



Dr. Pranay P. Morajkar



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<https://scholar.google.com/citations?user=qNKvDpcAAAAJ&hl=en>



Assistant Professor of Chemistry,
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Interest

To establish a research laboratory of excellence via integrated national and international collaborations to address challenging problems in the field of Energy and Environment: Addressing the genesis of gas / solid /liquid interfacial processes through kinetic experiments and kinetic modelling approach.

Education

- November 2012 Ph.D. in Lasers, Optics, Gas kinetics and Atmospheric Chemistry, University of Lille1 in collaboration with University of Bordeaux1 (France)
- May 2009 Master of Science in Physical Chemistry, Goa University (India)
- May 2007 Bachelor of Science in Chemistry, Goa University (India)

Permanent employment & designation

- Since June 2014 Assistant Professor, School of Chemical Sciences, Goa University, Goa (India).

Scientific prizes and Awards

- Nov. 2018 Indo-European research grant under INNO-INDIGO S&T Cooperation 2017
- March 2016 DST-SERB Early Career Research Award (India).
- March 2015 UGC-BSR-research grant (India).
- Oct. 2009 MRT doctoral research fellowship by Ministry of Research, (France).
- May 2009 State Rank at the M.Sc. Physical Chemistry examination, Goa University, (India).
- April 2007 State Rank at the B.Sc. Chemistry examination, Goa University, (India).
- May 2007 Merit Proficiency Award –awarded by Chemistry Teachers Associations of Goa University, Goa, (India).
- May 2007 Chemistry Proficiency Award-awarded by SESA Goa Pvt. Ltd. Goa (India)

Research Experience

June 2014-till date Assistant Professor - School of Chemical Sciences, Goa University, India

- Established my research group and a new “Laboratory of Nanostructured Materials for Energy & Environmental Applications”.
- Developed Continuous Flow Fixed Bed High Pressure Catalytic Reactor for biofuel oxidation applications
- Developed High pressure-Low temperature Continuous Stirred Reactor for CO₂ Capture Storage and sequestration applications
- Developed Photocatalytic Batch Reactor for remediation of dye polluted water
- Developed low pressured batch reactor hyphenated with Micro Gas Chromatograph for CO₂ conversion to value added fuels
- Established research collaboration with i) PTB, Braunschweig Germany, ii) University of Helsinki Finland and iii) IIT Madras India under Indo-European Science and Technology Cooperation 2017.
- Initiated work on international joint project entitled “Towards higher efficiencies and lower emissions for Indian-origin biodiesel combustion: Developing a predictive CFD model with validated reduced kinetics for device-scale applications” supported by DST, India
- Completed work on funded research project entitled “CO₂/O₂ reactivity with hydrocarbons in depleted oil reservoirs in the context of CCS technology applications supported Science & Engineering Research Board of India.
- Completed work on funded research project entitled “TiO₂ based nanocomposites for photo-oxidation of hazardous organic pollutants supported by University Grants Commission of India

March 2019 Visiting Research Scientist - Khalifa University, Abu Dhabi, UAE

- Developed a modified exhaust system for detection and analysis of particulate matter emissions from diesel engine
- Optimization of diesel engine performance via tailored modifications in diesel blends
- Performed measurement of sooting propensity, nanostructure analysis and oxidative reactivity of diesel soot in a diffusion flame setup.

June 2013

CNRS Post Doctoral Associate - LRGP-CRT, University of Lorraine (France).

- Worked on a sponsored research project entitled “HP/ LT oxidation studies of n-octane in context of CO₂/O₂ mixture injection under depleted oil reservoir condition by Total (France).
- Developed global kinetic models, simulated the oxidation kinetics and product distribution of n-octane oxidation.

June 2009- Dec 2012 Doctoral research fellow –University of Lille1/University of Bordeaux1 France.

