Prangya Ranjan Rout, PhD

Co-founder and Director
Fermibio Solutions Pvt. Ltd.

Mob No.: +91-8917379390 | **Email Id:** routpr@nitj.ac.in
Skype Id: prangya rout |www.linkedin.com/in/prangya/
Orcid-0000-0001-9263-3806|Webofscience-AEM-2331-2022
Google Scholar (H-index-24) | Scopus (H-index-20)

Professional Summary

- Highly motivated and goal-oriented Environmental Biotechnologist with 10+ years of experience in advanced wastewater treatment not limited to nutrient removal, resource (phosphorous) recovery, environmental microbiology, bioreactor design, membrane technology, and micro-pollutant removal leading to a young scientist award, 2 granted patents (201731036014, 394577-001), best practice-oriented paper award by ASCE, BK21 plus research fellowship and SERB-SIRE Visiting Fellow by Government of India.
- Effective scientific communicator, reviewer, mentor, and active team player involved in several research collaborations and dissemination of research in the form of 48 peer-reviewed research articles, 3 books, 29 book chapters, 29 national and international conference presentations, and 9 nucleotide sequence submissions.
- Proven ability in project and time management skills, as evidenced by handling three projects concurrently during postdoc tenure, meeting deadlines, and presenting technical reports. Completed a fast-paced industrial project three months before the deadline, resulting in grant approval ($85,000) for a new project. Currently handling five research projects of INR 2.25 Crore, mostly related to biological wastewater treatment aiming at nutrient removal and phosphorous recovery.

Current Employment

Assistant Professor
Dr B R Ambedkar National Institute of Technology (NIT) Jalandhar, Punjab **02/2023 – Present**

Co-founder and Director **01/2024 – Present**
Fermibio Solutions Pvt. Ltd. (Reg. No.-060463)

- The start-up dedicated to advancing gut microbiota research. Our designed and developed Artificial Colon Model for Microbiota Research (AMMR) simulates the human colon environment for detailed studies of gut microbiota.

Professional Experience

Visiting Professor/SIRE Fellow
University of Manitoba, Winnipeg, Manitoba, Canada **12/2023 – 06/2024**

- Collaborated with Dr. Qiuyan Yuan on research projects centered around nutrient removal and recovery from wastewater. Guided graduate students in their research projects. Served as a committee member for two Master's theses.

Postdoctoral Researcher (Environmental Engineering) **09/2018 – 08/2020**
INHA University, Incheon, Republic of Korea

- Co-supervised a Ph.D. and a postgraduate student for the successful operation of a pilot-scale anaerobic fluidized membrane bioreactor for micropollutant removal and recovery of nutrients and dissolved methane from domestic wastewater. Assisted another graduate student in the application of an Anammox fluidized membrane bioreactor for low ammonia wastewater treatment, resulting in 4 high-impact research publications.

Assistant Professor

Thapar Institute of Engineering and Technology, Patiala, Punjab **02/2021 – 31/2023**
Madhav Institute of Technology and Science, Gwalior, MP (**TEQIP III, MHRD**) **01/2018 - 08/2018**
K L University, Vijayawada, AP **11/2017 - 01/2018**
National Institute of Technology Warangal, TS **07/2011 - 05/2012**

- Demonstrated effective communication and mentorship skills through delivering lectures, conducting laboratory sessions, and grading examinations while addressing different courses in Biotechnology and Environmental Engineering disciplines for undergraduate and postgraduate classes. Received ~ 4.8/5.0 (MITS Gwalior), around 89% (TIET Patiala), and > 85% (NIT Jalandhar) student feedback/reaction survey score.

Editorial Experience

Associate Editor

Springer *Environment, Development, and Sustainability* **01/2024 – Present**

ASCE *Journal of Hazardous, Toxic and Radioactive Waste* **02/2019 - Present**

- Edited a special issue on "Shifting Paradigms in Advanced Wastewater Treatment Innovations: From Eco-contaminant Abatement to Bio-energy Recovery", besides the regular editorial assignments.

Editorial Board Member

Elsevier *Journal of Water Process Engineering* **01/2022 – Present**

Springer-Nature *Discover Applied Sciences* **08/2024 – Present**

Springer-Nature *Scientific Report* **10/2024 – Present**

- I oversee the peer-review process for manuscripts within their areas of my expertise, assigning reviewers, assessing their feedback, and making initial recommendations for acceptance, revision, or rejection.

Associate **02/2017 - Present**

Global Institute for Energy, Environment, and Sustainability (GIEES), Lenexa, USA

- Partnering with environmental consultants of GIEES, volunteering in consultation services in projects related to bioconversion of wastes into value-added products and application of microbial biotechnology in recovering biomolecules, nutrients, bioenergy from sewage sludge.

Education

PhD, Environmental Engineering, Indian Institute of Technology Bhubaneswar, India **2012 - 2018**

Thesis Title: Development of advanced treatment systems for nutrient removal from domestic wastewater.

M.Tech, Environmental Biotechnology, National Institute of Technology Rourkela, India **2009 - 2011**

B.Tech, Biotechnology, Biju Patnaik University of Technology Rourkela, India **2005 – 2009**

Research Projects

Phosphorous Recovery from Wastewater by DST-IC-IMPACTS (₹1,10,00,000) **11/2023 – 11/2025**

- As a Principal Investigator (**PI**), exploring the development of a single unit bio-reactor employing novel denitrifying phosphorus accumulating organisms (DPAOs) to fulfill the purpose of simultaneous nutrient (nitrogen and phosphorous) removal and phosphorous recovery from wastewater.

Microalgae Mediated Energy Recovery by TAU-TIET (Indo-Israel) (₹96,00,000) **08/2022 – 07/2025**

- As a Co-Principal Investigator (**Co-PI**), working with an overall objective of enhancing the treatment efficiency of the domestic wastewater in rural ponds and assessing its possibility of utilizing the treated wastewater for irrigation in agricultural fields of staple crops.

Bio-briquette from waste biomass by NIT Jalandhar (Seed Grant) (₹15,00,000) **11/2024 – 10/2026**

- As a Principal Investigator (**PI**), working with an overall objective of exploring the feasibility of briquette manufacturing from plant waste biomass, the study aims to address the challenges of plant based solid waste management and promote energy-saving and environmentally friendly biofuel production.

