About the speaker :

Dr. Debabrata Das pursued his doctoral studies from Indian Institute of Technology (IIT) Delhi and post-doctoral research work at University of Utah (UU), USA. Presently, he is a INAE-AICTE Distinguished Visiting Professor of SRM Institute of Science and Technology, Chennai and Heritage Institute of Technology, Kolkata. In addition, he is the Scientific Advisor of M/s. Dhampur Sugar Mills Ltd., New Delhi. He was also associated as MNRE Renewable Energy Chair Professor for three years and Professor for 32 years at IIT Kharagpur. He is actively involved in the research of hydrogen biotechnology for a period of more than twenty years. His commendable contributions towards development of a commercially competitive and environmentally benign bioprocess for the biohydrogen production from organic wastes using both mesophilic and thermophilic microorganisms.His recent work on biohythane process for the maximization of gaseous energy recovery from the organic wastes is worth mentioning. 10 m^3 biohydrogen pilot plant study was successfully carried out. Technology License agreement of the process has already transferred to M/s. Dhampur Sugar Mills Ltd. He is the author of the five text books: "Biohydrogen Production: Fundamentals and Technology Advances"; "Fundamentals of Biofuel Production Processes" and "Industrial Biotechnology" published by M/s. CRC Press, New York and "Biohythane: Fuel for the future", "Biochemical Engineering: An Introductory Text Book" and "Biochemical Engineering: A Laboratory Manual" published by M/s. Pan/Jenny Stanford Publishing, Singapore. He is the Editor of the books entitled "Algal Biorefinery: An Integrated Approach" and "A bioelectrochemical system that convert wastes to Watts" published separately by M/s. Springer, Switzerland and M/s. Capital Publishing Company, India. He has two Indian patents. He has the Google h-index of 56 for his research work. He has more than 170 research publications in the peer reviewed journals and contributed more than 38 chapters in the books published by International publishers. He offered two NPTEL 12-weeks courses on Industrial Biotechnology (has been offering for the last four consecutive years) and Aspects of Biochemical Engineering (has been offering for two years). (AICTE approved course for Undergraduate and Postgraduate students and FDP). He was awarded IAHE Akira Mitsue award 2008 and BRSI Malaviya Memmorial award 2013 for his contribution in hydrogen research. He is the Fellow of International Association for Hydrogen Energy (IAHE) , Indian National Academy of Engineering (INAE) ; Biotechnology Research Society of India (BRSI) ; West Bengal Academy of Science and Technology (WAScT); and Institution of Engineers (IE) . He is the member of the editorial board of several International Journals.

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Invites you for the lecture series on

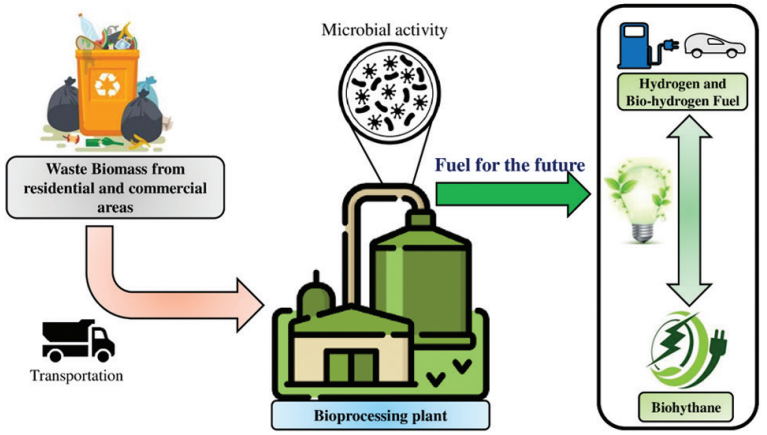
Fundamental and Technology Advances on Biohydrogen Production Processes

Session-I: Sep. 13, 14 & 15
Session-II: Sep. 20, 21 & 22

Talks delivered by

Dr. Debabrata Das,

Ph.D.(IIT–Delhi), FIAHE, FNAE, FBRS, FAScT, FIE(I)
INAE–AICTE Distinguished Visiting Professor, SRM IST



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Abstracts of lecture topics:

Advanced biofuel production processes using renewable resources

Energy plays an important role in human society because it contributes to the technological developments and social progress of a country. This contribution has great impact on the quality of our life. Due to rapid industrialization and urbanization, energy consumption has been increased extensively. According to the International Energy Agency (IEA), the world's primary energy need is expected to grow by 55 percent between 2005 and 2030, at an average annual rate of 1.8 percent. At present, the world energy needs are supplied mostly through fossil fuels such as coal, natural gases, and petrochemical sources that will be exhausted in less than 100 years as predicted by the World Energy Forum. Fossil fuels also are responsible for the greenhouse effect resulting from the generation of carbon dioxide. Renewable energy sources as alternatives to fossil fuel energy sources may play a vital role in overcoming the energy shortage problem in future. Renewable energy sources not only help to meet our energy demand but also safe guard our environment. Biomass is considered an important renewable energy source. The emergence of biofuel production from biomass has endured since the dawn of early civilization. Solid biofuels such as wood and cow dung have been used for cooking and heating purposes for ages. Similarly, liquid biofuels have been used in the automotive industries since its inception. Recent development of different biofuels production processes from renewable resources will be elucidated.

Fundamentals and technology advances of biohydrogen production processes

Hydrogen is the fuel of the future mainly due to its highest heating value, recyclability and nonpolluting nature. Biological hydrogen production processes are found to be more environment friendly and less energy intensive as compared to thermochemical and electrochemical processes. They are mostly controlled by either photosynthetic or fermentative organisms. The microorganisms and biochemical pathways involved in hydrogen generation processes are playing important role. Several developmental works will be discussed. Immobilized system is found suitable for the continuous hydrogen production. Fermentative hydrogen production processes have some edge over the other biological processes. Several pilot plants have been successfully demonstrated throughout the world to find out the viability of the biohydrogen production processes.

Biohythane: Fuel for the future

For the quest of clean, renewable energy solutions, many technologies have been explored, viz., bio-oil production by hydrothermal liquefaction, biomass gasification, pyrolysis of petroleum for methane production, etc. One such concept that has gained importance in recent times is hythane (hydrogen and methane). The biological process for clean energy gaseous energy generation encompasses biohydrogen and biomethane production. The carbon footprint of biohydrogen and biomethane production processes is still less compared to chemical processes. Biohydrogen can be produced from organic wastes at ambient temperature and atmospheric pressure, thereby generating a sustainable process that subsequently helps in waste stabilization. In addition, biogas generation process is mainly governed by two groups of microflora: acidogens and methanogens. Little information is available to find out the suitability of acidogens on hydrogen production, which may be considered potential microflora in the dark fermentation process. Thus, the dark fermentation process is considered a most promising method for biohydrogen production amongst all other processes. The spent media of the dark fermentation process contains a significant amount of short-chain fatty acids, viz., acetate, butyrate, propionate, etc. These volatile fatty acids are suitable substrates for methanogens. Therefore, integration of the biohydrogen with biomethane processes under the eponym of "biohythane" could help in the improvement of gaseous energy recovery. The integration of the biohydrogen and biomethanation processes is challenging, and an immediate emphasis is required to develop human resource, expertise, and infrastructure related to it.

Programme Schedule

September 13th '2021

10.30 a.m	:	Welcome address
10.45 a.m	:	Introduction about the speaker
10.50 a.m	:	Introduction about session I and II

Session I

11.00 a.m –12.00 Noon	:	Advanced biofuel production processes using renewable resources

September 14th '2021

11.00 a.m –12.00 Noon	:	Fundamentals and technology advances of biohydrogen production processes

September 15th '2021

11.00 a.m–12.00 Noon	:	Biohythane: Fuel for the future

Session II

September 20th '2021

11.00 a.m–12.00 Noon	:	Kinetics of Biohydrogen production

September 21st '2021

11.00 a.m–12.00 Noon	:	Thermodynamic and Kinetics of Biomethanation process

September 22nd '2021

11.00 a.m–12.00 Noon	:	Effect of physico–chemical parameters on the biofuels production
12.05 p.m		Concluding remarks
12.15 p.m.		Vote of Thanks