- Worked on a Franco-German research project entitled “Novel approaches in investigation of oxidation chemistry of monoaromatics” supported by DFG (Germany) and CNRS (France).
- Performed experiments with excimer laser photolysis coupled to time resolved UV-VIS spectrometer on oxidation experiments and kinetic simulation of Hexamethyl benzene reactivity with O₂.
- Performed experiments with excimer laser photolysis coupled to Laser Induced Fluorescence (LIF) and cw-Cavity Ringdown Spectrometer (CRDS) for gas phase detection of OH and HO₂ radicals.
- Performed kinetic experiments and simulations on OH and HO₂ radical initiated oxidation of volatile organic compounds such as Benzene, Toluene, Xylene, Formaldehyde and Acetaldehyde.
- Performed OH radical lifetime measurements in smog chamber at Forschungszentrum Jülich (Germany) as a visiting scholar under Franco-German bilateral research collaboration.

Research Outcomes, Research Guidance, Teaching and Examinations

June 2014-till date

✚ Research Patent

- **P. Morajkar*** and A. V. Salkar, Indian Patent application number 201821000046, METHOD FOR SYNTHESIZING TUNGSTEN TRIOXIDE NANORODS, publication date 05/01/2018.

✚ Publication Overview

- 32 peer reviewed research papers in international journals of high reputation and impact such as ACS, RSC, Elsevier, Springer, etc.

Publications

- G. Bharath, K. Rambabu, A. Hai, **P. P. Morajkar**, A. V Salkar, S. W. Hasan, P. L. Show and F. Banat, Highly selective etherification of fructose and 5-hydroxymethylfurfural over a novel Pd-Ru/MXene catalyst for sustainable liquid fuel production, *Int. J. Energy Res.*, 2021 DOI:<https://doi.org/10.1002/er.6743>. (**Impact factor 3.7**)
- W. A. Ali, G. Bharath, **P. P. Morajkar**, A. V Salkar, M. A. Haija and F. Banat, Morphology-dependent catalytic activity of tungsten trioxide WO₃ nanostructures for hydrogenation of furfural to furfuryl alcohol, *J. Phys. D. Appl. Phys.*, 2021, **54**, 305502. (**Impact factor 3.2**)
- A. V Salkar, A. P. Naik, S. V Bhosale and **P. P. Morajkar**, Designing a Rare DNA-Like Double Helical Micro fiber Superstructure via Self-Assembly of In Situ Carbon Fiber-Encapsulated WO_{3-x} Nanorods as an Advanced Supercapacitor Material, *Appl. Mat. Inter.*, 2021, **13**, 1288-1300. (**Impact factor 8.8**)
- M. R. Biradar, A. V Salkar, **P. P. Morajkar**, S. V Bhosale and S. V Bhosale, Designing neurotransmitter dopamine-functionalized naphthalene diimide molecular architectures for high-performance organic supercapacitor electrode materials, *New J. Chem.*, 2021, **45**, 9346–9357. (**Impact factor 3.2**)
- M. R. Biradar, A. V Salkar, **P. P. Morajkar**, S. V Bhosale and S. V Bhosale, High-performance supercapacitor electrode based on naphthoquinone-appended dopamine neurotransmitter as an efficient energy storage material, *New J. Chem.*, 2021, **45**, 5154–5164. (**Impact factor 3.2**)
- H. Mittal, A. Al Alili, **P. P. Morajkar** and S. M. Alhassan, Graphene oxide crosslinked hydrogel nanocomposites of xanthan gum for the adsorption of crystal violet dye, *J. Mol. Liq.*, 2021, **323**, 115034. (**Impact factor 5.1**)
- G. Bharath, K. Rambabu, **P. P. Morajkar**, R. Jayaraman, J. Theerthagiri, S. J. Lee, M. Y. Choi and F. Banat, Surface functionalized highly porous date seed derived activated carbon and MoS₂ nanocomposites for hydrogenation of CO₂ into formic acid, *J. Hazard. Mater.*, 2021, **409**, 124980. (**Impact factor 9.0**)
- A. P. Naik, J. V Sawant, H. Mittal, A. Al Alili and **P. P. Morajkar**, Facile synthesis of 2D nanoflakes and 3D nanosponge-like Ni_{1-x}O via direct calcination of Ni (II) coordination compounds of imidazole and 4-nitrobenzoate: Adsorptive separation kinetics and photocatalytic removal of Amaranth dye contaminated wastewater, *J. Mol. Liq.*, 2021, **325**, 115235. (**Impact factor 5.1**)