Nutrient Recovery and Removal from Wastewater, NIT Seed Grant (₹5,00,000) **11/2023 – 11/2025**

- As a Principal Investigator (**PI**), working with an overall objective of simultaneous removal of nitrogen and phosphorus from wastewater and the development of nutrient removal bioprocess for domestic wastewater utilizing specific group of microbes.

Mainstream Nitrogen Removal from Wastewater by SERB-SIRE (₹17,63,363) **12/2023 – 06/2024**

- As a Principal Investigator (**PI**), focusing on the development of a laboratory scale energy positive integrated system for simultaneous nutrient removal and phosphorous recovery from low strength wastewater of diversified origin.

Artificial Colon Model for Microbiota Research by DBT-BIRAC (₹44,40,000) **02/2023 – 10/2024**

- As a Co-Principal Investigator (**Co-PI**), we are designing, developing, and validating a low-cost, customizable, multipurpose dual-arm anaerobic pseudo-colon system that would provide an effective *in vitro* platform for versatile microbiome-related R&D activities in an inexpensive but well-controlled manner.

Re-Invent Toilet by Samsung Groups, Republic of Korea ($85,000) **09/2019 – 08/2020**

- Co-investigated the resource recovery from human waste (Volatile fatty acids, Biogas, Biochar) by operating three fermenters of 200 L capacity each and an anaerobic baffled reactor of 100 L capacity emphasizing on the optimization of experimental parameters for maximizing the recovery.

Up scaling Biogas Production from Food Wastes **09/2018 - 08/2019**
Daelim Industrial Co. Ltd., Republic of Korea ($50,000)

- Executed concurrent responsibilities of budget control, project documentations and experimental analysis in examining the effect of anaerobic toxicity on biochemical methane potential of food wastes for possible commercial scale production.

Research Publications

Categories		International	National
Referred Journals-**48**	**SCI**	38	
	Scopus	8	2
Book (Edited)-**3**		3	
Book Chapters-**29**		27	2
Conference Presentations-**28**		11	17
Nucleotide Sequence-**7**		7	
Patent Granted-**2**		--	2
Patent Published-**2**		1	1

Student Supervision

Categories	Ongoing	Completed
Research Associate	1	--
Ph.D	4	--
M.Tech/M.Sc	1	5
B.Tech	10	12
Summer Interns	--	4

PhD Student Supervision

1. ***Nehal***
   PhD Research Area: Metagenomics and Metabolomics study of Gut Microbiota
   Period: January 2024 to till Date
2. ***Payal Guleria***
   PhD Research Area: Valorization of lignocellulosic biomass
   Period: July 2023 to till Date
3. ***Swati Singh***
   PhD Research Area: Nutrient removal and recovery from wastewater
   Period: September 2021 to till Date
4. ***Bimalpreet Singh***
   PhD Research Area: Algal-bacterial consortia for wastewater treatment
   Period: March 2021 to till Date

Master Student Supervision

1. ***Rakhya Ranjan Nanda***: July 2024 (Ongoing)
2. ***Mansi Achhoda***: July 2022 (Completed)
3. ***Gurleen Singh:*** July 2022 (Completed)
4. ***Shahrukh Saleem:*** July 2022 (Completed)
5. ***Pirzada Uzair:*** July 2022 (Completed)

Thesis Committee Member

External Committee Member

1. **Aidin Khordadi,** MSc, Department of Civil Engineering, University of Manitoba, Canada, June 2024
2. **Pratik Kailas Borade,** MSc, Department of Civil Engineering, University of Manitoba, Canada, June 2024

Internal Committee Member for PhD Scholars

1. **Neha Chauhan,** Department of Biotechnology, NIT Jalandhar, July 2023
2. **Sundeep Kaur,** Department of Biotechnology, NIT Jalandhar, July 2023
3. **Snejuti Barua,** Department of Biotechnology, NIT Jalandhar, July 2023

Teaching Merits

Subject Concern	Students Participation (No.)
Environmental Biotechnology and Bioengineering	8th semester B. Tech Biotech (40)
Bioprocess Modelling and Simulation	6th semester B. Tech Biotech (50)
Bioprocess Equipment Design and Economics	6th semester B. Tech Biotech (50)
Fermentation and Bio separation Technology	1st semester M. Tech Biotech (15)
Bioprocess Engineering	1st semester M. Tech Biotech (15)
Downstream Processing	2nd semester M. Tech Biotech (15)
Bioprocess Engineering	5th semester B. Tech Biotech (60)
Downstream Processing	6h semester B. Tech Biotech (60)
Technology for Sustainable Development	6th and 8th semester B. Tech CSE, Civil, Mechanical, Electronics (100)
Energy and Environment	2nd semester B. Tech CSE, Civil, Biomedical (150)
Environmental Engineering Theory and Lab	3rd semester B. Tech Biotech (30)
Biology for Engineers	3rd semester B. Tech CSE (150)
Water and Wastewater Engineering Theory and Lab	5th semester B. Tech Civil (40)
Bio-reaction Engineering Theory and Lab	5th semester B. Tech Biotech (70)
Environmental Biotechnology Theory	6th semester B. Tech Civil (30)
Advanced Bioprocess Engineering Theory and Lab	6th semester B. Tech Biotech (90)

Accomplishments

- ASCE Outstanding Reviewer 2023
- SERB-SIRE Fellowship (Government of India) 2023-24
- ASCE Outstanding Reviewer 2019
- ASCE Best Practice Oriented paper 2019
- Odisha Young Scientist Award 2017
- BK21PLUS Korean Government Postdoctoral Fellowship Award 2018
- Qualified UGC NET (Environmental Science) June 2015
- Best Poster award 2015 in National Science Day, IIT Bhubaneswar
- Best Paper Award 2014 in 17th Odisha Bigyan Congress
- Young Scientist Travel Grant Fellowship by DST, Government of India.
- Finalist of INNOVIO: Business-Plan Competition by KIIT-TBI.
- Qualified GATE-2009, ranked among top 3% of the candidates qualified in the subject
- **Affiliations**: (i) BRSI-Life member (ii) ASCE-Associate member (iii) Environmental and Water Resource Institute (EWRI)-Member, (iv) Biotech Helpline Foundation India-Life member.

