion Sensing, Nonlinear Optics and Catalysis' an invited lecture delivered in the chemistry week organized by CRSI local chapter, School of Chemistry, Madurai Kamaraj University, Madurai and Bharathidasan University, Trichy, India during Nov 02-07, 2020.
	52.	**M. Sankar,** 'Effect of *Meso- vs β*-Substitution on Porphyrin Macrocycle and Utilization of Porphyrins in Solar Cell, Anion Sensing, Nonlinear Optics and Catalysis' an invited lecture delivered in the National Conference on Recent Advancement in Physical Sciences (NCRAPS-2020) organized by the

Department of Chemistry, NIT Srinagar, Uttarakhand, India during Dec. 19-20, 2020.

Poster Presentation in the international conferences by our group members: **84**
Poster Presentation in the national conferences by our group members: **56**

(iii) Book Chapters : **04**

1. Thakur, P. S.; Gautam, L.; Vyas, S. P.; **Sankar, M**. Metalloporphyrin Nanoparticles for Diverse Theranostic Applications. In *Inorganic Nanosystems: Theranostic Nanosystems, Volume 2*; Academic Press, 2023; pp 489–507. https://doi.org/10.1016/B978-0-323-85784-0.00009-1.
2. Gautam, L.; Kaurav, M.; Thakur, P. S.; **Sankar, M**.; Vyas, S. P. Zinc and Zinc Oxide Nanoparticles for Theranostic Applications. In *Inorganic Nanosystems: Theranostic Nanosystems, Volume 2*; Academic Press, 2023; pp 167–199. https://doi.org/10.1016/B978-0-323-85784-0.00003-0.
3. Gautam, L.; Thakur, P. S.; Goel, I.; **Sankar, M**.; Jain, A.; Shrivastava, P.; Vyas, S.; Vyas, S. P. Polymeric Nanoparticles as Theranostics for Targeting Solid Tumors; Springer, Cham, 2022; pp 273–306. https://doi.org/10.1007/978-3-031-14848-4_10.
4. Thakur, P. S.; **Sankar, M**. "Nanofibers for Drug Delivery Application" for the book entitled "Advanced and Modern Approaches for Drug Delivery" to be published by Elsevier Ltd, USA, Submitted *for publication*.

12. Any Other Relevant Information :

Information Related to Teaching Aspects

I have tremendous interest in teaching and used to motivate students to go for higher education. I used to take four class tests in the interval of 10 lectures and made sure that they learn the entire syllabus. I'm meticulous in conducting laboratory classes and improving the students' practical knowledge which is the basic for experimental research. I am also motivating and helping our PG students to study PhD in abroad. Herewith I am providing the representative data of teaching score for the past 9 years and have improved a lot during the past 6 years.

Year	Semester	Name of the Course	Faculty Score (Out of 5)
2013-14	Autumn	**CY-631 Advanced Analytical Chemistry-I**	**4.5**
2013-14	Spring	CY-512 Organometallic Chemistry	3.8
2014-15	Autumn	CY-202M Basic Inorganic Chemistry	3.8
2014-15	Spring	CY-312 Chemical & Biological Aspects of Transition Metals	4.0
2015-16	Autumn	**NTN-603 Supramolecular Chemistry of Nanomaterials**	**4.3**

		CYN-621A Advanced Analytical Chemistry-I	4.0
		CYN-681 Supramolecuar Chemistry	4.0
		CYN-509 Coordination Chemistry	4.1
2015-16	Spring	CYN-008 General Chemistry-III	4.0
		CYN-502 Organometallic Chemistry	4.0
2016-17	Autumn	CYN-681 Supramolecuar Chemistry	4.1
		CYN-621A Advanced Analytical Chemistry-I	**4.4**
		CYN-509 Coordination Chemistry	4.0
2016-17	Spring	CYN-502 Organometallic Chemistry	4.2
2017-18	Autumn	**CYN-617 Supramolecuar Chemistry**	**4.5**
		CYN-509 Coordination Chemistry	**4.4**
2018-19	Autumn	**CYN-617 Supramolecuar Chemistry**	**4.5**
2018-19	Spring	**CYN-202 Main Group and Cluster Chemistry**	**4.8**
		NTN-603 Supramolecular Chemistry of Nanomaterials	**4.8**
		CYN-502 Organometallics, Inorganic Chains & Clusters	4.2
2019-20	Autumn	**CYN-617 Supramolecuar Chemistry**	**4.9**
2019-20	Spring	**NTN-603 Supramolecular Chemistry of Nanomaterials**	**4.8**
		CYN-502 Organometallics, Inorganic Chains & Clusters	4.0
2020-21	Autumn	CYN-509 Coordination Chemistry	4.3
		CYN-617 Supramolecuar Chemistry	4.1
	Spring	**CYN-902 Advanced Inorganic Chemistry**	**5.0**
		NTN-603 Supramolecular Chemistry of Nanomaterials	**5.0**
2021-22	Autumn	CYN-509 Coordination Chemistry	4.50
		CYN-617 Supramolecuar Chemistry	**4.83**
	Spring	CYN-308 Bioinorganic & Biomimetic Chemistry	4.4
		NTN-603 Supramolecular Chemistry of Nanomaterials	4.6
2022-23	Autumn	**CYN-303 Advanced Coordination Chemistry**	**4.93**
	Spring	**CYN-308 Bioinorganic & Biomimetic Chemistry**	**5.0**
		NTN-603 Supramolecular Chemistry of Nanomaterials	**4.93**
		CY-210 Bioinorganic & Biomimetic Chemistry	**4.74**
		CY-208 Polymer Chemistry (shared basis 1L+1/3T)	**4.44**