- H. Mittal, A. Al Alili, **P. P. Morajkar** and S. M. Alhassan, GO crosslinked hydrogel nanocomposites of chitosan/carboxymethyl cellulose – A versatile adsorbent for the treatment of dyes contaminated wastewater, *Int. J. Biol. Macromol.*, 2021, **167**, 1248–1261. **(Impact factor 5.2)**
- A. P. Naik, A. V. Salkar, G. D. J. G. J. G. Peña, J. V. Sawant, G. Bharath, F. Banat, S. V. Bhosale and **P. P. Morajkar**, Facile synthesis of fibrous, mesoporous Ni_{1-x}O nanosponge supported on Ni foam for enhanced pseudocapacitor applications, *J. Mater. Sci.*, 2020, **55**, 12232–12248. **(Impact factor 3.4)**
- M. K. Abdrabou, **P. P. Morajkar**, G. D. J. Guerrero Peña, A. Raj, M. Elkadi and A. V. Salkar, Effect of 5-membered bicyclic hydrocarbon additives on nanostructural disorder and oxidative reactivity of diffusion flame-generated diesel soot, *Fuel*, 2020, **275**, 117918. **(Impact factor 5.6)**
- **P. P. Morajkar**, M. K. Abdrabou, A. V. Salkar, A. Raj, M. Elkadi and D. H. Anjum, Nanostructural Disorder and Reactivity Comparison of Flame Soot and Engine Soot Using Diesel and Jatropa Biodiesel/Diesel Blend as Fuels, *Energy & Fuels*, 2020, **34**, 12960–12971. **(Impact factor 3.4)**
- **P. P. Morajkar**, M. K. Abdrabou, A. Raj, M. Elkadi, S. Stephen and M. Ibrahim Ali, Transmission of trace metals from fuels to soot particles: An ICP-MS and soot nanostructural disorder study using diesel and diesel/Karanja biodiesel blend, *Fuel*, 2020, **280**, 118631. **(Impact factor 5.6)**
- H. Mittal, **P. P. Morajkar**, A. Al Alili and S. M. Alhassan, In-Situ Synthesis of ZnO Nanoparticles using Gum Arabic Based Hydrogels as a Self-template for Effective Malachite Green Dye Adsorption, *J. Polym. Environ.*, 2020, **28**, 1637–1653. **(Impact factor 2.6)**
- A. P. Naik, H. Mittal, V. S. Wadi, L. Sane, A. Raj, S. M. Alhassan, A. Al Alili, S. V. Bhosale and **P. P. Morajkar**, Super porous TiO₂ photocatalyst: Tailoring the agglomerate porosity into robust structural mesoporosity with enhanced surface area for efficient remediation of azo dye polluted waste water, *J. Environ. Manage.*, 2020, **258**, 110029. **(Impact factor 4.2)**
- M. K. Abdrabou, **P. P. Morajkar**, G. D. J. Guerrero Peña, A. Raj, M. Elkadi and A. V. Salkar, Effect of 5-membered bicyclic hydrocarbon additives on nanostructural disorder and oxidative reactivity of diffusion flame-generated diesel soot, *Fuel*, 2019, **275**, 117918. **(Impact factor 5.6)**

