Current Bioprocess Technology, Products and Opportunities

Date: June 29, 2024 to July 3, 2024

Time: 1.30 PM to 5.00 PM

Organized by Department of Biotechnology

in association with

Academic Staff College, KLEF

About the FDP

The present FDP focuses on innovative techniques of bioprocesses aimed at harnessing biological systems for industrial purposes. This includes processes like fermentation, biocatalysis, and genetic engineering. Key advancements include the development of high-throughput screening methods for enzyme discovery, the use of synthetic biology for metabolic engineering, and the application of omics technologies for systems-level analysis of biological processes.

Overall, bioprocess technology is poised to play a pivotal role in addressing global challenges related to sustainability, resource scarcity, and environmental degradation, while also driving economic growth and innovation across various industries.

DAY-1 (29.06.2024)

Session-1

Topic: Production of biopolymer (polyhydroxy alkanoates) and its applications

Speaker: Dr. Suchada Chanprateep Napathorn, Associate Professor, Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand.

Summary: The speaker presented on the production of biopolymers, specifically polyhydroxyalkanoates (PHAs), which are biodegradable plastics produced by microbial fermentation of renewable resources. The talk covered the biosynthesis pathways, the types of microorganisms used, and the substrates involved in PHA production. Emphasis was placed on the environmental benefits of PHAs, including their biodegradability and potential to replace conventional plastics. The speaker also highlighted various applications of PHAs, such as in packaging, agriculture, medical devices, and as a raw material for other bioplastics. Challenges in production scalability, cost, and regulatory aspects were discussed, along with future prospects and research directions.

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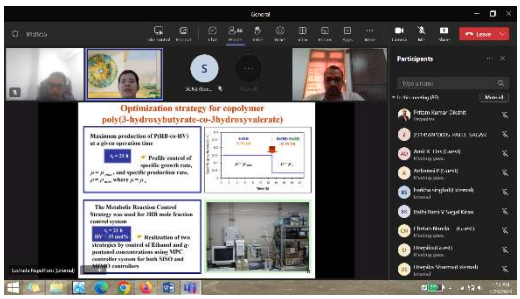

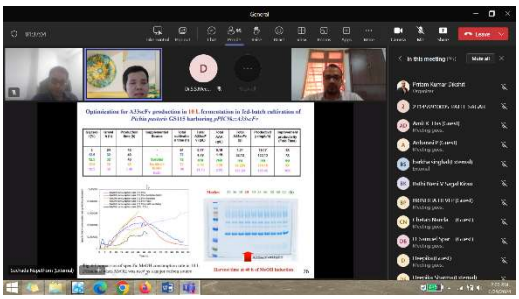

Session-2

Topic: Bioprocess Development in Bioremediation of Wastewater

Speaker: Dr. Vishal Mishra, Assistant Professor, School of Biochemical Engineering IIT (BHU), India.

Summary: The speaker's presentation on "Bioprocess Development in Bioremediation of Wastewater" highlighted innovative methods for treating polluted water using biological processes. Emphasizing the importance of sustainable practices, the speaker discussed various microbial and enzymatic techniques that break down contaminants, transforming harmful substances into harmless byproducts. Key advancements included the optimization of microbial consortia, genetic engineering of microbes for enhanced performance, and the integration of bioreactors for efficient large-scale applications. The presentation underscored the potential of bioprocessing as a cost-effective and eco-friendly solution for addressing global wastewater challenges, with promising implications for environmental health and industrial sustainability.

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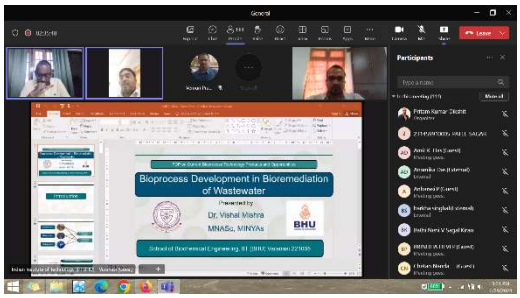