	2023-24	Autumn	**CYN-303 Advanced Coordination Chemistry**	**4.89**
		Spring	**CY-210 Bioinorganic & Biomimetic Chemistry**	**4.86**
			NTN-603 Supramolecular Chemistry of Nanomaterials	**4.84**
			CY-510 Inorganic Chemistry Laboratory	**4.75**

13. Salient Features of Prof. Sankar's Teaching Methodology

Throughout these thirteen years of my teaching career at IIT Roorkee, I have taught various core and program elective courses to UG (integrated MSc) and PG students (MSc) of Chemistry Department and PG students (MTech) of Centre for Nanotechnology (CON). I adopt the *teaching-by-questioning* method to make my lectures more interactive and lively. I pose questions from the topics covered in the beginning of my lecture (first 5 minutes) to know whether they have gone through my earlier lecture notes or not. In that way, I make sure that they are in-line with my lecture topic(s) and understood well. I ask random questions from the topics covered to get answers from most of the students. During the teaching, I start with the basic knowledge that the students already have, I guide them to more advanced topics through intriguing questions and discussions. I organize my lectures such that they are intellectually provoking, and easy to follow for students with varying levels of comprehension. I try to provide applications of the topics or materials which I cover during the lecture along with real-world examples. Hence, the students learn the subject with interest. In some cases, I take latest examples from the reputed journals and discuss about their applications. Class tests are conducted at periodic intervals, and the corrected copies or soft copies are returned to the students such that they get timely feedback. I also take special care who are having difficulties in studies. I provide books and notes for them with special care. I always avoid asking memory based questions in the exams and class tests. I give emphasis for their understanding of the topics and application of the concepts learned during the lectures. I make sure that the students must study the subject to have class average in the range of 70-75 marks so that the students will have healthy competition to get highest grade in the particular subject. I like the traditional '*blackboard teaching practice*' as well as *online teaching with PowerPoint slides along with stylish pen* to write on the slides for explaining the concepts (during this pandemic).

The tutorial periods serve as forums for an in-depth discussion on the topics covered in the lectures. In the spectroscopy course, I provide the original spectra (UV-Vis, IR, NMR and mass) and ask the students to derive the molecular structure using the given information. I try to test their intellectual and problem solving ability. In some cases, I give a bunch of numerical problems and ask the students one by one to solve the problem on board.

I'm meticulous in conducting laboratory classes to improve the students' practical knowledge which is the basic for experimental research and to have job opportunities in the industry and PSUs. I am also motivating and helping our PG students to pursue their PhD in India and abroad. I try to send at least 10% of our PG students every year to reputed institutes in US, Europe, Japan and Israel for pursuing PhD. Many of them were successful in getting permanent positions in India and abroad.

The following are some of the responses given by students about my teaching methodology

- "He is extremely passionate for teaching, and is absolutely marvelous at being a teacher and a human being. Had a blast of good time during his course"
- "The teaching method of the teacher which actually excite me is his interactive way of teaching, personality, punctuality, friendly nature and the way he guides and motivates the students"
- "The way of teaching, amazing lectures, latest material covering all topics, mainly helpful in my research area"
- "Good mentor, doubt clearing teacher"
- "Engaging, latest materials, interesting lectures"
- "Exciting examples which he explains us in the classes"
- "The way sir taught in class makes the subject very easy"
- "Very interactive classes. The teacher asked thought-provoking questions in class and answered student's queries effectively. Enough material was given and books were also suggested"