Competent Skills

- **Instruments handled**: Fermenter/Bioreactor, Gas chromatography (GC), Gas chromatography-Mass spectrometry (GC-MS), Ion chromatography (IC), High performance liquid chromatography (HPLC), Polymerase chain reaction (PCR), Gel electrophoresis, Lyophilyzer, Spray Drier, Solid phase extraction (SPE), UV/VIS Spectrophotometer, Atomic absorption spectrophotometer (AAS), Fourier transformed infra-red spectrophotometer (FTIR), X-ray diffraction (XRD), Thermo Gravimetric Analysis (TGA), and Elemental Analyzer (CHNS).
- **Bioreactors worked with**: Anaerobic fluidized membrane bioreactor, continuous stirred tank reactor, anaerobic baffled reactor, packed bed bioreactor, fluidized bed reactor and multi-stage bio-filter.
- **Microorganisms dealt with**: *Bacillus cereus*, *Stenotrophomonas maltophilia*, *Ochrobactrum anthropic*, *Pseudomonas beteli*, and anaerobic ammonium oxidation (Anammox) bacteria.
- **Scholarly skills**: Preparing project proposal, technical paper writing and reviewing and patent analysis.
- **Statistical tools used**: Design of experiments (DOE), Design xpert, Minitab, and SPSS statistics.
- **Bioinformatic tools**: BLAST, FASTA, CLUSTALW, Pymol, Auto dock, Prodrg, Preadmet, and Molegro.
- **Software skills**: Microsoft office tools, Microsoft visio (image design), and Origin pro (data plotting).

Research Experience and Interest

- Expertise in microbial isolation, characterization, culture and exploiting their novel features for realization of bioconversion/biotransformation/bioremediation processes.
- Hands on experience in design and development of scalable and cost effective bioreactors for microbial biotechnology applications. Operational exposure to a pilot scale (1 m^3/d) bioreactor.
- Practiced nutrient removal and methane recovery from low strength wastewater with a pilot scale anaerobic fluidized bed membrane bioreactor (AFMBR).
- Familiar with bioprocess engineering unit operations like bioreaction and downstream process optimization, product recovery and purifications.
- Experimented micro pollutant removal from anaerobic effluent and monitored nitrogen toxicity on Lettuce cultivation for possible reuse of treated anaerobic effluent as nutrient medium in hydroponics systems.
- Laboratory experience in isolation and application of both intra and extra cellular enzymes like protease and lipase. Knowledge of enzyme assay and functional gene amplification for the validation of specific microbial metabolic pathway.
- Facilitated the utilization of locally available waste materials as resources for the treatment of wastewater and simultaneous exploitation of the used up waste materials as value added stuffs in diverse applications.
- Experienced in exploring the adsorptive potential of various waste materials, by-products and natural substances for removal of diverse pollutants from wastewater.
- Broad areas of research interest include: Physicochemical and biological treatment of water and wastewater, Resource recovery from diversified wastes, Anaerobic digestion, Elimination of emerging contaminants, Membrane technology, and Mainstream Anammox application.

Short Term Courses Conducted

1. Biotechnological Approach for Bioprospecting and Waste Valorization, 07-11 June 2023
2. Advances in Biomaterials and Nanotechnology for Biomedical Applications, 28 Sept. - 02 Oct. 2023
3. Bioprocess Engineering for Waste Valorization, 01-05 November 2023

Training and Workshops

- Participated in the International Water Association (IWA) Workshop on "Sewer Sediments", August 27-30, 2019, Aalborg, Denmark.
- Attended the Short Term Course (STC) on "Microbial Diversity for Human Welfare", April 9-11, 2018 at IIT Delhi.
- Participated in the AICTE sponsored STC on "Assuring Global Quality in Technical Education through Outcome Based Education", March 10-11, 2018, MITS Gwalior.
- Participated in the TEQIP Workshop on "Faculty Induction Program", January 25-29, 2018 at IIT Hyderabad.
- Participated in the AICTE sponsor Faculty Development Program (FDP) on "Green Technology in Industrial Waste Minimization", January 18-31, 2018 at GIET University, Gunupur.
- Attended Two-week Short-term Course on "Polluted Sites: Characterization and Remediation", under GIAN program, MHRD Government of India.
- Participated in the workshop on "protein structure, function and folding", Dec 20-24, 2010 at IISc, Bangalore.
- Participated in the workshop on "Introduction to Mathematical Techniques in Life Sciences", Jan 4-12, 2011 at IISc, Bangalore.
- One month training on Plant Biotechnology at RPRC, Bhubaneswar.
- Training program on Transmission Electron Microscope at W.B.U.T, Kolkata.
- Attended a workshop on DNA Fingerprinting by Helini Bio-molecules.
- Participated in a work shop on "in-silico drug discovery based on the Integration of bioinformatics and chemo informatics", at biotech park, Lucknow.
- Participated in the AICTE sponsor FDP on "Clean Process Technologies", April 2-14, 2012 at GMRIT Rajam.

Administrative Experience

Designation	Responsibility
Department Library Committee Member	Responsible for managing and overseeing the library operations of the department
Examination and results Coordinator	Responsible to ensure the smooth and fair conduct of examinations and the timely release of results in the department level
Department Planning and Policy Committee secretary	Responsible to frame out departmental policy and future infrastructural planning time to time
Industry interaction cell member	Responsible for carrying out activities involving industry and academia
NBA coordinator	Carried out departmental NBA activities.
In-house internship coordinator	Conducted mandatory summer internship for 1st year under graduates
Examination committee member	Recommending of panel of examiners for end term examinations

Review Experience

Journals (Selected)	Publisher
Journal of Hazardous, Toxic and Radioactive Wastes	American Society for Civil Engineers (ASCE)
Journal of Environmental Management	Elsevier
Science of the Total Environment	Elsevier
Environmental Science and Pollution Research	Springer
Colloids and Surfaces	Elsevier
Process Biochemistry	Elsevier
Microbial Cell Factories	BMC (Springer-Nature)
Journal of Water Process Engineering	Elsevier
Journal of Chemical Technology and Biotechnology	Willey
Process Safety and Environmental Protection	Elsevier

3Biotech	Springer
Journal of Bioscience and Bioengineering	Elsevier
Desalination and Water Treatment	Taylor & Francis
Industrial & Engineering Chemistry Research (I&ECR)	American Chemical Society (ACS)
SN Applied Sciences	Springer
Biotechnologia	Polish Academy of Sciences
Heliyon	Elsevier
Brazilian Journal of Chemical Engineering	Springer
Water and Environment Journal	Willey
International Biodeterioration & Biodegradation	Elsevier
Clean-Soil, Air, Water	Wiley
International Journal of Earth Sciences	Springer
Bioelctrochemistry	Elsevier
Bioprocess and Biosystems Engineering	Springer
Chemosphere	Elsevier

Thesis

Evaluated a Ph.D Thesis entitled “Process Development for Production and Purification of Industrial and Biopharmaceutical Relevant Enzymes from Microbial Systems”.

