

Bioorganic Material Research Laboratory

Principal Investigator: Dr. Pratibha Kumari

Assistant Professor
Department of Chemistry
Deshbandhu College (University of Delhi)
Kalkaji, New Delhi-110 019, India
Mobile: +91 9899367030
E-mail: pkumari@db.du.ac.in; pratibhasinghdu@gmail.com,



Research Areas: Catalysis, Supramolecular Chemistry, Sensing, Energy Conversion, Environmental Remediation, Material Chemistry, Medicinal Chemistry

Supervision of Ph.D Students:

Ms. Raveena
Mr. Sanjay Kumar
Ms. Alka

Supervision of M.Sc. Dissertation:

1. Himanshu Singh, 2018. Title: *Synthesis of magnetite based acidic nanomaterials and their catalytic application in condensation reactions*. Dissertation submitted to Amity Institute of Applied Sciences, Amity University, Uttar Pradesh (External Supervisor).
2. Sam John Koshy, 2018. Title: *Synthesis of calixarene modified magnetite nanocomposite*. Dissertation submitted to Amity Institute of Applied Sciences, Amity University, Uttar Pradesh (External Supervisor)
3. Sanjay S. Rawat, 2018. Title: *Synthesis of Porphyrin substituted Graphene Oxide Material*. Dissertation submitted to Amity Institute of Applied Sciences, Amity University, Uttar Pradesh (External Supervisor).
4. Anjali Vijay, 2018. Title: *Synthesis of calix[4]pyrrole decorated graphene oxide*. Dissertation submitted to Amity Institute of Applied Sciences, Amity University, Uttar Pradesh (External Supervisor)
5. Mohit Sharma, 2019. Title: *Green synthesis of newer Dibenz[1,4] diazepine-1-one derivatives*. Dissertation submitted to Department of Applied Chemistry, School of Vocational Studies and Applied Sciences, Gautam Buddha University, Greater Noida, Uttar Pradesh (Co-supervisor)

6. Beena, 2020. Title: Synthesis of 5,11,17,23-tetra-tert-butyl-25,27-di(hydroxycarbonylmethoxy)-26,28-dihydroxycalix[4]arene modified with 7-hydroxy-4-methylcoumarin and their application in remediation studies (External Supervisor)

Research Papers Published in Refereed/Peer Reviewed Journals (Last Ten Years): 23

1. Isolation, synthesis and biomimetic reactions of metalloporphyrinoids in ionic liquids. Pratibha Kumari, N. Sinha, P. Chauhan, S.M.S. Chauhan, *Current Organic Synthesis*, **2011**, 8, 393-437.
2. Formation of hydridocobalt(III) phthalocyanine by reaction of cobalt(II) phthalocyanines with sodium borohydride and its reactions with antioxidant isoflavones. Poonam, Pratibha Kumari, S.M.S. Chauhan, *New Journal of Chemistry*, **2011**, 35, 2639-2646.
3. Reductive dechlorination of atrazine using sodium-borohydride catalysed by cobalt(II) phthalocyanines. Poonam, Pratibha Kumari, Sohail Ahmad, S.M.S. Chauhan, *Tetrahedron Lett.* **2011**, 52, 7083-7086.
4. Biomimetic oxidation of polycyclic aromatic hydrocarbons with hydrogen peroxide catalyzed by iron(IV) corroles in ionic liquids. Pratibha Kumari, Ritika Nagpal, S.M.S. Chauhan, *Catal. Commun.* **2012**, 29, 15-20.
5. Efficient Iron(III) Porphyrins-Catalyzed Oxidation of Guanidoximes to Cyanamides in Ionic Liquids, Pratibha Kumari, Ritika Nagpal, Prashant Chauhan, Vinith Yatindranath, S.M.S. Chauhan, *J. Chem. Sci.* **2015**, 127, 13-18.
6. Efficient reduction of C-N multiple bonds catalyzed by magnetically retrievable magnetite nanoparticles with sodium borohydride, Pratibha Kumari, Renu Gautam, Harshit Yadav, Vikas Kushwaha, Avinash Mishra, Shilpi Gupta, Veena Arora, *Catalysis Letters*, **2016**, 146, 2149-2156.
7. Application of Porphyrin nanomaterials in Photodynamic therapy, Pratibha Kumari, Renu Gautam, Archana Milhotra, *Chem. Biol. Lett.* **2016**, 3(2), 32-37. 2347-9825.
8. Challenges with Mosquito-borne Viral Diseases: Outbreak of the Monsters, Renu Gautam, Sweta Mishra, Archana Milhotra, Ritika Nagpal, Mradul Mohan, Anchal Singhal and Pratibha Kumari, *Current Topics in Medicinal Chemistry*, **2017**, 17, 2199-2214.
9. Efficient Friedlander Synthesis of Quinolines in the Presence of Sulfonyl Imidazolium Salts, Anchal Singhal, Pratibha Kumari, S.M.S. Chauhan, *Current Organocatalysis*, **2017**, 4, 182-188.