- A. V Salkar, R. X. Fernandes, S. V Bhosale and **P. P. Morajkar**, NH- and CH-Substituted Ureas as Self-Assembly Directing Motifs for Facile Synthesis and Electrocapacitive Applications of Advanced WO_{3-x} One-Dimensional Nanorods, *ACS Appl. Energy Mater.*, 2019, **2**, 8724–8736. (**Impact factor 4.5**)
- M. D. Aljabri, N. M. Gosavi, L. A. Jones, **P. P. Morajkar**, D. D. La and S. V Bhosale, Arginine-Induced Self-Assembly of Protoporphyrin to Obtain Effective Photocatalysts in Aqueous Media Under Visible Light., *Molecules*, 2019, **24**, 4172. (**Impact factor 3.2**)
- **P. P. Morajkar**, G. D. J. Guerrero, A. Raj, M. Elkadi, R. K. Rahman, A. V Salkar, A. Pillay, T. Anjana and M. S. Cha, Effects of Camphor Oil Addition to Diesel on the Nanostructures and Oxidative Reactivity of Combustion-Generated Soot, *Energy & Fuels*, 2019, **33**, 12852–12864. (**Impact factor 3.4**)
- A. V. Salkar, A. P. Naik, V. S. Joshi, S. K. Haram and **P. P. Morajkar**, Designing a 3D nanoporous network: Via self-assembly of WO_3 nanorods for improved electrocapacitive performance, *CrystEngComm*, 2018, **20**, 6683–6694. (**Impact factor 3.4**)
- A. P. Naik, A. V Salkar, M. S. Majik and **P. P. Morajkar**, Enhanced photocatalytic degradation of Amaranth dye on mesoporous anatase TiO_2 : evidence of C–N, N=N bond cleavage and identification of new intermediates, *Photochem. Photobiol. Sci.*, 2017, **16**, 1126–1138. (**Impact factor 2.2**)
- C. Pacini-Petitjean, **P. P. Morajkar**, V. Burkle-Vitzthum, A. Randi, C. Lorgeoux, D. Morel, J. Pironon and P. Faure, Oxidation of n-Alkane ($n\text{-C}_8\text{H}_{18}$) under Reservoir Conditions, in Context of Gas Mixture Injection (CO_2/O_2): Construction of a Kinetic Model, *Energy & Fuels*, 2015, **29**, 1913–1922. (**Impact factor 3.4**)
- H. Bouzidi, M. Djehiche, T. Gierczak, **P. P. Morajkar**, C. Fittschen, P. Coddeville and A. Tomas, Low-Pressure Photolysis of 2,3-Pentanedione in Air: Quantum Yields and Reaction Mechanism, *J. Phys. Chem. A*, 2015, **119**, 12781–12789. (**Impact factor 2.6**)
- C. Pacini, **P. P. Morajkar**, P. Faure, V. Burkle-Vitzthum, A. Randi, C. Lorgeoux, J. Pironon and D. Morel, Effect of the Injection of a Gas Mixture ($\text{CO}_2 + \text{O}_2$) Onto Residual hydrocarbOns in a Depleted oil Reservoir: Experiments and Modelling, *Energy Procedia*, 2014, **63**, 7830–7835. (**Impact factor 1.9**)
- **P. P. Morajkar**, A. Bossolasco, C. Schoemaeker and C. Fittschen, Photolysis of CH_3CHO at 248 nm: Evidence of triple fragmentation from primary quantum yield of CH_3 and HCO radicals and H atoms, *J. Chem. Phys.*, 2014, **140**, 214308. (**Impact factor 3.0**)

