

Department of Biochemical Engineering and Biotechnology
Departmental Research Committee Minutes
(DRC-3/2023-24)

5 Mar 2024

The third meeting of the Departmental Research Committee for the academic session 2023-24 was held on 21st Feb 2024 in the DBEB Committee Room at 10 am.

The following members were present:

Prof. Prashant Mishra (Chairperson)
Prof. Ritu Kulshreshtha
Prof. Preeti Srivastava
Prof. Ravikrishnan Elangovan
Prof. Anjan Roy
Prof. Kumari Priti Sinha
Prof. Lucinda Elizabeth Doyle (Convenor)

Agenda Items

1. Confirmation of the minutes of the 2nd meeting of the DRC for the session 2023-24 held on 10 Nov 2023 and the 3rd special meeting of the DRC for the session 2023-24 held on 10 Jan 2024.
[The minutes were confirmed as circulated.](#)
2. Matters arising from the minutes of Meeting No. 2/2023-24 and Special Meeting No. 2/2023-24.
[None.](#)
3. Constitution of new SRCs.

Student Name	Supervisor	Chairperson	Internal Expert	External Expert
Tamanna Lohra (2023BEZ8542)	Prof. Shilpi Sharma	Prof. RK	Prof. Preeti Srivastava	Prof. Pooja Ghosh (CRDT)
Jennice Philip	Prof. Ravikrishnan Elangovan	Prof. Prashant Mishra	Prof. Priti Sinha	Prof Vivekanandan Perumal (KSBS)

Action: All supervisors with students whose SRCs are not yet constituted are requested to submit the names of SRC members to DRC for approval.

4. M.Tech courses

It was decided that for M.Tech students who already completed their B.Tech in the Department and thus may be facing issues with having already taken programme electives, the student is to prepare a course plan consisting of OC courses from other departments to achieve any outstanding credits in consultation with their project supervisor.

5. Approval of Plan of Work for Ph.D. students

- a. Plan of work of Kshitij Kathait (2022BEZ8358) for the thesis entitled “Investigating spin-selective interactions between electroactive microorganisms and their environment” was approved based on recommendation by the student’s SRC. (Supervisor: LED)
- b. Plan of work of Shriya Grover (2022BEZ8359) for the thesis entitled “Towards enhancing electron transfer between electroactive microorganisms and electrodes” was approved based on recommendation by the student’s SRC. (Supervisor: LED)
- c. Plan of work of Ratnabali Ghosh (2021BEZ8008) for the thesis entitled “AI-driven HER2 detection and spatial transcriptomics: for breast cancer diagnostics” was approved based on recommendation by the student’s SRC. (Supervisor: RE)
- d. Plan of work of Poorvika Kulshreshtha (2022BEZ8514) for the thesis entitled “Microbe mediated plastic depolymerization and production of value added products” was approved based on recommendation by the student’s SRC. (Supervisor: PS)
- e. Plan of work of Archana V (2022BEZ7568) for the thesis entitled “Isolation and characterization of plastic degrading microbes” was approved based on recommendation by the student’s SRC. (Supervisor: PS)
- f. Plan of work of Chudamani Chandrakanta (2022BEZ8353) for the thesis entitled “Development of genome engineering tools for *Gordonia* based upon the recombination machinery of phages” was approved based on recommendation by the student’s SRC. (Supervisor: PS)
- g. Plan of work of Argha Sinha (2022BEZ8516) for the thesis entitled “Mitigation of abiotic stresses in plants using microbiome based approach” was approved based on recommendation by the student’s SRC. (Supervisor: SS)
- h. Plan of work of Triveni Shelke (2022BEZ8352) for the thesis entitled “Study of host-pathogen interaction using experimental evolution” was approved based on recommendation by the student’s SRC. (Supervisor: IG)

Action: Supervisors are to ensure two hard copies of the Plan of Word document are submitted to the Department office.