10. Efficacious and selective oxidation of atrazine with hydrogen peroxide catalyzed by magnetite nanoparticles: Influence of reaction media, Pratibha Kumari, Sanjay Kumar, Shilpi Gupta, Avinash Mishra and Arun Kumar, *ChemistrySelect* **2018**, 3, 2135– 2139.
11. β -cyclodextrin modified magnetite nanoparticles for efficient removal of eosin and phloxine dyes from aqueous solution. Pratibha Kumari, Shekhar and Himanshu Parashara, *Materials Today: Proceedings*, **2018**, 5, 15463-15470.
12. Facile One-Pot Friedlander Synthesis of Functionalized Quinolines using Graphene Oxide Carbocatalyst, Anchal Singhal, Pratibha Kumari, Kharu Nisa, *Current Organic Synthesis*, **2019**, 16, 154-159.
13. Oxygen mediated highly efficient cobalt(II) porphyrin-catalyzed reduction of functional chromones: Experimental and Computational studies, Poonam, Pratibha Kumari, Maria Grishina, Vladimir Potemkin, Abhishek Verma , Brijesh Rathi, *New Journal of Chemistry*, **2019**, 43, 5228-5238.
14. Efficient system for encapsulation and removal of paraquat and diquat from aqueous solution: 4-sulfonatocalix[n]arenes and its magnetite modified nanomaterials, Pratibha Kumari, Alka, Sanjay Kumar, Kharu Nisa, DK Sharma, *Journal of Environmental Chemical Engineering*, **2019**, 7, 103130.
15. Visible light-assisted photodegradation by silver tungstate-modified magnetite nanocomposite material for enhanced mineralization of organic water contaminants. Sanjay Kumar, Alka, Tarun, Jatin Saxena, Chirag Bansal, Pratibha Kumari, *Applied Nanoscience*, **2020**, 10, 1555-1569.
16. Recent progresses in Organic-Inorganic Nano technological platforms for cancer therapeutics, Sanjay Kumar, Anchal Singhal, Uma Narang, Sweta Mishra, Pratibha Kumari. *Current Medicinal Chemistry*, **2020**, 27 (35), 6015-6056.
17. Therapeutic applications of Peptides against Zika Virus: A Review. Preeti Karwal, Ishwar Dutt Vats, Niharika Sinha, Anchal Singhal, Teena Sehgal, Pratibha Kumari. *Current Medicinal Chemistry*, **2020**, 27(23), 3906-3923.
18. Synthesis and applications of hydrogels in cancer therapy, Anchal Singhal, Niharika Sinha, Pratibha Kumari, Manoushikha Purkayastha, *Anti-Cancer Agents in Medicinal Chemistry*, **2020**, 20(12), 1431-1446.
19. Exploring Carbonaceous nanomaterials for arsenic and chromium removal from waste water, Seema Lal, Anchal Singhal, Pratibha Kumari, *Journal of Water Process Engineering*, **2020**, 36, 101276.

