

MHRD Scheme on Global Initiative of Academic Networks [GIAN]



One week Online Course
on



“Microbial electrochemical Systems as a platform technology and its emerging applications”

January 9 – 13, 2023

Organized by
Department of Biotechnology
National Institute of Technology – Raipur, Chhattisgarh, India

Last Date of Registration 31 December 2022

Course Overview

Number of Participants for the Course will be Limited to Fifty (50)

Microbial electrochemical systems (MESs) are promising novel technologies that generate the energy as well as various value-added products under mild operational conditions. Microorganisms function as biocatalysts in the anodic chamber and the emitted electron flux from oxidative metabolism plays a vital role in the operation of these systems. It offers a flexible platform for both oxidation and reduction reaction oriented processes.

Bio-based economy is a global need for the production of green energy and products. Hence the microbial-derived electrochemistry sprung into Bio electrochemical Systems (BES) that exploit the process of bio electrochemical utilisation of organic matter via microbial metabolism to generate usable by-products and a great variety of applications in chemical production (microbial electrolysis cells, MECs; microbial electrosynthesis, MES), toxic compound detection (Biosensor) or water desalination (microbial desalination cells, MDCs).

The primary objectives of the course are as follows:

- To understand the concept of bio-catalytic activity of electrochemically active microbes inside the MESs.
- Exposing participants to the fundamentals of electrochemical performance and evaluation of Oxidation- reduction potential in bio-electrochemical reactions.
- To provide knowledge about design and fabrication of various types of MESs.
- To provide mechanistic insight to participants on various applications of MESs
- Providing exposure to potential challenges arising from MESs and how to resolve those problems.

Foreign Faculty



AEN

Dr. Abraham Esteve Núñez (in short AEN) is the Principal investigator of the Bioe Group, his scientific activity focuses on environmental biotechnology; specifically, in the use of electromicrobiology for bioremediation of water (urban and industrial) and natural environments, as well as the detection of pollutants. After his postdoctoral stays at UMass-Amherst (USA) and the Astrobiology Center (INTA / CSIC, Madrid), in 2009 he joined the Universidad de Alcalá through the Ramón y Cajal programme and since 2013 he has been a professor in Chemical Engineering. Supervisor of 8 doctoral theses, with another 12 in progress, and more than 20 master's theses, he is the author of 78 scientific publications, 13 book chapters, and seven national and international patents. He has participated and coordinated 30 national and European projects, including iMETland (awarded by Madrid), ELECTRA (EU-China Flagship) and ATTRACT, all from the Horizon 2020 programme. Among his technology transfer activities, the foundation of the start-up METfilter, co-owned by IMDEA Agua, is remarkable. Its METland® solution was chosen in 2020 among the top three in the field of biotechnology in Europe. In 2016 and 2020 he was awarded the First Prize of the International Excellence Campus Smart Energy for different works. In 2021 he was honored by the International Society for Microbial Electrochemistry and Technology (ISMET) with the Innovation Award for the development of the METland® technology.

Faculty



PG

Dr. Pratima Gupta (in short PG) is an Associate Professor in the Department of Biotechnology at the National Institute of Technology, Raipur, India. Her major research areas are antimicrobial resistance and applied microbiology. She has supervised 6 doctoral theses in diverse areas of applied microbiology. She is the author of 53 national and international scientific publications, 1 book and 3 book chapters. She has been a Principal Investigator of research projects of different sponsoring agencies such as the Science and Engineering Research Board (SERB, Government of India), Chhattisgarh Council of Science & Technology (CGCOST, Government of Chhattisgarh), Ministry of New and Renewable Energy (MNRE, Government of India), and the Department of Biotechnology (DBT, Government of India).



DNR

Dr. Dijendra Nath Roy (in short DNR) is currently working as Assistant Professor, Department of Bio Technology, National Institute of Technology, Raipur, India. He received PhD in Bio Technology from the CSIR-Indian Institute of Chemical Biology (IICB) and carried out postdoctoral research training at the National University of Singapore (NUS), Singapore. Dr. Roy has already earned several project grants from different funding agencies to carry out research on microbial biofilm. In 2015, he was honoured with a prestigious young scientist award from the Science and Engineering Research Board, Department of Science and Technology, Govt. of India. Dr. Roy has already published several research articles, books, review articles, and book chapters in the international platform of repute and he has guided PhD students in medical biotechnology.