6. Synopsis submission of students:

- a. The Committee discussed and based on the recommendation of SRC, approved the synopsis of the MSR thesis with the title ‘Identifying Early Gene Expression Changes Associated With NAFLD Towards Candidate Gene Prioritization’

submitted by Qazi Noorul Mateen (2020BEY7605). The Committee also approved the panel of Examiners and authorised the Chairperson to forward the same to Dean (Academics). (Supervisor: IG)

- b. The Committee discussed and based on the recommendation of SRC, approved the synopsis of the PhD thesis with the title 'Fructan synthesis using whole cell-based and recombinant enzyme system' submitted by Avijeet Singh Jaswal (2018BEZ8436). The Committee also approved the panel of Examiners and authorised the Chairperson to forward the same to Dean (Academics). (Supervisor: SM and RKE)
- c. The Committee discussed and based on the recommendation of SRC, approved the synopsis of the PhD thesis with the title 'Development of an advanced treatment system for the effective removal of emerging contaminants from wastewater' submitted by Deepchandra Joshi (2018BEZ8240) (Supervisor: TRS). The Committee also approved the panel of Examiners and authorised the Chairperson to forward the same to Dean (Academics).

Action: Supervisors to submit two hard copies of synopsis and synopsis submission form to the Departmental Office for signature of DRC Chairperson. Supervisors are also to forward a soft copy of the same (signed copy of synopsis submission form), DRC minutes and synopsis to PG section (pg_eval@admin.iitd.ac.in) with a copy to DRC Chairperson.

7. Student requests:

- a. Conversion of Tanya Bansal (2023BEM2002) from M.Tech to Ph.D. program to work on project "Characterization of plasmid replicons from *Rhodococcus* sp. IITD102" (Supervisors: P.S. and D.S.)
The Committee discussed and approved the request, along with the proposed Ph.D. project (Annexure A).
- b. Request of Sidra Rizvi (2018BEZ8442) to avail of RSTA award to attend ASM Microbe in Georgia, USA, 13 – 17 June 2024 (Supervisor: SZA).
The Committee discussed and approved the request.
- c. Rashi Tyagi (2020BEZ8525): Continuation of fellowship during research tenure in Switzerland (Supervisor: SS)
The Committee discussed and approved the request.
- d. Request of Preetha Ganguly (2020BEZ8521) for Ex-India leave from 1 Feb to 2 May 2024 as part of the Sorbonne Mobility programme (Supervisor: PM)
The Committee discussed and approved the request.
- e. Request of Salila Pradhan (2020BEZ8522) for Ex-India leave with continuation of Indian fellowship (CSIR) from 10th May to 15th November 2024 for 6 month research visit to DTU, Denmark under SPARC scheme. (Supervisor: SS)
The Committee discussed and approved the request.
- f. Request of Archi Bansal (2022QIZ8045) for Ex-India leave for 1 year from 27 Feb 2024 to attend UQ as part of his degree requirement.
The Committee discussed and approved the request.

- g. Kreeti Pandey (2023BEZ8539): Request to change from DBT Fellowship to UGC Fellowship (Supervisor: RK)
 The Committee discussed and approved the request.

8. Matters for ratification

- a. The resignation letter received from Ishita Mittal (2022BEZ8509) (Supervisor: RK) was discussed and ratified.
 b. The following Ph.D. students were nominated for 3 Minute Thesis presentation during Research Communications Event:

1. Nidhi Nitin Patil (2019BEZ8669)
2. Shubham Sharma (2020BEZ7520)
3. Salila Pradhan (2020BEZ8522)
4. Ritanksha Joshi (2021BEZ8444)

- c. Project proposals submitted by faculty members.