Doctoral Research Overview

Thesis Title: Development of advanced treatment systems for nutrient removal from domestic wastewater

Advisors: Dr. Rajesh Roshan Dash and Dr. Puspendu Bhunia

The research work was aimed at designing and developing two different categories of laboratory-scale passive treatment configurations with the objective of achieving enhanced simultaneous nitrogen and phosphorus removal from domestic wastewater. One was an integrated treatment system consisting of a multi-stage bio-filter with drop aeration and a post-positioned attached growth carbonaceous denitrifying bio-reactor. The other one was a single-unit packed bed bio-reactor with immobilized specific microbial species to carry out simultaneous nitrification, denitrification, and phosphorous removal (SNDPR). The bio-filter is packed with ‘dolochar’, a sponge iron industry waste, as an adsorbent mainly for phosphate removal through a physicochemical approach. The bio-filter also facilitates biological nitrification through passive aeration. The denitrifying bio-reactor is packed with many waste organic solid substances (WOSS) as carbon sources and substrates for biomass attachment, mainly to remove nitrate in the biological denitrification process. On the other hand, the SNDPR bioreactor was immobilized with a newly isolated Bacillus cereus GS-5 strain exhibiting heterotrophic nitrification, aerobic denitrification, and denitrifying phosphate removal. Both the systems continuously removed nutrients from real domestic wastewater meeting the discharge limit over a period of two months before getting exhausted. It has been suggested in this work that, the saturated dolochar can be used as nutrient supplier in agricultural practices and the partially degraded carbonaceous substances can also be used as an organic fertilizer after composting. Thus, the systems displayed immense potential for treating domestic wastewater significantly by decreasing the concentrations of nutrients and, most importantly, facilitating the conversion of the waste materials into usable ones.

References

Dr. Puspendu Bhunia
Professor
School of Infrastructure
Indian Institute of Technology Bhubaneswar
Jatni, Khordha, Odisha - 752050, India.
E-mail: pbhunia@iitbbs.ac.in;
Phone no:- +91-9692187132

Dr. Rajesh Roshan Dash
Professor
School of Infrastructure
Indian Institute of Technology Bhubaneswar
Jatni, Khordha, Odisha - 752050, India.
E-mail: rrdash@iitbbs.ac.in;
Phone no:- +91-9439864561

Personal Details

Nationality: Indian

Gender: Male

Marital Status: Married

Passport Number: J3047824

Language Known: English, Hindi and Odia

Permanent Address: At-Kodabatia, Po-Rajagharapokhari, Via- Pirahat Bazar Dist- Bhadrak, Odisha, Pin-756131

Declaration

I hereby declare that the above-mentioned information is true to the best of my knowledge and belief. I bear the responsibility for the correctness of the above-furnished particulars.

Date: 10/11/2024 **Signature**: Pranjya Ranjan Rout

List of Scientific Works

A. Patents

1. **P.R. Rout,** R.R. Dash, P. Bhunia. A single unit fixed bed reactor for simultaneous heterotrophic nitrification-aerobic denitrification-adsorptive coupled denitrifying phosphate removal from wastewater. **Application No. 201731036014**. **Patent No. 394070 (Granted)**
2. **P.R. Rout,** P. Dey. Artificial colon model for in vitro gut microbiome research. **Application No. 394577-001** (**Granted**) on 01/04/2024
3. **P.R. Rout,** P. Dey. An artificial colon model and associated system for achieving a long-term in-vitro stable human gut microbial community. **Application No. 202311013073 A**. Publication Date: 05/05/2023 (**Published**)
4. A. Dhir, B. Singh, H. Mamane, **P. R. Rout**, G. S. Kocher, S. G. Sharma. Wastewater treatment method using microalgae-bacterial biofilm with PLA-based 3D printed carriers. **Application No. 202411013409** (**Published**)

B. Edited Books

1. P. Pathak, **P. R. Rout**. Urban Mining for Waste Management and Resource Recovery: **Sustainable Approaches**. *CRC Press,1st Edition, 2021, **ISBN 9781032061795***.
2. R.Y. Surampalli, T.C. Zhang, J. (C.M.) Kao, M.M. Ghangrekar, P. Bhunia, M. Behera, P.R. Rout. Microconstituents in the environment: Occurrence, Fate, Removal and Management. *John Wiley & Sons, 1st Edition, 2023, **ISBN 9781119825265***.
3. **P.R. Rout,** M. P. Shah, Q. Yuan. Advanced wastewater treatment for micropollutant and pathogen removal. Microplastics in the Environment. *Springer-Nature* (***Editing***).