20. Cyclodextrin based nanostructured materials for sustainable water remediation applications, Pratibha Kumari, Parul Singh, Anchal Singhal, Alka. *Environ Sci Pollut Res*, **2020**, 27, 32432-32448.
21. Potential diagnostics and therapeutic approaches in COVID-19. Kumari, Pratibha, Singh, A., Ngasainao, M. R., Shakeel, I., Kumar, S., Lal, S., Singhal, A., Sohal, S. S., Singh, I. K., & Hassan, M. I. *Clinica chimica acta; international journal of clinical chemistry*, **2020**, 510, 488–497.
22. Emerging Therapeutic Approaches to COVID-19, Indrakant Kumar Singh, Pratibha Kumari, Pooja Mittal, Amit Kumar, Bharti Singal, Gulam Mustafa Hasan, Rajiv Aggarwal, Mohammad Amjad Kamal, Archana Singh, and Imtaiyaz Hassan, *Current Pharmaceutical Design*, **2021**, 27, 3370-3388. doi: 10.2174/1381612827666210125160703
23. Gold-carbonaceous materials based heterostructures for gas sensing application, Sanjay Kumar, Suneel Kumar, Manisha Sengar and Pratibha Kumari, *RSC Adv.*, **2021**, 11, 13674.

Book Chapters: 4

1. *Magnetic nanoparticles based nanocontainers for water treatment*, Pratibha Kumari, Sanjay Kumar, Anchal Singhal, in Book “Smart Nanocontainers: Fundamentals and Emerging Applications” Editors: Phuong Nguyen, Tri Trong-On Do, Tuan Anh Nguyen, **2019**, Publisher: Elsevier, paperback ISBN: 9780128167700. Chapter 29.
2. *Emerging Nanomaterials for Cancer Therapy*, Sanjay Kumar, Pratibha Kumari, Rajeev Singh, in Book “Nanoparticles in Medicine”, Editor: Ashutosh Kumar Shukla, **2019**, Publisher: Springer, ISBN:978-981-13-8953-5, Chapter 2, Pages: 25-54.
3. *Advanced applications of green materials in catalysis applications*, Pratibha Kumari, Seema Lal, Anchal Singhal, in Book “Applications of Advanced Green Materials” Editors: Shakeel Ahmad, **2020**, Publisher: Woodhead publishing, eBook ISBN: 9780128209387, Chapter 22.
4. *Flexible Nano Smart sensors*, Sanjay Kumar, Pratibha Kumari, in Book “Nanosensors for Smart Manufacturing” Editors: Sabu Thomas Tuan Anh Nguyen Mazaher Ahmadi Ali Farmani Ghulam Yasin, **2021**, eBook ISBN: 9780128236529, Publisher: Elsevier, Chapter 9.

Research Publications (Abstracts) in International Conferences/Symposiums (Last five years): 19