	➢ "Very helpful, Good Mentorship, nice and easy explanation of new topics" ➢ "Conceptual knowledge, good delivery. He is well organized" ➢ "His activeness in class and make class interactive in the complete lecture" ➢ He knows how the student life is ... So he acts accordingly and he's very interactive ➢ "The way you tries to interact all students and if someone is wrong while answering you tries your best to support them to reach the right answer" ➢ "He should be given more subjects to teach so that students' future become bright. He is amazing" ➢ "His way of interaction with students and turning the virtual class into such an interactive session as it appears that we are sitting in the class itself is commendable" ➢ His pedagogy and way of explaining things ➢ Explains very clearly and engaging classes ➢ Teacher explained each and every concepts clearly and, in needed cases he provided extra information too. Really interesting lectures. He always helps students in solving their doubts. ➢ Correlates topics with real life examples, which facilitate in recalling concepts. Classes are fun-filled and interactive. ➢ Interactive teaching methods, real world relevance, inspiration and motivational. He is an amazing professor with super amazing delivery of the lectures, his motivation of taking classes, Class Interaction. ➢ Friendly and dedicated ➢ Sir explained every topics of coordination chemistry very clearly and cleared each and every doubts of students. Sir is well organized and prepared for the class. He created a WhatsApp group in which we can ask our doubts. That was very helpful for me. The class was very interactive so that he could deliver even the tough topics easily. After completing each chapter sir shared question banks which are very helpful for students to practice. Sankar sir also explains very well in practical of inorganic chemistry. His classes are concepts based. So electronic spectra like tough topics became easy after

	attending his class. Sir has provided many study materials for us for specific topics. This is the best teacher I got after coming to IITR. ➢ Having a tremendous interactive lecture and mentoring in all aspects. Keep on updating the latest material and properly organize notes and reference material. ➢ His classes are very interactive and his way of teaching and clearing doubts in a very easy way. Helps a lot. ➢ Classes are very interactive; enthusiasm and efforts in making students assimilate the concepts are reflected. Way of teaching is unique in linking real life situations with subject that ensures one doesn't forget the concept at all. ➢ He explained everything very clearly, asked for doubts after every topic and helped us at every step. He not only provided us knowledge about our course but also general information related to our course work. ➢ Teaches new concepts in class and he teaches very politely. ➢ "Words come to an end when it comes to define the teaching skills of Dr. M. Sankar. He is outstanding in his field. I want to learn more Organometallics from him in future if it is possible"
14.	**Statement of significant academic contributions with Special Emphasis on the Last Five Years**:
	Details of Most Significant Research Problems **Facile Synthesis of *Meso/β*-Functionalized Porphyrinoids and Their Utilization in Anion Sensing, Catalysis, Nonlinear Optics and Solar Cells** **(a) Statement of the problem:** A variety of instrumental techniques have been developed for the detection of toxic anions (for e.g. cyanides and fluorides) and explosives such as picric acid which require time-consuming procedures and sophisticated instrumentation. In general, 'push-pull' Zn^{II}-porphyrinic dyes for perovskite or dye-sensitized solar cells were synthesized in 12-16 steps using palladium catalyzed coupling reactions *via* stepwise *meso*-functionalization. Usually, the oxygen reduction reaction (ORR) and hydrogen evolution reaction (HER) of a fuel cell are catalyzed by platinum based catalysts as anode and cathode but its rarity, high cost and low methanol tolerance hampers their commercialization. In general, VO-tetraphenylporphyrin catalysts yield mixture of

products in a catalytic oxidation of epoxides. For the above-mentioned targeted applications, the facile syntheses of *meso*/*β*-functionalized 'push-pull' π-extended metalloporphyrinoids are essential.

(b) Contribution by Sankar's Research Group:

(i) **Detection of toxic anions and explosives**: β-Dicyanovinyl appended porphyrinogen (Oxp-MN) has been synthesized by a two-step facile synthetic route in quantitative yield. Oxp-MN was found to be capable of detecting picric acid even as low as 1 ppm through naked eyes by the color change from reddish-pink to purple. It can detect the cyanide and fluoride ions even if they are hidden within a mixture of other anions by unique color change. The simultaneous and independent naked-eye detection of picric acid, cyanide and fluoride ions is the added advantage of the new chemosensor. The reversibility studies revealed that the sensor (Oxp-MN) can be recoverable and reusable for numerous cycles without losing its sensing ability.

(ii) **Developing porphyrinic dyes for solar cells**: Recently, we have synthesized *trans*-A_2BC porphyrins in three steps without use of any Pd catalyzed coupling reactions and the power conversion efficiency (η) values highly depend on the electron donating ability of donor groups. The η values of DSSCs based on these dyes are in the range of 5.3% to 8.8% under 1 sun illumination. Notably, *meso*-phenothiazine dimesitylcarboxyphenyl-porphyrin has shown highest PCE value of 8.8% due to its better electron-donating nature and light harvesting capacity.