C. Peer-reviewed Referred Journals

1. S. Singh, S. P. Elumalai, S. Chand, **P. R. Rout***. Assessment of dew harvesting as a sustainable water source and air quality indicator: a case study of Dhanbad, Jharkhand, India. *Environmental Technology* **(Taylor and Francis)**, 2024, 1-9, (**SCIE**), ISSN: 0959-3330. [**IF-2.2**] (**InPress**)
2. S. Sahoo, N. Sahoo, P. K. Sahoo, S. Mishra, A. Kumar, B. Naik, **P. R. Rout.** Treatment of chromium-contaminated water using highly efficient, novel ternary synergistic S-rGO-BiOBr-In2S3 heterojunction. Materials Advances (RSC), 2024, (**Scopus**) ISSN: 2633-5409. [**IF-5.2**] (**InPress**)
3. P. Donyanavard, A. Tavakoli, **P. R. Rout**, Q. Yuan. Valorization of agricultural by-product *Moringa stenopetala* seed husks into activated carbon for Reactive Black and Basic Blue dye removal from textile wastewater. *Biomass Conversion and Biorefinery* **(Springer**), 2024, (**SCIE**), ISSN: 2190-6823. [**IF-3.5**] (**InPress**)
4. M. Achhoda, N. Halder, N. Thakur, D. Ratha, B. Behera, **P.R. Rout*.** Assessing the efficacy of waste organic solids as carbon sources in denitrification bio-filters for abating nitrate toxicity from wastewater. *Biomass Conversion and Biorefinery* (**Springer**), 2024, (**SCIE**), ISSN: 2190-6823. [**IF-3.5**] (**In Press**)
5. A. Jena, B. Mahanty, D. Deka, P. K. Sahoo, S. Pradhan, **P. R. Rout**, S. Mishra, N. K. Sahoo. Green synthesis of potential magnetic-mesoporous EG-nZVI/CA-MCM-41 nanocomposite for reductive sorption of europium. *Environmental Science: Nano* (**RSC**), 2024, (**SCIE**), ISSN: **2051-8153**. [**IF-7.3**]
6. J. Tripathy, A. Mishra, M. Pandey, R. R. Thakur, S. Chand, **P. R. Rout**, M. K. Shahid. Advances in Nanoparticles and Nanocomposites for Water and Wastewater Treatment: A Review. *Water* (MDPI), 2024, *16(11)*, 1481 **(SCIE),** EISSN: 2073-4441. [**IF-3.4**]
7. S. Sabinaya, B. Mahanty, **P.R. Rout**, S. Raut, S. K. Sahoo, V. N. Jha. Multi-model exploration of groundwater quality and potential health risk assessment in Jajpur district, Eastern India. *Environmental Geochemistry and Health*, (**Springer**), 2024; 46, 57 (**SCIE**), ISSN: **0269-4042**. [**IF-4.2**]
8. S. Mishra, N. K. Sahoo, P. K. Sahoo, S. Sahoo, L. Nayak, **P. R. Rout**. Construction of a novel ternary synergistic $CuFe_2O_4$-SnO_2-rGO heterojunction for efficient removal of cyanide from contaminated water. *RSC Advances* (**Royal Society of Chemistry**), 2024; 14: 13850-13861 (**SCI**) ISSN 2046-2069. [**IF-3.9**]
9. L. Adagadda, M. Goel, M. K. Shahid, V. P., Sundramurthy, S. Chand, N. K. Sahoo, **P.R. Rout***. Tricks and Tracks in Resource Recovery from Wastewater Using Bio-electrochemical Systems (BES): A Systematic Review on Recent Advancements and Future Directions. *Journal of Water Process Engineering*, (**Elsevier**), 2023; 56, 104580 (**SCIE**), ISSN: 2214-7144. [**IF-7.3**]
10. A. Chalotra, R. Babbar, D. Ratha, M. Baranwal, **P.R. Rout.** Assessment of kinetic and statistical models for predicting breakthrough curves of bio-colloid transport through saturated porous media. *Journal of Contaminant Hydrology*, (**Elsevier**), 2023; 259, 104246 (**SCIE**), ISSN: 1873-6009. [**IF-3.6**]
11. M. Ibrahim, M.H. Nawaz, **P.R. Rout**, J.W. Lim, B. Mainali, M.K. Shahid. Advances in Produced Water Treatment Technologies: An In-Depth Exploration with an Emphasis on Membrane-Based Systems and Future Perspectives. *Water* (MDPI), 2023, *15(16)*, 2980 **(SCIE),** EISSN: 2073-4441. [**IF-3.4**]
12. S. Chand, S.K. Chand, B. Paul, M. Kumar, **P.R. Rout.** Indirect Aqueous Mineral Carbonation of Samples of Linz–Donawitz Slag from the Steel Industry in Eastern India. *Journal of Hazardous, Toxic, and Radioactive Waste* 27 (4), 04023031(Scopus), ISSN: 2153-5515. [Cite Score (CS)-2.7]
13. **P.R. Rout**, M. Goel, D.S. Pandey, C. Briggs, A. Mohanty, N. Halder, V. P., Sundramurthy, S. Mukherjee, S. Varjani. Advancements in Biotechnological and Thermochemical Processes for Treatment and Valorisation of Wastewater from Hydrothermal Liquefaction of Biomass and Waste: Strategic Innovations and Perspectives. *Environmental Pollution* **(Elsevier),** 2023, 316, 120667 **(SCI),** ISSN: 2352. [**IF-8.9**]
14. M. K. Shahid, B. Mainali, **P.R. Rout**, J. W. Lim, M. Aslam, A. E. Al-Rawajfeh, Y. Choi. A Review of Membrane-Based Desalination Systems Powered by Renewable Energy Sources. *Water* (MDPI), 2023, *15*(3), 534 **(SCIE),** EISSN: 2073-4441. [**IF-3.4**]
15. B. Pradhan, S. Chand, S. Chand, **P.R. Rout***, S.K. Naik. Emerging groundwater contaminants: A comprehensive review on their health hazards and remediation technologies**.** *Groundwater for Sustainable Development* **(Elsevier),** 2023, 20, 100868 **(Scopus),** ISSN: 2352-801X. [**IF-5.9**]
16. A. Priyadashinia, S. Mishra, M. M. Sahoo, P. R. Rout, N. K. Sahoo. Effect of nutrient and culture conditions on enhanced biodegradation of phenolic pollutants; A review on recent development and future prospective.

Environmental Quality Management **(Wiley),** 2022, 32(2), 161-176 **(Scopus),** ISSN: 1520-6483. [**CS-2.3**] DOI: 10.1002/tqem.21934

17. **P.R. Rout**, D. S. Pandey, M. H. Parry, C Briggs, H.L.C, Manuel, U. Reddicherla, S. Mukherjee, M. Goel. Sustainable Valorisation of Animal Manures via Thermochemical Conversion Technologies: An Inclusive Review on Recent Trends. *Waste and Biomass Valorization* (**Springer**), 2023, 14(2), 553-582 (**SCIE**), ISSN: 1877-265X [**IF-3.5**]
18. A.A. Das, S. Mishra, P.Pradhan, L. Nayak, S. Raul, K. Das, M.Sahoo, P. K. Sahoo, B. Naik, P. R. Rout, N. K. Sahoo. Recent advancements in microplastics treatments: Characteristics, occurrence, and removal technologies. *Materials Today: Proceedings* (**Elsevier**), 2022, 67(8), 1211-1217 (**Scopus**), ISSN: 2214-7853. [**CS-2.3**]
19. **P.R. Rout**, A. Mohanty, A. Sharma, M. Miglani, D. Liu, S. Varjani. Micro-and Nanoplastics Removal Mechanisms in Wastewater Treatment Plants: A Review. *Journal of Hazardous Materials Advances* (**Elsevier**), 2022; 6; 100070 (**Scopus**), ISSN: 2772-4166.
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51. Y. Wang, G. Hausner, P. R. Rout, Q. Yuan. Investigation of Fungal Mycelium based Bio-foams from Agricultural Wastes as Sustainable and Eco-conscious Packaging Innovations. *Chemical Engineering Journal* (***Revision Submitted***)