1. Emerging nanotechnology and water treatment, Pratibha Kumari, Ruby Mishra, The 5th Asia Oceania Conference on Green and Sustainable Chemistry (AOC-5 GSC), organized by North India Section of The Royal Society of Chemistry (London), Green Chemistry Network Centre (New Delhi) and The Energy and Resources Institute (New Delhi), (Jan. 15-17, **2015**).
2. Efficient reduction of oximes catalyzed by magnetic Fe₃O₄ nanoparticles using sodium borohydride, Pratibha Kumari, Umesh Kumar, National conference on Solid State Chemistry and Allied Areas (ISCAS-2015), organized by Bhaskaracharya College of Applied Sciences (University of Delhi), New Delhi (May 8-10, **2015**).
3. Green Biosynthesis of Magnetic Fe₃O₄ Nanoparticles and their Application in Remediation of Organic Pollutants, Pratibha Kumari, Sanjay Kumar, 1st National Conference on Emerging Trends & Future Challenges in Chemical Sciences (ETFC - 2016), organized by Kirori Mal College, University of Delhi, New Delhi (Feb. 3-4, **2016**).
4. Efficient Reduction of C-N multiple bonds catalyzed by magnetically retrievable magnetite nanoparticles with sodium borohydride, Pratibha Kumari, Ritu, Shilpi Gupta, Avinash Mishra, Harshit Yadav, Vikas Kushwaha, Vaibhav Goel, Kuldeep Sharma, Akshita Sharma, Monika Gaur, Ankit Kumar, International Conference on Material Science & Technology, organized by Department of Chemistry, University of Delhi, New Delhi (March 1-4, **2016**).
5. Magnetic Fe₃O₄ nanoparticles catalyzed oxidative degradation of Atrazine with hydrogen peroxide. Pratibha Kumari, Ritu, Shilpi Gupta, Avinash Mishra, Harshit Yadav, Vikas Kushwaha, Vaibhav Goel, Kuldeep Sharma, Akshita Sharma, Monika Gaur, Ankit Kumar, S.M.S. Chauahn. International Conference on Material Science & Technology, organized by Department of Chemistry, University of Delhi, New Delhi (March 1-4, **2016**).
6. Efficient removal of herbicides by hydrogen peroxide in presence of magnetite nanoparticles, Pratibha Kumari, Shilpi Gupta, Avinash Mishra, Vaibhav Goel, Kuldeep Sharma, Ankit Kumar, Harshit Yadav, Vikas Kushwaha, Ritu, Akshita Sharma, Monika Gaur. National Symposium on Nanotechnology (BIOTIKOS 2016), organized by Department of Biotechnology, TERI University, New Delhi (March 31-April 1, **2016**).
7. Eosin dye removal from aqueous solution using Fe₃O₄@β-cyclodextrin Nanocomposites, Pooja Yadav, Prateek Sharma, Vivek Kumar, Ankur Kumar Rastogi,

Kajal Chaudhary, Shilpi Gupta, Avinash Mishra, Harshit Yadav, Vikas Kushwaha, Pratibha Kumari, National Conference on "Combating Industrial pollution for sustainable environment-A fusion of industrial and scientific efforts", Department of Chemistry, Gargi College, University of Delhi, Delhi (September 22-23, **2016**).

8. Efficient Oxidative Transformation of Atrazine with Hydrogen Peroxide catalyzed by Magnetite Nanoparticles, Pratibha Kumari, Slany Merine Johnson, Shilpi Gupta, Avinash Mishra. National conference on Environmental sustainability in waste water remediation: current status and future prospects (ESWR-2017) organized by Department of chemistry, Sri Venkateswara College, University of Delhi, New Delhi, India (19-20 January **2017**).
9. Synthesis of magnetite@ β -cyclodextrin nanocomposites and its application in removal of eosin and phloxine dyes, Shekhar, Himanshu Parashara, Sanjay Kumar, Pratibha Kumari, National conference on Trends in Nanobiotechnology (BIOTIKOS 2017), organized by Department of biotechnology, TERI University, New Delhi, India (28-29 September, **2017**)
10. Efficient synthesis of 1,5-benzodiazepines using acid functionalized magnetite nanoparticles, Pratibha Kumari, Atul Kumar and Atul Tiwari, National conference on Recent Advances in Chemical Sciences towards Green & Sustainable Environment: Swachh Bharat Abhiyan Perspective, organized by Aditi Mahavidyalaya, University of Delhi, Delhi, India. (10-11 October **2017**)
11. Application of 4-sulfonatocalix[6]arene modified magnetite nanoparticles in crystal violet removal from aqueous solution, Pratibha Kumari and Alka, National Conference on innovations in sciences and emerging challenges in health and environment(NSHE-2018), Organized by Daulat Ram College, University of Delhi, New Delhi, India (20 March **2018**).
12. An Enhanced Photocatalytic Degradation and mineralization of organic water pollutant using Functionalized graphene oxide, Sanjay Kumar, Pratibha Kumari, Tarun, Jatin Saxena, National Conference on innovations in sciences and emerging challenges in health and environment(NSHE-2018), Organized by Daulat Ram College, University of Delhi, New Delhi, India (20 March **2018**). (**Best Poster Presentation Award**)
13. Photocatalytic Oxidation of Methylene Blue using Functionalized Graphene Oxide, Jatin Saxena, Tarun, Sanjay Kumar, Pratibha Kumari, National conference on skill development to build a clean India, organized by Deshbandhu College in Collaboration with CSR, Oil and Natural Gas Corporation Ltd., New Delhi. (7-8 June **2018**).