- **P. P. Morajkar**, C. Schoemaeker, M. Okumura and C. Fittschen, Direct Measurement of the Equilibrium Constants of the Reaction of Formaldehyde and Acetaldehyde with HO₂ Radicals, *Int. J. Chem. Kinet.*, 2014, **46**, 245–259. (**Impact factor 1.5**)
- C. Bahrini, **P. P. Morajkar**, C. Schoemaeker, O. Frottier, O. Herbinet, P.-A. Glaude, F. Battin-Leclerc and C. Fittschen, Experimental and modeling study of the oxidation of n-butane in a jet stirred reactor using cw-CRDS measurements, *Phys. Chem. Chem. Phys.*, 2013, **15**, 19686–19698. (**Impact factor 3.4**)
- J.-C. Loison, M.-T. Rayez, J.-C. Rayez, A. Gratien, **P. P. Morajkar**, C. Fittschen and E. Villenave, Gas-Phase Reaction of Hydroxyl Radical with Hexamethylbenzene, *J. Phys. Chem. A*, 2012, **116**, 12189–12197. (**Impact factor 2.6**)
- **P. P. Morajkar**, C. Schoemaeker and C. Fittschen, Absolute absorption cross sections for two selected lines of formaldehyde around 6625cm⁻¹, *J. Mol. Spectrosc.*, 2012, **281**, 18–23. (**Impact factor 2.2**)
- C. Jain, **P. P. Morajkar**, C. Schoemaeker and C. Fittschen, Formation of HO₂ Radicals from the 248 nm Two-Photon Excitation of Different Aromatic Hydrocarbons in the Presence of O₂, *J. Phys. Chem. A*, 2012, **116**, 6231–6239. (**Impact factor 2.6**)
- C. Jain, **P. P. Morajkar**, C. Schoemaeker, B. Viskolcz and C. Fittschen, Measurement of absolute absorption cross sections for nitrous acid (HONO) in the near-infrared region by the continuous wave cavity ring-down spectroscopy (cw-CRDS) technique coupled to laser photolysis., *J. Phys. Chem. A*, 2011, **115**, 10720–10728. (**Impact factor 2.6**)
- **P. P. Morajkar** and J. B. Fernandes, A new facile method to synthesize mesoporous γ -Al₂O₃ of high surface area and catalytic activity, *Catal. Commun.*, 2010, **11**, 414–418. (**Impact factor 3.6**)

Doctoral Thesis

- Miss Amarja P. Naik (Rg.No.201002655), thesis entitled “*Synthesis characterization of titanium dioxide based nanocatalyst and their catalytic application*” (ongoing).
- Mr. Akshay V. Salkar (Rg.No. 201103516), thesis entitled “*Synthesis, characterization and applications of nanostructured metal oxides*” (ongoing).
- Miss Sarvesha Shetgaonkar (Rg.No. 201303500), thesis entitled “*Conversion of CO₂ into value added chemicals using nanostructured catalyst*” (ongoing).

Research Assistants

- Guided 02 research assistants on sponsored research projects of DST and SERB India.

Master Thesis

- Guided 33 Master thesis since 2014 as a part of the M.Sc. Chemistry curriculum.

Teaching and Examination

- Conducted teaching and examination duties for M.Sc. courses entitled i) Advanced thermodynamic and reaction kinetics, ii) Advances in Catalysis, iii) General Physical Chemistry, iv) Solid state chemistry v) Selected topic in Physical Chemistry vi) Laboratory practical in physical chemistry for MSc. I & II.

Career Advancement Training

- Refresher Course in Natural & Biosciences (Inter Disciplinary), UGC-HRD, India
- Teaching Orientation Program UGC, UGC-HRDC-GJUST, Haryana India

Professional Activities/services

- January 2019** Member of Institution Innovation Council, Goa University
- March 2018** Elected Court Representative of Teaching Departments, Goa University
- March 2018** Member of DICE, Goa University
- February 2018** Member of Technical Committee TC20, energy & related quantities IMEKO
- July 2017** Member of American Chemical Society
- March 2017** Appointed as Warden, Men's Hostel, Goa University, India
- May 2017** Appointed as Member Secretary, Hostel Management Committee, Goa University, India
- May 2017** Appointed as Member, Anti Ragging Committee, Goa University, India
- May 2017** Appointed as Member of Campus Amenities Committee, Goa University, India
- April 2017** Appointed as Member of Executive Council, CDFAA, Goa University, India
- June 2016** Appointed as Member of Foreign Student Advisory Committee, Goa University, India
- April 2016** Appointed as Scientific Evaluator of Goa University for Goa Energy Development Cooperation Sponsored Research Projects
- January 2015** Appointed as Joint Secretary of International Conference on Green Chemistry, Catalysis, Energy and Environment (ICGC), Goa University, India
- January 2015** Appointed as Member of Examination Panel of Chemistry Teachers, Goa University