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53. A. Hansda, S. K. Chand, B. Pradhan, S. Chand, A. K. Shukla, **P. R. Rout.** Toxicological Impacts and Microbial-Mediated Degradation Processes of Microplastics. *Journal of Hazardous, Toxic, and Radioactive Wastes* (***Revision Submitted***)

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57. P. Guleria, S. Kaur, S. S. Meena, A. Mohanty, **P. R. Rout**[*]. Sustainable Solutions for Livestock Driven Carbon Emission in Food (Meat) Supply Chain: Assessing Impacts, Mitigation Strategies and Future Prospects. *Trends in Food Science* ***(Under Review)***

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59. L. Addagada, N. K. Sahoo, S. Chand, R. Ahmad, Q. Yuan, **P. R. Rout***. Progress in electrochemical techniques for concurrent micropollutant removal and resource recovery from water matrices. *Chemsphere* ***(Under Review)***

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D. Book Chapters

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2. B. Behera, K.V. Supraja, M. Selvam, S.Kinger, **P.R. Rout**. Transesterification of Waste Cooking Oil Through Microwave Technology: Recent Advances and Challenges. In "Circular Bioeconomy Perspectives in Sustainable Bioenergy Production. Energy, Environment, and Sustainability". (Eds. G Baskar et al., 2024). 2024: ISBN 978-981-97-2523-6, pp. 117-141 ***Springer Nature***, pp. 1-22.
3. N. Haldar, K. V. Supraja, Anamika, M. Achhoda, M. Mayank, M. Sharma, N. Thakur, A. Mohanty, S. S. Meena, P. R. Rout, B. Behera. Production of value-added products using microalgae: A zero waste biorefinery approach. In "Biotechnological Advances in Biorefinery". (Eds. K Agrawal et al., 2024). 2024: ISBN 978-981-97-5544-8, ***Springer Nature***, pp. 97-126
4. M.Behera, **P.R. Rout**, P. Bhunia, R.Y. Surampalli, T. Zhang, J. Kao, M.M. Ghangrekar. Introduction to Microconstituents. In "Microconstituents in the Environment". (Eds. R.Y. Surampalli et al., 2023). 2023: ISBN 9781119825265, ***John Wiley & Sons***, pp-3-26.
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8. S.N. Behera, M. Yadav, V. Kumar, **P.R. Rout**. Various perspectives on occurrence, sources, measurement techniques, transport, and insights into future scopes for research of atmospheric microplastics. (Eds. R.Y. Surampalli et al., 2023) 2023: ISBN 9781119825265, ***John Wiley & Sons***, pp-203-219.
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19. A. Ehsan, R. Ahmad, I. U. Khan, M. Aslam, **P. R. Rout.** Photocatalytic Membrane Reactors (PMRs) for Wastewater Treatment Photodegradation Mechanism, Types, and Optimized Factors. In "Urban Mining for Waste Management and Resource Recovery: Sustainable Approaches". (Eds. P. Pathak and **P. R. Rout**). 2021: ISBN: 97810032 01076; ***CRC Press,*** New York, pp. 252-272.
20. **P.R.** Rout, P. Bhunia, E. Lee, J. Bae. Microbial Electrochemical Systems - promising alternatives for energy sustainability. In Alternative Energy Resources - The Way to a Sustainable Modern Society. (Eds. P Pathak and RR Srivastava). Hand Book of Environmental Chemistry, 2021, 99: ISBN: ISSN: 1867-979X; ***Springer Nature***, Switzerland, pp. 223-251
21. **P.R. Rout**, A.K. Verma., P. Bhunia, R.Y. Surampalli. Introduction to Sustainability and Sustainable Development. In Sustainability: Fundamentals and Applications. (Eds. RY Surampalli *et al*.). 2020: ISBN: 9781119434016; ***John Wiley & Sons,*** New York, pp. 1-19.
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23. **P. R. Rout,** R. R. Dash, P. Bhunia. Insight into a Waste Material-Based Bioreactor for Nutrient Removal from Domestic Wastewater. In Recent Developments in Waste Management. (Ed. Kalamdhad, A.S.). 2020: ISBN: 978-981-15-0990-2; ***Springer,*** Singapore, pp. 397-407.
24. **P.R Rout**, Bhunia, P., Surampalli, R.Y. Landfill Technologies and Recent Innovations. In Handbook of Environmental Engineering. (Eds. RY Surampalli *et al*.). 2017: ISBN (print) 9781259860225, ISBN (Ebook): ISBN 9781259860232; ***Mc Graw-Hill International*** publishing New York, pp. 293-302.
25. **P.R. Rout**, R.R. Dash, P. Bhunia. Response Surface Optimization of Phosphate Removal from Aqueous Solution Using a Natural Adsorbent. In Trends in Environmental Science and Technology. (Eds. F. Kurisu *et al*.). 2017: ISBN: 978-93-81891-28-5; ***Springer international*** publishing, Cham, Switzerland, pp. 93-104
26. **P.R. Rout**, P. Bhunia, A. Ramakrishnan, R.Y. Surampalli, T.C. Zhang, R.D. Tyagi. Sustainable Hazardous Waste Management/Treatment: Framework and Adjustments to Meet Grand Challenges. In Sustainable Solid Waste Management. (Eds. J.W.C. Wong *et al*.). 2016: ISBN (print): 978-0-7844-1410-1, ISBN (PDF): 978-0-7844-7930-8; *American Society of Civil Engineers* (**ASCE**); Reston, Virginia, pp. 319-364.
27. A.K. Verma, **P.R. Rout**, P. Bhunia, R.R. Dash. Anaerobic Treatment of Wastewater. In Green Technologies for Sustainable Water Management. (Eds. HH Ngo, W Guo, RY Surampalli and TC Zhang). 2016: ISBN 978-0-7844-1442-2 (print) ISBN 978-0-7844-7978-0 (PDF); *American Society of Civil Engineers* (**ASCE**); Reston, Virginia, pp. 297-336.
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29. M. Mishra, **P.R. Rout**, S. Mohapatra, M. Sudarshan, A.R. Thakur, S.R. Chaudhuri. Heavy metal accumulating and Enzyme secreting novel Pseudomonas sp. From east Calcutta Wetland: implications for Environmental sustenance. In Microbial Biotechnology: Methods and Applications. (Eds. HN Thatoi and BB Mishra). 2012: ISBN: 978-8487-131-9: ***Narosa Publication***; New Delhi, pp. 216-233.