S. No	Project name	Investigator	Funding Agency
1.	Targeted ultra-small mesoporous silica nanoparticles for receptor-mediated delivery of novel luminescent metallodrugs toward theranostics applications for treating solid hypoxic tumors	Prof. Ritu Kulshreshtha (PI) Prof. Archana Chugh (KSBS), Prof. Ashis Patra (IITK), Prof. Rana P Singh (JNU) (Co-PIs)	ICMR
2.	Coupling Partial Autotrophic Denitrification- Anammox- Denitrifying Phosphorous Accumulation for Simultaneous Phosphorus Recovery and Removal of Carbon, Nitrogen, and Sulphur from Waste Streams: An AI/ML Based Bio-modelling Approach for Sustainable and Circular Bioeconomy	Prof. Shaikh Ziauddin Ahammad	MoE
3.	Development of Fucoidan nanocarriers for receptor mediated targeted delivery of nucleic acids to treat GBM	Prof. Ritu Kulshreshtha (mentor) Dr. Jaspreet Kaur (applicant)	DBT-RA
4.	Bacterial microcompartments: a novel technology for recombinant	Prof. Preeti Srivastava	DBT

	protein production		
5.	Rhizospheric microbiome transplantation as an eco-friendly approach to mitigate Fusarium wilt in tomato	Prof. Shilpi Sharma (mentor) Dr. Annapurna Bhattacharjee (applicant)	DBT-RA
6.	Understanding the basis of heterogeneity in cell population: win of bacteria against multiple antibiotics	Prof. Preeti Srivastava	ICMR
7.	Training and support for build-your-own affordable light sheet microscope for large-volume tumor imaging	Prof. Ravikrishnan Elangovan (PI) Prof. Kedar Khare (Co-PI)	MoE
8.	Unravelling Molecular Mechanisms and Candidate Biomarkers for Enhancing Fusarium Resistance in Pigeonpea using an Integrative Omics Approach	Prof. Shilpi Sharma (mentor) Dr. Pashupat Vasmatkar (applicant)	DBT-RA
9.	Machine learning approaches for understanding the role of microbes in influencing the host virus interactions	Prof. Shilpi Sharma (mentor) Dr. Kavita Goswami (applicant)	DBT-RA
10.	Glucose-Driven Chemotactic Colloidal Fe-Au Janus Nanobots for Synergistically Disrupting Cancer Cells	Prof. Prashant Mishra (mentor) Dr. Saurabh Shivalkar (applicant)	DBT-RA
11.	Engineering recombinant Specifically Targeted Antimicrobial Peptides (STAMPs) for selective and targeted killing of Multi Drug Resistant (MDR) fungal pathogens	Prof. Prashant Mishra (mentor) Dr. Preeti (applicant)	DBT-RA
12.	Microbiome-based engineering of the rhizosphere to combat Fusarium wilt in pigeonpea (<i>Cajanus cajan</i>)	Prof. Shilpi Sharma	BIRAC
13.	Microfluidic approach for monitoring and diagnosing	Prof. Kumari Priti Sinha	CEFIPRA

	diabetes mellitus though increased vascular adhesiveness		
14.	Development and validation of microvasculature-on-a-chip platform for monitoring diabetes-mediated cardiovascular complications	Prof. Kumari Priti Sinha (PI) Prof. Ravikrishnan Elangovan (co-PI)	ICMR
15.	Dark-photo co-fermentation through integrated microbial carbon capture cell to produce biohydrogen and biofuel with concomitant power generation while treating wastewater	Prof. Lucinda Elizabeth Doyle (mentor) Dr. Swati Das (applicant)	DBT-RA
16.	Bio-Electro-Fenton based Advanced Oxidation Process in Electro-Wetlands for the Removal of Antibiotics and Antibiotic Resistance Genes from Urban Wastewater	Prof. Lucinda Elizabeth Doyle (mentor) Dr. Supriya Gupta (applicant)	DBT-RA
17.	Employing rhizospheric microbiome engineering in soil-less matrices for sustainable crop production.	Prof. Shilpi Sharma (mentor) Dr. Michael Dare Asemoloye (applicant)	TWAS-DBT postdoc fellowship programme
	A comparative study on the Impact of Climate Change on Yield, Nutritional Values, and Disease Susceptibility of different cultivars of Finger Millet (<i>Eleusine coracana</i>) grown in varied agroclimatic zones of Maharashtra, India.	Prof. Shilpi Sharma (Collaborator) Dr Om Prakash, Symbiosis Centre for Climate Change and Susceptibility (co-PI)	BIRAC
18.	Deciphering the Mechanisms and Markers of Cachexia in Tuberculosis Through Spatial Transcriptomics	Prof. Ishaan Gupta	BIRAC
19.	Comprehensive genomic characterization of young onset lung adenocarcinoma in India	Prof. Ishaan Gupta (co-PI) Dr. Prabhat Malik (PI)	DBT
20.	Bidirectional promoters for tunable production of biosurfactants	Prof. Preeti Srivastava	SERB