14. An Enhanced Photocatalytic Degradation of Organic Water Pollutants using Functionalized Magnetite Nanomaterials, Tarun, Sanjay Kumar, Pratibha Kumari, INDO-US Colloquium on Recent Developments in Interdisciplinary Research, organized by Hansraj College, University of Delhi in association with Loyola University Stritch School of Medicine, USA (2 July **2018**).
15. Recent Advances in Hydrogels for Cancer Treatment, Manoushikha, Prashant, Archana, Pratibha Kumari, INDO-US Colloquium on Recent Developments in Interdisciplinary Research, organized by Hansraj College, University of Delhi in association with Loyola University Stritch School of Medicine, USA (2 July **2018**).
16. Effective photocatalytic degradation of Methomyl using functionalized Graphene oxide Nanocomposites, Tarun, Jatin Saxena, Pratibha Kumari, Faculty Development Program cum National Workshop on Greening an undergraduate chemistry lab (GUCL 2018)" organized by Sri Venkateswara College, University of Delhi, New Delhi, (8-9 August **2018**).
17. Enhanced Photocatalytic Degradation of Organic Pollutants using Functionalized Graphene Oxide Nanocomposite, Chirag Bansal, Jatin Saxena, Pratibha Kumari, Faculty Development Program cum National Workshop on Greening an undergraduate chemistry lab (GUCL 2018)" organized by Sri Venkateswara College, University of Delhi, New Delhi, (8-9 August **2018**) (**Best Poster Presentation Award**).
18. Application of functionalized graphene oxide nanomaterials for the removal of pesticides from aqueous solution, Alka, Pratibha Kumari, 1st International Conference on Integrative, Biology and Translational Medicine (ICBTM-2019) organized by Hansraj College, University of Delhi, Delhi, India and Loyola University Chicago Stritch School of Medicine, USA. (25-26 Feb. **2019**).
19. Synthesis of ionic liquid functionalized calix[4]arene grafted magnetite nanoparticles and their application in water remediation, Alka, Sanjay Kumar, Pratibha Kumari, National Conference on Recent Trends and Advancements in Chemical Sciences, Organized by Department of chemistry, University of Delhi and Bhaskaracharya College of Applied Sciences (University of Delhi), New Delhi (29-31 March, **2019**).

Research Project Completed/Ongoing:

- Principal Investigator, Innovation project DBC 306/2015-16 Titled "Remediation of organic contaminants from soil using magnetic iron oxide based nanomaterials", 2015-2016.

- Principal Investigator, UGC: Start-up Research Project Titled “Development of calix[4]pyrrole modified graphene oxide materials and their application in water remediation”, 2016-2018.
- Principal Investigator, DST-SERB: ECR Research Project Titled “Synthesis of calixarenes functionalized magnetite (Fe_3O_4) nanomaterials and their potential applications in waste water treatment: “Little solution to big problems” 2016-2019.
- Principal Investigator, DRDO-LSRB funded Research Project Titled “Design and development of smart nanomaterial-based biosensors for pesticide detection in food” 2021-2024.

Awards & Distinctions:

- Award of *Junior Research Fellowship* from CSIR (July 2002- Jun 2004), New Delhi, India.
- Award of *Senior Research Fellowship* from CSIR (July 2004- May 2007), New Delhi, India.
- Early Career Research Award (2016-2019) by Science & Engineering Research Board (SERB), Ministry of Science of Technology, Govt. of India.
- Indo-US Fellowship award for women in STEMM by the Department of Science and Technology (DST), Govt. of India and the Indo-US Science & Technology Forum (IUSSTF) jointly (Jan- Oct 2020).

Research Facilities and Infrastructure:

- Rotary Evaporator with Vacuum pump and Chiller
- UV-visible spectrophotometer
- Research centrifuge
- Ultrasonic bath sonicator
- Digital Balance
- UV Chamber
- Water Bath Shaker
- Suction pump with filtration unit
- Temperature controlled Lab Oven