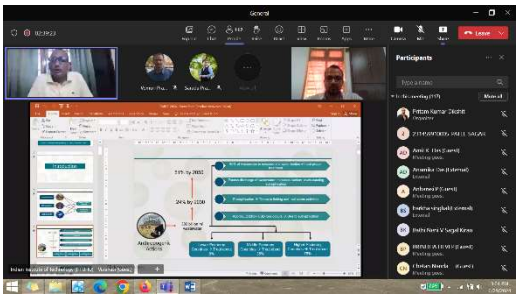

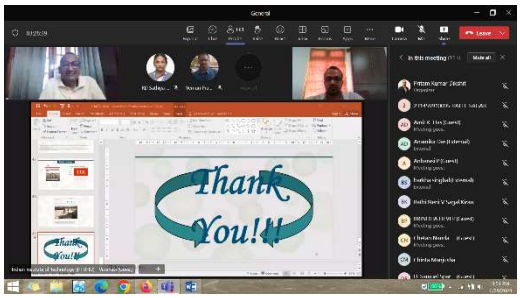

DAY-2 (30.06.2024)

Session-1

Topic: Biosaccharification of lignocellulosic biomass and biotransformation to ethanol

Speaker: Dr. Sreedhar Bodiga, Associate Professor, Department of Basic Sciences, Forest University, Mulugu, Telangana, India.

Speaker: The speaker's presentation on "Biosaccharification of Lignocellulosic Biomass and Biotransformation to Ethanol" detailed the process of converting plant biomass into ethanol through biological means. Key points included the breakdown of lignocellulose into fermentable sugars via enzymatic saccharification, and the subsequent fermentation of these sugars into ethanol by microorganisms. The speaker emphasized the advantages of this method, such as renewable resource utilization and reduced greenhouse gas emissions. Challenges like enzyme efficiency, biomass pretreatment, and microbial tolerance were discussed, along with potential solutions and recent advancements in biotechnology aimed at improving process efficiency and economic viability.

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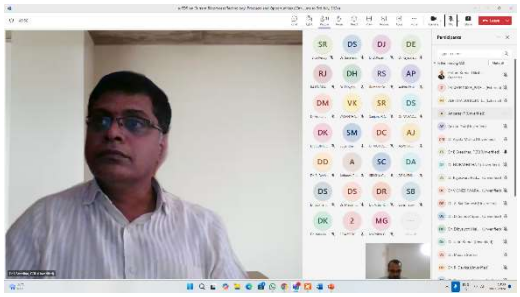

Session-2

Topic: Biosimilars and Pharma 4.0

Speaker: Mr. M. M Khaja Riazuddin Nawaz, Manager, TheraNym Biologics, Hyderabad, Telengana, India.

Summary: The speaker's presentation on Biosimilars and Pharma 4.0 highlighted the transformative impact of advanced technologies in pharmaceutical manufacturing. Biosimilars, as cost-effective alternatives to biologics, are gaining traction, offering similar efficacy and safety profiles. The integration of Pharma 4.0 principles—leveraging digitalization, automation, and data

analytics—enhances the production, monitoring, and quality control processes of biosimilars. This synergy ensures higher efficiency, reduced costs, and improved patient outcomes. The speaker emphasized the importance of regulatory frameworks and collaboration among stakeholders to fully realize the potential of these innovations in modernizing the pharmaceutical industry and meeting the growing healthcare demands.

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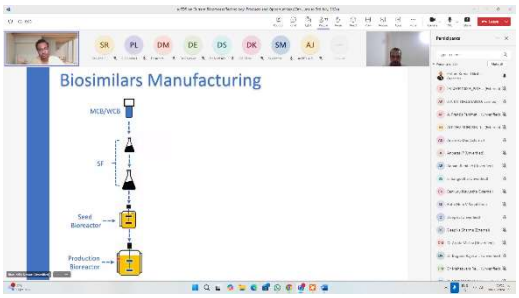

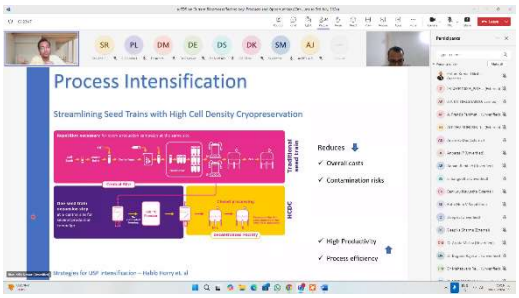

DAY-3 (01.07.2024)

Session-1

Topic: Vitamins as Tools in Biological Chemistry and Synthetic Biology

Speaker: Dr. Amrita Hazra, Associate Professor, Indian Institute of Science Education and Research (IISER) Pune, India.