(iii) Co^{II}-Porphyrin-MWCNT Conjugates for Fuel Cell Improvement: Our team has prepared non-covalently immobilized Co^{II}-porphyrins on MWCNTs as catalysts for fuel cell technology. The composition of MWCNTs and Co(II) porphyrins is 10:0.001 which state that only few mg is needed for 1.0 g of MWCNTs. These composite materials employed for the oxygen reduction reaction (ORR) in wide range of pH and show efficient electrocatalytic performance for ORR at low over potential as compared to Pt-C and Co^{II}-porphyrin without MWCNTs. Our material is cheaper than commercially available platinum based catalyst with high methanol tolerance and long term stability which make it more worthy.

(iv) Catalysis using Vanadyl porphyrins: $VOTPPBr_{16}$ exhibited 100% selectivity for epoxide formation (84-99% yield) with very high TOF numbers (12227-14347 h^{-1}) in CH_3CN/H_2O mixture. Remarkably, $VOTPPBr_{16}$ biomimics vanadium bromoperoxidase (VBrPO) enzyme with extremely high TOF value (83333-87719 h^{-1}) for oxidative bromination of thymol and some other phenols in water under ambient conditions. The

observed TOF number is close to enzymatic reactions. The excellent catalytic activity of $VOTPPBr_{16}$ is ascribed to its robust nonplanar structure and electron withdrawing perbromo groups. Recently, he could reach up to $2.1 \times 10^6\ h^{-1}$ using robust VO porphyrin.

(v) Facile syntheses of *meso* and/or *β*-functionalized 'push-pull' π-extended metallo-porphyrinoids have been carried out by an oxidative fusion using DDQ in excellent yields under ambient conditions.

(c) List of Best Papers related to above-mentioned research problems

Syntheses of *meso/β*-functionalized 'push-pull' π-extended metalloporphyrinoids

(a) N. Chaudhri, N.Grover, & **M. Sankar**, *Inorg. Chem.* **2018**, *57*, 6658-6668 (IF = 4.70)

(b) N. Chaudhri, N.Grover, & **M. Sankar**, *Inorg. Chem.* **2018**, *57*, 11349-11360 (IF = 4.70)

(c) N. Grover, N. Chaudhri, & **M. Sankar**, *Inorg. Chem.* **2019**, *58*, 2514-2522 (IF = 4.85)

(d) M. K. Chahal *et al*., *Inorg. Chem.* **2019**, *58*, 14361-14376 (IF = 4.85)

(e) N. Chaudhri *et al*. *Inorg. Chem.* **2020**, *59*, 16737-16746. (IF = 4.86)

(f) W. R. Osterloh *et al*., *Inorg. Chem.* **2020**, *59*, 16737-16746 (IF = 4.85)

(g) R. K. Rohal *et al*., *Inorg. Chem.* **2022**, *61*, 1297-1307 (IF = 5.20)

(h) A. S. Bulbul *et al*. *Inorg. Chem.* **2022**, *61*, 9968-9982 (IF = 5.20)

(i) I. Yadav *et al*. *Inorg. Chem.* **2022**, *61*, 19289-19301. (IF = 5.20)

(j) I. Yadav *et al*. *Inorg. Chem.* **2023**, *62*, 1738-1752. (IF = 5.44)

(k) I. Yadav *et al*. *Inorg. Chem.* **2023**, *62*, 5292-5301. (IF = 5.44)

(l) I. Yadav *et al Chem. Eur. J.* **2023**, *29*, e202301341 (IF = 5.02)

(m) I. Yadav *et al*. *Inorg. Chem.* **2023**, *62*, 19956-19970. (IF = 5.20)

(n) S. K. Yadav, A. Patter, & **M. Sankar**, *Inorg. Chem.* **2024**, *63*, 1738-1752. (IF = 5.20)

(o) R. Kumar, V. Prakash, & **M. Sankar**, *Inorg. Chem.* **2024**, *63*, 12506-12515. (IF = 5.20)

(p) M. Sankar *et al Chem. Eur. J.* **2024**, *30*, e202301341 (IF = 5.40)

Detection of toxic anions and explosives:

(q) S. Kumar, **M. Sankar** *et al*., *Dalton Trans*. **2021**, *50*, 6256-6272 (IF = 4.30)

(r) M. K. Chahal and **M. Sankar**, *Dalton Trans*. **2017**, *46*, 11669-11678 (IF = 4.20)

(s) K. Prakash & **M. Sankar**, *Sensor & Actuators: B Chemical* **2017**, *240*, 709-717 (IF = 8.4)

Developing porphyrinic dyes for solar cells

(t) R. Kumar, V. Sudhakar, K. Prakash, G. Krishnamoorthy and **M. Sankar**, *ACS Appl. Energy Mater.* **2018**, *1*, 2793-2801 (current IF = 6.5)

Co^{II}-Porphyrin-MWCNT Conjugates for Fuel Cell Improvement

(u) P. Sonkar, K. Prakash, M. Yadav, V. Ganesan, **M. Sankar**, R. Gupta and D. K. Yadav, *J. Mater.* A **2017**, *5*, 6263-6276 (IF = 14.51).