In Press/Under Review/In Preparation Chapters

30. B. Behera, K.V. Supraja, M. Selvam, **P.R. Rout**. Importance of Biological Knowledge in the Downstream of Microalgae-based Processes and Products. In "Algal Bioreactors: Volume II Science, Engineering and Technology of Downstream Processes". ***Elsevier*** **(In Press*)***

31. P. Thapa, S. Pant, **P.R. Rout**, Qiuyan Yuan. Phosphorus recovery from food waste: A case study of Canadian solid waste management practices. In "Solid Waste Management in Canada: Approaches, Practices, and Experiences". ***Springer-Nature*** (**Accepted**)

32. S. S. Meena, A. Mohanty, N. K. Pandit, P. Sharma, **P.R. Rout**. Membrane Processes for Pathogen Removal from Wastewater. In "Advanced Wastewater Treatment Processes for Micropollutants and Pathogens Removal". ***Springer-Nature*** (**Accepted**).

33. S. S. Meena, M. Mankoti, P. Guleria, S. Kaur, **P.R. Rout**. Emerging Technologies for Pathogen Removal from Wastewater and Future Directions. In "Advanced Wastewater Treatment Processes for Micropollutants and Pathogens Removal". ***Springer-Nature*** (**Accepted**).

E. Invited Talks

1. Expert Panelist for the workshop titled "Research Advice from Academic Experts," organized by the University of Manitoba Environment and Water Federation (UMWEF), University of Manitoba, Canada, 5th April 2024

2. Delivered a talk as a Keynote Speaker on "How wastewater holds the key: Unveiling phosphorous recovery from wastewater for sustainability and food security". International Conference on Generic and Pedagogical Research Evolutions in Civil Engineering and its Allied Sciences (IC-GPREC - 2023), organized by G. Pulla Reddy Engineering College (GPREC), Kurnool, 10th-11th November 2023.

3. Guest Talk on **"**Bioreactor Design for Environmental Applications". Department of Biotechnology, Noida Institute of Engineering and Technology (NIET), 21st March 2023.

4. Webinar on "Nutrient Removal and Recovery from Wastewater". Centre for Biotechnology, School of Pharmaceutical Sciences, Siksha 'O' Anusandhan (Deemed to be) University, 5th June 2022.

5. Expert Talk on "Case Studies on Advanced Treatment Systems for the Removal and Recovery of Nutrient from Wastewater". Faculty Development Program On Recent Developments in Environmental Engineering (RDEE-2020) organized by Veer Surendra Sai University of Technology (GPREC), Burla, 19th September 2020.

6. Expert Talk on "Nutrient Removal and Recovery from Wastewater". Faculty Development Program On Recent Developments in Civil Engineering:Research and Practical Applications organized by G. Pulla Reddy Engineering College (VSSUT), Kurnool, 15th August 2020

F. International Conference presentations

1. **P.R. Rout**, S. Chand, M. Achhoda, Mm Gupta, S. Das. Emerging Contaminants in Water Environment: Bisphenol A (BPA) Removal from Wastewater in a Denitrifying Biofilter**. International Water Association Water Safety Conference 2022 (IWA-WSC 2022),** June 22 - 24, 2022, in Narvik, Norway.

2. **P.R. Rout**, C. Briggs, L. Addagada, S. Chand, G. Raheja, M. Goel. Recent Progress in Advanced Oxidation Processes for Emerging Pollutant Removal from Wastewater: A Methodical Review**. The 5th International Conference on Alternative Fuels, Energy and Environment: Future & Challenges (ICAFEE 2021),** 15th - 18th October 2021, Turkey.

3. **P.R. Rout**, D. S. Pandey, C. Briggs, U. Reddicherla, H. Manual, S. Jain, S. Mukherjee, M. Goel. Recent Advancements in Thermochemical Treatment of Manure. **The 5th International Conference on Alternative Fuels, Energy and Environment: Future & Challenges (ICAFEE 2021),** 15th - 18th October 2021, Turkey (**Accepted**).
4. E. Lee, **P.R. Rout**, J. Bae. Assessing the reuse potential of anaerobically treated domestic wastewater as a nutrient medium through hydroponic Lettuce culture. **6th Young Water Professionals (YWP) BeNeLux Conference**, February 12-14, 2020, Luxembourg.
5. E. Lee, **P.R. Rout**, J. Bae. Efficacy of a vacuum degasifier system for dissolved gas removal from anaerobic effluent. 9th International Conference on Sewer Processes & Networks (**SPN9-IWA**), August 27-30, 2019, Aalborg, Denmark.
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9. S.Alex, **P. R. Rout**, P. Bhunia. Membrane contactors: an attractive process to reduce organic and inorganic contamination in wastewater. **Americana 2017**, Montreal Convention Centre, Montreal, Qc., **Canada**, 21-23 March, 2017.
10. **P.R. Rout**, P. Bhunia, R.R. Dash. Development of an integrated system for the treatment of rural domestic wastewater: Emphasis on nutrient removal. 2nd International Conference on Desalination and Environment (**ICODE 2016**), 23-26 January, 2016 in Doha, **Qatar**.
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G. National Conference presentations