Summary: The speaker's presentation on "Vitamins as Tools in Biological Chemistry and Synthetic Biology" explored the multifunctional role of vitamins beyond nutrition. Highlighting their importance as coenzymes and cofactors, the talk detailed how vitamins drive key biochemical reactions. The speaker discussed innovative applications in synthetic biology, where vitamins are engineered to create novel pathways and enhance metabolic processes. Case studies included using vitamin B12 in gene editing and vitamin C in antioxidant defenses. Emphasizing the potential for therapeutic advancements and sustainable biotechnological solutions, the presentation showcased vitamins as pivotal tools in advancing biological research and applications.

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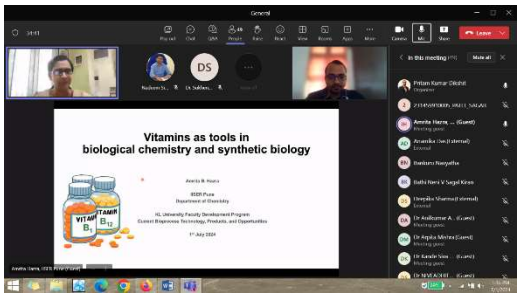

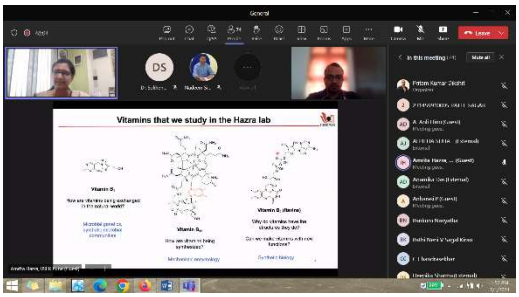


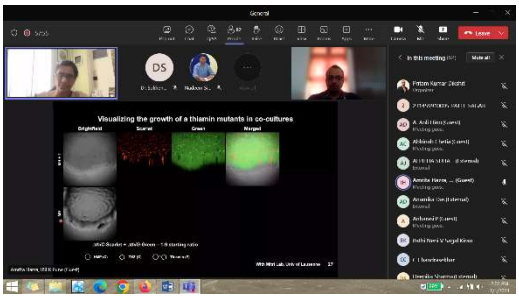

Session-2

Topic: Antarctic Research and Microbiology

Speaker: Dr. Japareng Lalung, Associate Professor, Universiti Sains Malaysia, School of Industrial Technology, Penang, Malaysia.

Summary: The speaker's presentation on Antarctic Research and Microbiology highlighted the unique and extreme conditions of Antarctica that make it a valuable site for scientific study. They discussed how microbial life thrives in this harsh environment, providing insights into life's adaptability and resilience. The research contributes to understanding global climate change, as microbes play a crucial role in nutrient cycling and carbon sequestration. The presentation also covered the technological advancements enabling more detailed and accurate studies, and the importance of international collaboration in Antarctic research to address global scientific and environmental challenges.

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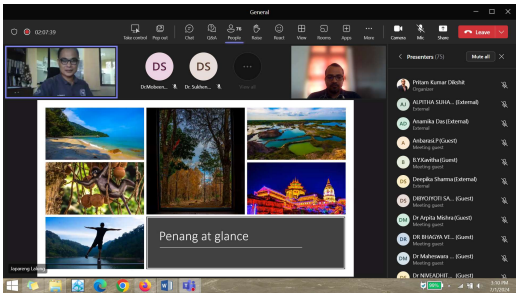

DAY-4 (02.07.2024)

Session-1

Topic: Biodiesel Production from Marine Macro Algal Biomass

Speaker: Dr. S. Renganathan, Professor, Center of Biotechnology, Anna University, Chennai, India

Summary: The presentation on "Biodiesel Production from Marine Macro Algal Biomass" explored the potential of using marine macroalgae as a sustainable feedstock for biodiesel production. The speaker highlighted the advantages of macroalgae, such as high growth rates and minimal competition with food crops. Key topics included the cultivation methods of macroalgae, the extraction process of lipids, and the conversion techniques to biodiesel. The environmental benefits, including reduced carbon emissions and decreased reliance on fossil fuels, were emphasized. Challenges like scalability, cost-effectiveness, and technological limitations were also discussed, along with future research directions to optimize the production process.