21.	Molecular and structural insights on the regulation of a catabolic dsz operon	Prof. Preeti Srivastava (PI) Prof. Atul Narang (DBEB), Prof. Neel S. Bhavesh (ICGEB), Prof. AKPatel (KSBS) (co-PIs)	DBT
22.	Nov-Sid: Novel siderophores identification, production and application for CRM recovery	Prof. Shaikh Ziauddin Ahammad (PI) Prof. T R Sreekrishnan, Prof. Ashish Misra (co-PIs)	DST-DAAD
23.	16S rDNA amplicon and metagenomic nanopore sequencing for rapid detection of bacterial pathogens in febrile neutropenia	Prof. Ishaan Gupta (co-PI) Dr. Sameer Bakshi (PI)	ICMR

The meeting ended with a vote of thanks to the Chair.



Lucinda E. Doyle
DRC Convenor



Indian Institute of Technology Delhi
Department of Biochemical Engineering and
Biotechnology

**Proposed PhD project to be offered to [Tanya Bansal \(2023BEM2002\)](#)
 who has requested conversion from MTech to PhD program**

Project details	
Project title	Characterization of plasmid replicons from <i>Rhodococcus</i> sp. IITD102
Project description	<p><i>Rhodococcus</i> are a group of Gram-positive, aerobic, non-sporulating, and non-motile bacteria which belongs to the group of Actinomycetes which are isolated from different environment samples. <i>Rhodococcus</i> spp. can show diverse metabolic activities which are useful in bioremediation and production of biosurfactants, amino acids, antibiotics, and lignocellulosic biomass conversion. Despite this huge potential of <i>Rhodococcus</i> there are only limited genetic tools available. <i>Rhodococcus</i> sp. IITD102 is one of the 9 members of the consortium reported for asphaltene biotransformation. This strain has four plasmids of sizes 80 kb, 68 kb, 44 kb and 18kb. These plasmids can be used for constructing four vector system.</p> <p>Broadly, this PhD project will involve bioinformatics analyses for deciphering the multi-replicon structure to predict replication origins and utilization in <i>Rhodococcus</i> genome, followed by experimental demonstration of those predictions to understand the control and coordination of multiple replication origins.</p> <p>The specific objectives will be:</p> <ol style="list-style-type: none"> a) Identification of the minimum replicon of the plasmids b) Characterization of the minimum replicon c) Determination of host range, stability, plasmid compatibility and mode of replication d) Construction of a four-plasmid system and its application
Instruments required	Bioinformatics computational facilities (hardware and software) available in Prof. Sundar's lab & the HPC facility and Molecular biology equipment available in Prof. Preeti Srivastava's lab.
Any other comments	

PhD supervisors			
Role	Faculty	Academic unit at IITD	E-mail
Supervisor 1	Preeti Srivastava	DBEB	sundar@dbeb.iitd.ac.in
Supervisor 2	D. Sundar	DBEB	preeti@dbeb.iitd.ac.in

Skills required	
Qualification	B. Tech (Biotechnology)
Skills	Experience in molecular biology and bioinformatics will be desirable

References
Deedwania, A., Karmakar, S., Kumar, V., Shefrin, S., Sundar, D.* and Srivastava, P.* (2024). Construction and characterization of a temperature-sensitive pRC4 replicon for <i>Rhodococcus</i> and <i>Gordonia</i> . Gene 896: 147990.