(v) A. S. Bulbul, V. Rathour, V. Ganesan and **M. Sankar*** ***Chem. Commun.*** **2024**, *60*, 3146-3149 (IF = 6.20)

(w) M. Tasleem. V. Singh, A. Bansal, V. Ganesan and **M. Sankar*** ***Small*** **2024**, *60*, 1201273 (IF = 13.4)

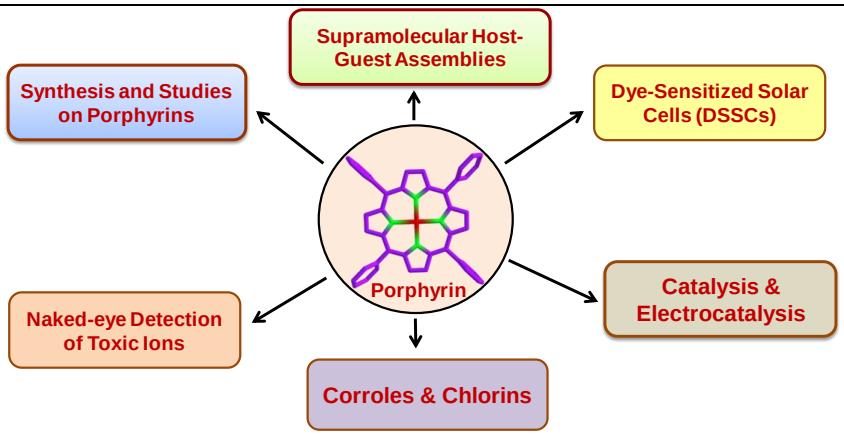
Catalysis using Vanadyl porphyrins or Mo Corroles

(x) T. A. Dar, B. Uprety, **M. Sankar** & M. R. Maurya, *Green Chem.* **2019**, *21*, 1757-1768 (IF = 9.30) (y) M. R. Maurya, V. Prakash, F. Avecilla & **M. Sankar**, *Eur. J. Inorg. Chem.* **2021**, 1685-1694. (z) M. R. Maurya, V. Prakash & **M. Sankar**, *ACS Omega.* **2023**, *8*, 6391-6401. (aa) I. Yadav *et al*. *Inorg. Chem.* **2023**, *62*, 5292-5301.

Details about Each Research Problems

(i) Facile Synthesis of *Meso/β*-Functionalized Metalloporphyrins, Chlorins & Corroles

Unsymmetrical *meso*-functionalized 'push-pull' porphyrin derivatives have been widely used in the areas of dye-sensitized solar cells (DSSC), catalysis, toxic ion sensing, photodynamic therapy (PDT) and nonlinear optics (NLO). They have been widely explored due to their ease of synthesis and facile functionalization whereas limited reports on *β*-substituted 'push-pull' porphyrinoids due to lack of synthetic methodologies. However, it is found that the latter ones exhibit unique physicochemical and electrochemical redox properties with interesting material and medicinal applications. Recently, our group has reported a new series of *β*- and *meso*-functionalized porphyrins, chlorins and corroles with mixed substitutents pattern.[1,2] DFT studies and the crystal structure analyses of highly substituted porphyrins and chlorins revealed nonplanar saddle shape conformation. Notably, nonplanarity of the porphyrinoid core was controlled and modified by varying in size, shape, number and the electronic nature of *β*-substituents. These porphyrinoids exhibited highly red-shifted electronic spectra with dramatic decrement in HOMO-LUMO gap. In addition, the redox tunability was achieved by introducing both electron donating and withdrawing *β*-substituents into the tetrapyrrole skeleton which led to nonplanarity with enormous 'cross polarization'.[1,2]



1. (a) R. Kumar and M. Sankar, *Inorg. Chem.* **2014**, *53*, 12706-12719. (b) N. Grover *et al*., *Inorg. Chem.* **2016**, *55*, 584-597. (c) N. Chaudhri, N. Grover and M. Sankar, *Inorg. Chem.* **2017**, *56*, 424-437. (d) X. Ke *et al*., *Inorg. Chem*., **2017**, *56*, 8527-8537. (e) N. Chaudhri, N. Grover and M. Sankar, *Inorg. Chem*. **2017**, *56*, 11532-11545. (e) M. Sankar *et al*., *Inorg. Chem.* **2018**, *57*, 1490-1503.