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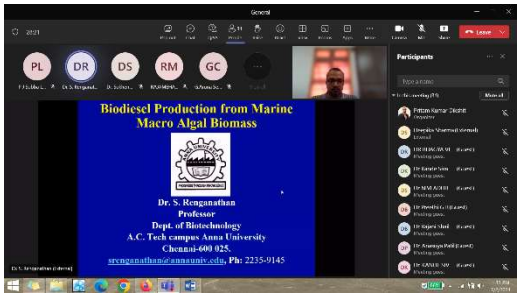

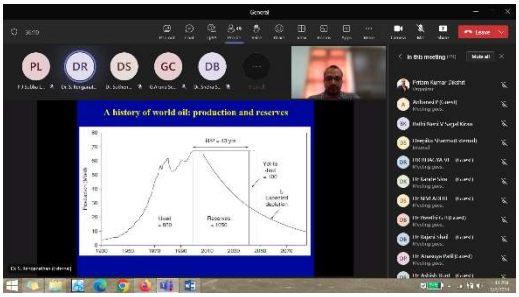

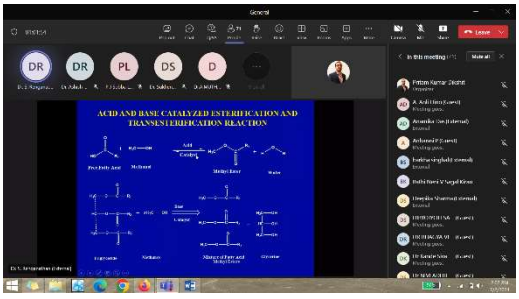

Session-2

Topic: An Overview of Gene Therapy and Case Studies

Speaker: Dr. Pardhasaradhi Mathi, Sr Development Scientist, NHS-Blood and Transplant, Bristol, United Kingdoms.

Summary: The speaker's presentation on "An Overview of Gene Therapy and Case Studies" highlighted the transformative potential of gene therapy in treating genetic disorders. They explained the basic principles, including the use of vectors like viruses to deliver therapeutic genes into patients' cells. Key techniques such as CRISPR-Cas9 and viral vector delivery systems were discussed. The speaker also presented several case studies demonstrating successful treatments for conditions like hemophilia, spinal muscular atrophy, and certain cancers. Challenges, including ethical considerations, potential side effects, and high costs, were acknowledged. The presentation concluded with an optimistic outlook on future advancements in the field.

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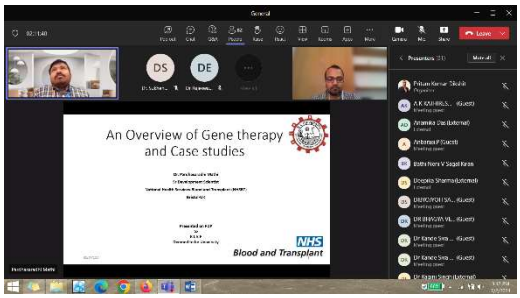
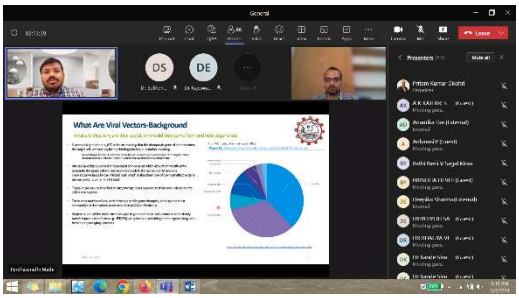
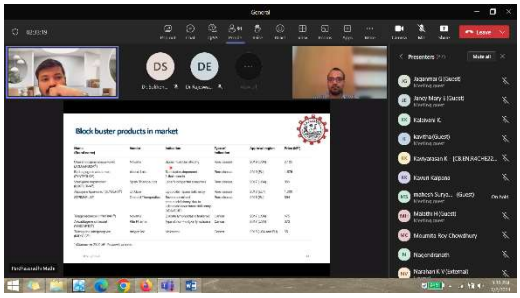