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Schedule

	Time (IST)	Program
Day 1	<i>Inauguration</i>	<i>11.30 – 12.20</i> <i>Inaugural Function</i>
	Lecture: 1 (AEN)	12:30 - 13:30 <i>Topic: Fundamentals of Bioelectrochemical systems</i>
	Lecture: 2 (AEN)	14:30 -15:30 <i>Topic: Bioprocess aspects of Microbial electrochemical cells</i>
	Tutorial: 1 (AEN)	15:40 -17:40 <i>Topic: Problem solving session with examples: Electrochemical performance calculations</i>
Day 2	Lecture: 3 (PG)	12:30 - 13:30 <i>Topic: Construction of Microbial fuel cell</i>
	Lecture: 4 (AEN)	14:30 -15:30 <i>Topic: Types of Microbial electrochemical systems</i>
	Tutorial: 2 (PG)	15:40 -17:40 <i>Topic: Problem solving session with examples: Electrochemical measurements Microbial fuel cell</i>
Day 3	Lecture: 5 (AEN)	12:30 - 13:30 <i>Topic: Simultaneous development of electrodes/low cost membranes in microbial electrochemical systems</i>
	Lecture: 6 (DNR)	14:30 -15:30 <i>Topic: Bioelectrochemically active microbes</i>
	Tutorial: 3 (AEN)	15:40 -17:40 <i>Topic: Problems related to sustainable approaches of MESs</i>
Day 4	Lecture: 7 (AEN)	12:30 - 13:30 <i>Topic: Upscale technologies of MESs and their challenges</i>
	Lecture: 8 (DNR)	14:30 -15:30 <i>Topic: Biofilm and Microbial electrochemical systems</i>
	Tutorial: 4 (AEN)	15:40 -17:40 <i>Topic: Real scale problem applied in microbial electrochemically assisted systems</i>
Day 5	Lecture: 9 (AEN)	12:30 - 13:30 <i>Topic: Microbial electrochemical systems for removing pollutants</i>
	Lecture: 10 (PG)	14:30 -15:30 <i>Topic: Microbial electrochemical systems for valorization</i>
	Tutorial: 5 (PG)	15:40 -17:40 <i>Topic: Advance oxidation reactions of Microelectrofenon & Examination</i>

You should attend if...

- Executive, Engineer, and Researcher from manufacturing, service and government organizations including R&D Laboratories.
- Student at all levels (B.Tech/M.Tech/M.Sc/PhD) from reputed university/institutes.
- Faculty from reputed university/institutes.

Course Registration

Step 1: One Time GIAN Registration

Visit <http://www.gian.iitkgp.ac.in/GREGN/index> and register by paying Rs 500/- (those who have already been registered and paid, need not pay again) then opt the course (**Course ID: 191029B01**) under course registration tab and save. After completing this process please inform to the course coordinator by e-mail. Course coordinator will confirm your attendance and then you must proceed to step- 2 to pay the course fee.

Step 2: Participation Fee

Industry/Research Organizations: Rs. 2000/-
Academic Institutions (Faculty): Rs. 1500/-
Academic Institutions (Students): Rs. 500/-
* The fees are inclusive of 18% GST.
* The above fee is towards participation in the course, and the course material.
* Participants must use their personal laptops.

Step 3: Course Fee Payment

By NEFT
Account holder name: The Registrar, National Institute of Technology (NIT) Raipur
Account No. 38027633250
IFSC Code: SBIN0002852
Bank: State Bank of India, NIT Raipur
Branch Name: NIT Raipur campus, G E Road

Important

- ✓ Participants for the course will be selected on first come first served basis (Maximum number of participants: 50).
- ✓ All registered participants must fill this Google form: <https://forms.gle/FotEgkBhdVa7UJEk9> (Copy & Paste in URL Space)

Course Coordinators

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