Invited as visiting scientist

- Visiting Scientist at Physikalisch-Technische Bundesanstalt (PTB) Braunschweig, Germany
- Visiting Scientist at Khalifa University of Science & Technology, UAE
- Visiting Scientist at Department of Mechanical Engineering, IIT Madras, India
- Visiting Researcher at ARTG, National Atmospheric Research Laboratory (NARL), India

Major Research Conference Presentations

- Dec 2020- Oral presentation on DNA-like WO_3 superstructures for advanced supercapacitor applications at the conference on advanced materials for renewable energy and sustainable environment organized by P.E.S. college of Arts and Science, Goa (India). **(Best Oral presentation)**
- Jan 2020- Poster presentation on NH- and CH- substituted ureas as motifs for synthesizing WO_3 nanorods at the conference on advanced materials for renewable energy and sustainable environment (AMRESE 2020) at the Govt. College of Arts, Science and Commerce, Khandola, Goa (India). **(Best Poster award)**
- Dec 2019- Poster presentation on superporous TiO_2 photocatalyst with enhanced surface area for wastewater treatment at the conference on new frontiers in chemistry (NFCFA 2019) at BITS, Goa (India).
- Feb 2019- Poster presentation on 3D nanoporous WO_3 for supercapacitor applications at the conference on advancement in science & technology (NCAST 2019) at the Govt. College of Arts, Science and Commerce, Khandola, Goa (India).
- Jan 2019- Poster presentation on nanostructured WO_3 for electrochemical applications at the conference on advanced in materials science & applied biology (AMSAB 2019) at the NMIMS Mumbai (India).
- May 2018- Invited talk: Nanostructured materials for treatment of exhaust gas emissions from diesel engine at the Department of Physical Quantities, PTB Braunschweig, (Germany).
- Jan 2018: 21st Workshop & Symposium on Thermal Analysis (THERMANS 2018) Goa

University, (India).

- Jan 2018: Conference on Advances in Catalysis for Energy and Environment (CACEE 2018) TIFR, Mumbai, (India).
- July 2017: 21st CRSI National Symposium in Chemistry, ICT Hyderabad, (India).
- Jan 2017: Conference on New Frontiers in Chemistry, the NFCFA BITS Goa (India).
- Dec 2015: Poster Presentation on Photocatalytic degradation of Amaranth dye using TiO₂ catalyst at the NFCFA BITS Goa (India).
- July 2015- Oral presentation: Reaction kinetics and its Applications in Atmospheric and Combustion systems. Invited lecture at the National Atmospheric Research laboratory, Gadanki (India).
- July 2015- Participated in Atmospheric aerosol balloon measurement campaign at NARL in collaboration with NASA Langley, (USA).
- Jan 2015: Participated in the International conference on Green chemistry, Catalysis, Energy and Environments at Goa University, Goa, (India).
- June 2012 – Poster presentation: A kinetic study of the gas phase reaction of CH₂O + HO₂ radicals. 22nd International Symposium on Gas Kinetics, Boulder, Colorado (USA).
- June 2012 – Oral presentation: Quantum yield of HCO and H atoms from the 248 nm photolysis of CH₃CHO and the reaction kinetics of CH₃ + HO₂ radicals. XXXIIth Reunion annuelle du group de CINETIQUE et Photochimie Bordeaux (France).
- June 2011– Poster presentation: OH initiated oxidation of Hexamethylbenzene. XXXIth Reunion annuelle du group de CINETIQUE et Photochimie, Wimereux (France).
- May 2011– Poster presentation: Direct measurement of equilibrium constant for the reaction of CH₂O + HO₂ radicals using laser photolysis coupled to cw-CRDS technique. Journée de Doctorat, IRENI, (France).
- Mar 2010 – Oral presentation: OH initiated oxidation of aromatic compounds: the special case of Hexamethyl benzene, DFG-CNRS Meeting, Bayreuth (Germany).
- Feb 2008 – Poster presentation: Nanotechnology- An introduction to Nano science. National conference on “Advances in Nanomaterial Drug Delivery”, NIO, Goa, (India).