DAY-5 (02.07.2024)

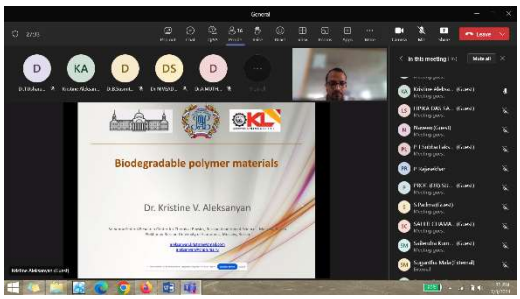
Session-1

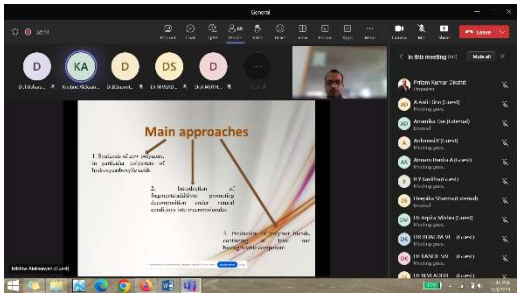
Topic: Biodegradable Polymer Materials

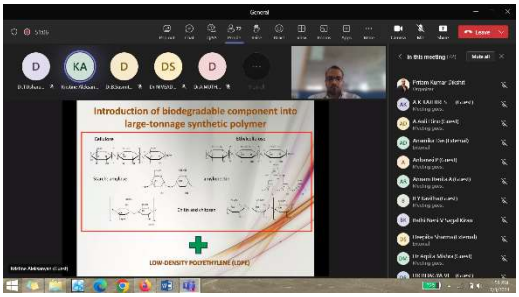
Speaker: Dr. Kristine Aleksanyan, Semenov Federal Research Center for Chemical Physics, Russian Academy of Sciences, Moscow 119991, Russia.

Summary: The speaker presented on biodegradable polymer materials, emphasizing their environmental benefits and potential applications. They discussed the composition and properties of these materials, highlighting their ability to break down naturally, reducing plastic pollution. The presentation covered various types of biodegradable polymers, such as polylactic acid (PLA) and polyhydroxyalkanoates (PHA), and their uses in packaging, medical devices, and agriculture. The speaker also addressed challenges in production, cost, and performance compared to

traditional plastics, and stressed the importance of ongoing research and development to improve these materials and make them more commercially viable.





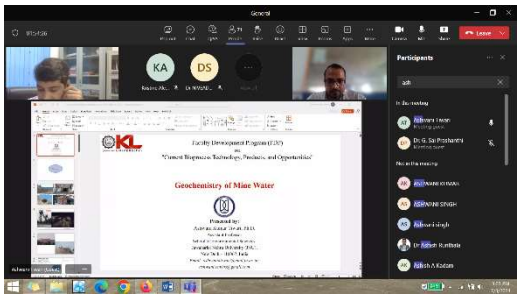


Session-2

Topic: Geochemistry of Mine Water

Speaker: Dr. Ashwani Kumar Tiwari, School of Environmental Sciences, Jawaharlal Nehru University (JNU), New Delhi, India.

Summary: The speaker's presentation on the "Geochemistry of Mine Water" highlighted the chemical processes and environmental impacts associated with mine water. Key points included the formation of acid mine drainage, the leaching of heavy metals, and the role of geochemical reactions in water contamination. The speaker discussed methods for monitoring and mitigating these effects, such as water treatment technologies and environmental management practices. Emphasis was placed on understanding the geochemical interactions between minerals and water, and their implications for ecosystem health and human safety. The presentation concluded with case studies and future research directions in mine water geochemistry.




General
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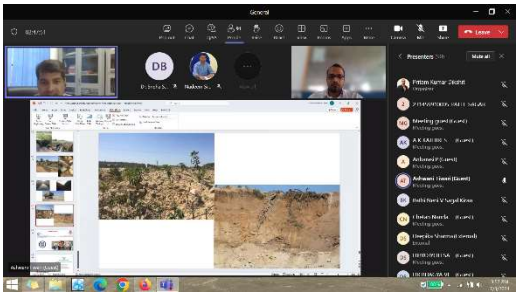
Why the study of mine water chemistry is required?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