2. (a) N. Chaudhri, N. Grover and M. Sankar, *Inorg. Chem.* **2018**, *57*, 6658-6668. (b) N. Chaudhri, N. Grover and M. Sankar, M. *Inorg. Chem.* **2018**, *57*, 11349-11360. (c) N. Chaudhri *et al*. *Inorg. Chem.* **2018**, *57*, 13213-13224. (d) N. Grover, N. Chaudhri and M. Sankar, *Inorg. Chem.* **2019**, *58*, 2514-2522. (e) M. K. Chahal *et al*., *Inorg. Chem*. **2019**, *58*, 14361-14376. (f) N. Chaudhri *et al*. *Inorg. Chem.* **2020**, *59*, 16737-16746. (g) R. K. Rohal *et al*., *Inorg. Chem*. **2022**, *61*, 1297-1307. (h) A. S. Bulbul *et al*. *Inorg. Chem*. **2022**, *61*, 9968-9982. (i) I. Yadav *et al*. *Inorg. Chem.* **2022**, *61*, 19289-19301. (j) I. Yadav *et al*. *Inorg. Chem.* **2023**, *62*, 1738-1752. (k) I. Yadav *et al*. *Inorg. Chem.* **2023**, *62*, 5292-5301. (l) I. Yadav *et al Chem. Eur. J*. **2023**, *29*, e202301341. (m) M. Sankar *et al*. *Inorg. Chem.* **2023**, *62*, 12895–12904. (m) S. K. Yadav, A. Patter, & **M**. **Sankar**, *Inorg. Chem.* **2024**, *63*, 1738-1752. (n) R. Kumar, V. Prakash, & **M**. **Sankar**, *Inorg. Chem.* **2024**, *63*, 12506-12515. (o) M. Sankar *et al Chem. Eur. J*. **2024**, *30*, e20230134.

(ii) Development of Novel Porphyrins for Dye-Sensitized/Perovskite Solar Cell Applications

Various artificial photosynthetic model systems have been designed and synthesized in order to elucidate the factors that control the photoinduced electron-transfer (PET) processes. Inspired by the efficient energy transfer in naturally occurring photosynthetic reaction centers, numerous porphyrins have been synthesized to mimic the photosynthetic process. Recently, triarylamine and arylalkoxy appended porphyrins (Donor-π-Linker-Acceptor (D-π-A)) have shown remarkable DSSC performance and higher power conversion efficiency (PCE) values (10-13%). In general, these porphyrins

were synthesized in 12-16 steps using Pd catalyzed coupling reactions **whereas our group has synthesized *trans*-A_2BC porphyrins in three steps without use of any Pd catalyzed coupling reactions**[3a,3b] and PCE values highly depend on the electron donating ability of donor groups. **The maximum power conversion efficiencies (η) of DSSCs based on these dyes are in the range of 2.1% to 8.8% under 1 sun illumination and highly depend on donor strength of appended moiety**. Notably, *meso*-phenothiazine dimesityl carboxyphenylporphyrin (**RA-200-Zn**) has shown highest PCE value of 7.1%. **RA-200-Zn** shows a broader absorption on TiO_2 surface and more significantly improved IPCE values in Soret and Q band region as compared to the other dyes, which ensured a good light-harvesting ability and a high short-circuit current density of 14.2 mA cm^{-2}.

Currently, we are trying to improve the PCE value by increasing the number of donor groups on porphyrin *meso*-positions.[3c] Further, several *meso*-substituted "push-pull" Zn(II) porphyrin dyes have been synthesized to utilize as hole transporting layers in perovskite solar cells.

3. (a) R. Kumar *et al*., *ACS Appl. Energy Mater.* **2018**, *1*, 2793-2801; (b) R. Kumar *et al*., *New J. Chem.* **2016**, *40*, 5704-5713; (c) K. Prakash *et al*., *ChemPhysChem* **2019**, *20*,2627-2634.

(iii) Co(II)-Porphyrin-based Elelctrocatalysts for O_2 Reduction Reactions (ORRs)

We have prepared non-covalently immobilized Co(II)-tetraarylporphyrins on MWCNTs as catalysts for fuel cell technology. The synthesis of functionalized Co(II) porphyrins and their immobilization on MWCNTs has been carried out through a facile noncovalent approach in quantitative yield.[4] The composition of MWCNTs and Co(II) porphyrins is 10:0.001 which state that only few mg is needed for 1.0 g of MWCNTs. These composite materials employed for the ORR in wide range of pH and show efficient electrocatalytic performance for ORR at low over potential as compared to Pt-C and Co(II) porphyrin without MWCNTs. Our studies further revealed that functionalized Co(II) porphyrins have better catalytic activity as compared to simple MWCNTs-CoTPP in all media due to their increased oxygen binding capacity. These porphyrin-MWCNTs materials follow the four electron pathway for ORR which favors the ORR. Kinetic interpretation and hydrodynamic voltammetry studies demonstrate high methanol tolerance and long term operational stability (upto 3000 cycles) as similar to commercially available platinum carbon catalyst.