1. P. Guleria, S. Kaur, A. Mohanty, S. S. Meena, P. R. Rout. Conversion of lignocellulosic-derived fermentable sugars into value-added chemicals using microbial cell factories. 4th International Conference on Recent Advances in Bio-Energy Research (**ICRABR 2023**), October 9th-12th 2023, Sardar Swaran Singh National Institute of Bio-Energy Kapurthala - 144603, Punjab, India
2. S. Singh, P. R. Rout, M. S Reddy. Unlocking the Nutrient Removal Potential of Pseudomonas aeruginosa strain NGNS-04: Microbial Characterization and Performance Analysis. 2nd International Conference on Advances and Innovations in Biotechnology for Sustainable Bioresources and Bioeconomy (**AI- BSBB2023**), November 22nd-25th 2023, AKS University. Satna, Madhya Pradesh.
3. P. R. Rout, B. Singh, A. Dhir. Comparative analysis of the effect of aeration and agitation on quality and quantity of algal biomass for its further valorisation to value- added products. International Conference on Recent Advances in Biotechnology (**icRAB-2022**) 2-4 December, 2022, NIT Jalandhar.
4. P. R. Rout, B. Behera, N. Sikri, M. Achhoda. Feammox mediated simultaneous nitrogen removal and phosphorous recovery from low strength wastewater. International Conference on Recent Advances in Biotechnology (**icRAB-2022**) 2-4 December, 2022, NIT Jalandhar.

5. B. Behera and P. R. Rout. Biosorption of 2,4 D using Magnetic Biochar: Studies on Adsorption Kinetics and Sustained Slow Release. International Conference on Biotechnology, Sustainable Bioresources and Bioeconomy (**BSBB-2022**), 7-11th December, 2022, IIT Guwahati.
6. M. Achhoda, **P. R. Rout.** Assessing the efficacy of waste organic solids as carbon sources in denitrification bio-filters for abating nitrate toxicity from wastewater. International Symposium on Sustainable Urban Environment (**ISSUE 2022**), 11-14th October, 2022, UPES, Dehradun.
7. **P.R. Rout,** M. Goel, B. Dubey, S. S. Meena, A. Mohanty. Microbial Electrochemical Systems for Nutrient Removal and Recovery - An Updated Review of Recent Advancements. Biotechnology for Sustainable Agriculture, Environment and Health (**BSAEH-2021**), 04-08 April, 2021, Jaipur, **Rajasthan**, India
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9. **P.R. Rout**, R.R. Dash, P. Bhunia. Bio-denitrification of nitrate rich aqueous solution using waste organic solid substances (WOSS) as carbon source and bio-film carrier.7th International Congress of Environmental Research (**ICER-14**), 26-28 December, 2014, **Bangalore**, India
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11. **P.R. Rout**, P. Bhunia, R.R. Dash. Phosphate adsorption from secondary effluents by an industrial waste: Emphasis on waste to wealth transformation. International Workshop on 'Reuse options for marginal quality water in urban and peri-urban agriculture and allied services in the gambit of WHO guidelines' (**REOPTIMA**), 9-12 March, 2015, Indian Institute of Water Management (IIWM), Bhubaneswar, **Odisha**, India.
12. **P.R. Rout**, R.R. Dash, P. Bhunia. Phosphate adsorption by dolochar: An attempt to convert waste into slow release fertilizer. In National Conference on Recent Advances and Future Prospects in Civil Engineering (**RAFPCE-15**), 28 February-1 March, 2015, CUTM, Bhubaneswar, **Odisha**, india.
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14. **P.R. Rout**, R.R. Dash, P. Bhunia. Isotherm and kinetics studies of phosphorous adsorption from aqueous solution onto a solid waste, grounded burnt patties. IIST Research Scholar's Day (**RS Day 13**), 16-17 December, 2013, in **Thiruvananthapuram**, India.
15. **P.R. Rout**, R.R. Dash, P. Bhunia. Biotechnology of nutrient removal from domestic wastewater: A review. Indian Water Management and Symposium on Sustainable Infrastructure Development (**IWMSID 2013**) 8-9 February, 2013, IIT Bhubaneswar, Odisha, India.
16. **P.R. Rout**, A. Singh, A. Kumar, M. Mina. From wastewater to electricity- Microbial fuel cell. National Conference on Recent Advances in Biotechnology (**NCRR 2011**), 6 December, 2011, MITS, Rayagada, **Odisha**, India.
17. **P.R. Rout**, G.R. Satpathy. R. Satpathy. Insilco docking and QSAR analysis of HIV protease inhibitors as anti -dengue drugs. World Congress on Biotechnology (**Biotechnology 2011**), 21-23 March, 2011, in **Hyderabad**, India.
18. **P.R. Rout**, G.R. Satpathy, R. Satpathy. Molecular docking study of HIV NS3 protease inhibitors on dengue virus. National Conference on Biotechnology, Bioinformatics and Bioengineering, 17-18 December, 2010, **Tamilnadu**, India.

H. Technical Note

1. S. Alex, F. Biasotto, **P.R. Rout**, P. Bhunia. Membrane contactors: a useful tool to solve environmental issues. **Research Gate**

I. Nucleotide Sequence Submission in NCBI Database

1. **P.R. Rout**, R.R. Dash, P. Bhunia. *Bacillus cereus* strain GS5 - Accession No**. KM212993**
2. **P.R. Rout**, P. Bhunia, R.R. Dash. *Stenotrophomonas maltophilia* strain CS1 - Accession No**. KM212994**
3. **P.R. Rout**, R.R. Dash, P. Bhunia. *Bacillus amyloliquefaciens* strain CSC4 - Accession No**. KM212997**
4. **P.R. Rout**, P. Bhunia, R.R. Dash. *Ochrobactrum anthropi* strain AS2 - Accession No. **KY570296**
5. **P.R. Rout**, R.R. Dash, P. Bhunia. *Bacillus cereus* strain GS5 nitrate reductase beta chain (*nar*) gene, partial cds- Accession No**. KX831474**
6. **P.R. Rout**, R.R. Dash, P. Bhunia. *Bacillus cereus* strain GS5 nitrite reductase (*nirS*) gene, partial cds- Accession No**. KY090788**
7. **P.R. Rout**, R.R. Dash, P. Bhunia. *Bacillus cereus* strain GS5 polyphosphate kinase (*ppk*) gene, partial cds- Accession No**. KY090787**
8. **S. Singh, P.R. Rout, M.S. Reddy.** *Rhodococcus gordoniae* strain NSO4- Accession No. OR984820
9. **S.Singh, P.R.Rout, M.S.Reddy.** *Pseudomonas aeruginosa* strain NGNS04- Accession No. PP178214

Date: 10/11/2024 **Signature**: Prangya Ranjan Rout