Our results are very important as they sum up the properties of porphyrin molecules and carbon nanotubes and studied it for ORR to provide an approach for fuel cell

improvement. Our material is cheaper than commercially available platinum based catalyst with high methanol tolerance and long term stability which make it more worthy.

4. (a) P. Sonkar *et al*., *J. Mater.* A **2017**, *5*, 6263-6276. (b) M. Yadav *et al*., *Intl. J. Hydrog. Energy*, **2020**, *45*, 9710-9722. (c) M. Tasleem *et al*., *Langmuir*, **2023**, *39*, 8075-8082. (d) A. S. Bulbul, V. Rathour, V. Ganesan and M. Sankar *Chem. Commun*. **2024**, DOI: 10.1039/D3CC05803D.

(iv) Highly Efficient Vanadyl Porphyrin Catalysts for Epoxidation and Oxidative Bromination:

We have synthesized electron deficient vanadyl perhaloporphyrins ($VOTPPBr_{16}$ and $VOTPPX_8$ where X = Br and Cl) and characterized by various spectroscopic techniques.[5] Crystal structure of $VOTPPBr_{16}$ exhibited severe nonplanar saddle shape conformation of porphyrin macrocycle.[5a] Further, both porphyrins were utilized for the selective epoxidation of various olefins in good yields with very high TOF numbers (6566-14347 h^{-1}). Remarkably, $VOTPPBr_{16}$ biomimics vanadium bromoperoxidase (VBrPO) enzyme with extremely high TOF value (83333-87719 h^{-1}) for oxidative bromination of thymol and some other phenols in water under ambient conditions. The observed TOF number is close to enzymatic reactions.[5a] The excellent catalytic activity of $VOTPPBr_{16}$ is ascribed to its robust nonplanar structure and electron withdrawing perbromo groups. *β*-Octabromo-*meso*-tetraphenylporphyrinatooxidovanadium(IV) (**2**) was synthesized by self-catalytic behavior of VOTPP (**1**) in excellent yield under mild conditions.[5c] **2** exhibits excellent catalytic activity for the oxidative bromination in water and epoxidation reactions in aqueous media due to its nonplanar structure and electron deficient nature[5c].

5. (a) T. A. Dar, B. Uprety, M. Sankar and M. R. Maurya, *Green Chem*. **2019**, *21*, 1757-1768; (b) R. Kumar, N. Chaudhary, M. Sankar and M. R. Maurya, *Dalton Trans*. **2015**, *44*, 17720-17729. (c) M. Sankar and coworkers, *Eur. J. Inorg. Chem.* **2021**, 1685-1694. (d) I. Yadav, V. Prakash, M. R. Maurya and M. Sankar. *Inorg. Chem*. **2023**, *62*, 5292-5301

(v) Detection of toxic anions and explosives: Rich spectroscopic and electrochemical redox properties of porphyrins make them to be colorimetric and ratiometric sensors for the detection of toxic anions in aqueous media.[6] β-Dicyanovinyl appended porphyrinogen (Oxp-MN) has been synthesized and it was found to be capable of detecting picric acid (major component of explosives) even as low as 1 ppm through naked eyes by the color change from reddish-pink to purple. It can detect the cyanide and fluoride ions even if they are hidden within a mixture of other anions by unique color change. The simultaneous and independent naked-eye detection of picric acid, cyanide

	and fluoride ions is the added advantage of the new chemosensor. The reversibility studies revealed that the sensor (Oxp-MN) can be recoverable and reusable for numerous cycles without losing its sensing ability. 6. (a) M. K. Chahal and M. Sankar, *Dalton Trans*. **2017**, *46*, 11669-11678; (b) K. Prakash and M. Sankar, *Sensor & Actuators: B Chemical* **2017**, *240*, 709-717; (c) M. K. Chahal and M. Sankar, *Dalton Trans*. **2016**, *45*, 16404-16412; (d) R. Kumar, N. Chaudhri and M. Sankar, *Dalton Trans*. **2015**, *44*, 9149-9157; (e) N. Chaudhri *et al*., *Inorg. Chem*. **2020**, *59*, 1481-1495. (f) S. Kumar, **M. Sankar** *et al*., *Dalton Trans*. **2021**, *50*, 6256-6272.
15.	**Responsibilities at the Institute and the Departmental level:**
	At Institute level Head, Centre for Nanotechnology, IIT Roorkee (June 2024-till date) Member, Institute Academic Program Committee (IAPC), IIT Rookee (Oct 2020-till date) Member, Matching Grant Committee, IIT Rookee (2018-2024) Member, SRIC Committee, IIT Roorkee (2017-2019) Chief Warden, Jawahar Bhawan, IIT Roorkee, (2020-2021) Warden, Jawahar Bhawan, IIT Roorkee, (2013-2014 and 2018-2020) – Received running trophy for "Varushanik Swachh Bharat Mess" at Institute level in Jan 2019 and Jan 2020 Member, CCB Purchase Committee, IIT Roorkee (2013-2014 and 2018-2021) Member, Floor Management Committee for Annual Convocation, IIT Rookee (2012-2021) **At Departmental Level** Professor-in-charge, Department of Chemistry (Jan 2023-till date) Chairman, Departmental Academic Program Committee (DAPC) (2020-2022) Member, Departmental Academic Program Committee (DAPC) (2011-2019 and 2023-) Member, Departmental Research Committee (DRC) (2020-2022) Coordinator, Single Crystal X-ray Diffractometer Facility (2013-till date) Coordinator, Departmental NMR Facility (2014-2022) Professor-in-charge, Time table (2018-2019) Coordinator, Int. M.Sc Syllabus Revision Committee, Inorganic Section (2016-2017)

	Member, Departmental Purchase Committee (DPC) (2012-Jan 2020) OC, Electrochemical Workstation, Department of Chemistry (2014-2024) Member, M.Tech Syllabus Revision Committee (2014-15) Member, M.Sc Syllabus Revision Committee (2015-16) Coordinator for B.Tech Courses (CY-101, CY-202M, CYN-002 and CYN-008) Coordinator for M.Sc Courses (CYN-502, CYN-509, CYN-510, CYN-511 and CYN-617) Coordinator for Dept. of Chemistry, MHRD 'ISHAN-VIKAS' Program (2016-2017) Coordinator for Departmental Activity (Conducting Chemistry Experiments for School Students) during Science Day Celebrations (2013-2017) **At Centre for Nanotechnology (CFN)** Head, Centre for Nanotechnology, IIT Roorkee (June 2024-till date) Chairman, Centre Academic Program Committee (CAPC) (2022-till date) Member, Centre Research Committee (CRC) (2020-2022) Member, CPC, Centre of Nanotechnology, IIT Roorkee (2013-2015) Member, M. Tech Dissertation Assessment Committee, CON, IIT Roorkee (2013-2015) Coordinator, NTN-603 Supramolecular Chemistry of Nanomaterials (2014-till date) **Extracurricular activities during Graduation and Post-graduation** ❖ Involved in National Service Scheme (NSS) for two years from July1996-July1998 and attended yearly special camp. ❖ Trained in National Cadet Crops (NCC) from July1997-May1999 and participated in Annual Training Camp. ❖ Trained in Social Service League (SSL) during July1996-May1999 and involved in Campus cleaning. ❖ Worked as Secretary for 'hostel administrative council' and also served as Counselor for 'guiding and counseling unit' at IIT-Madras from April 2004-March 2005
16.	**Membership in Professional Bodies**
	Fellow, Royal Society of Chemistry (RSC), Cambridge, UK since 2020 Member, American Chemical Society (ACS), Washington, USA

	Member, Electrochemical Society (ECS), New Jersey, USA Member, Society of Porphyrins and Phthalocyanines (SPP), Dijon, France Life Member (LM1563), Chemical Research Society of India (CRSI), Bengaluru, India Member, Indian JSPS Alumni Association, Trivandrum, India
17.	**Outreach Activities:**
	Research Achievement: Development of low-cost and efficient solar cells; Effective Sensors for explosives, cyanide ions and other toxic anions; and robust catalysts for epoxidation and oxidative bromination reaction; Development of highly stable electrode materials for ORR and HERs. **Research Work Highlighted by Media** 'IIT Roorkee and CSIR-NCL jointly develop dyes to increase efficiency of solar cell' by **India Today** (Magazine) and EDUADVICE on 16th Nov 2018. https://www.indiatoday.in/education-today/gk-current-affairs/story/iit-roorkee-and-csir-ncl-jointly-develop-porphyrin-dyes-with-light-to-current-conversion-efficiencies-of-7-for-third-generation-solar-cells-1389909- 2018-11-16 'New methods to detect toxins' by **Rajya Sabha TV** in a weekly **Science Monitor** Program telecasted on 4th March 2018. https://www.youtube.com/watch?v=eW_Dq6pyTCQ 'New chemical sensor in offing for explosives detection' by **The Hindu** Newspaper in Business Line Section and Vigyan Prashar, DST on 11th Dec 2017 http://vigyanprasar.gov.in/isw/explosives_detection_story.html Workshop on thin film solar cell conducted during 18th to 20th April 2018. High end Workshop (Theory and hands-on training) on Solar Photovoltaics was conducted during 18th July 2022 to 24th July 2022. The event was sponsored by SERB's Accelerate Vigyan scheme. We have trained around 150 students. Further, we trained 17 students for the operation of single crystal X-ray diffractometer (SCXRD) facility.

Place: IIT Roorkee

Date: 26.01.2025

(M. Sankar)