RESE
2021

A Virtual International Conference on

Technological Intervention in Renewable Energy for Sustainable Environment

Centre of Excellence in Sustainable Technologies for Rural Development [CESTRD]
Department of Biotechnology & Bioinformatics
Jaypee University of Information Technology
Waknaghat, Solan - INDIA (173234)

RESE - CESTRD

BY

CESTRD and TIED Team

A Virtual International Conference on
Technological Intervention in

Renewable Energy for Sustainable Environment (RESE-2021)

On 24th and 25th November 2021
Organised By

Technology Incubation And Entrepreneurship Development (TIED) Cell and Centre Of Excellence In Sustainable Technologies For Rural Development [CESTRD] Department Of Biotechnology And Bioinformatics

At

Jaypee University of Information Technology
Waknaghat, Solan - INDIA (173234)

Mission: The focus of TIED cell of JUIT is to harness the talents and research strengths available in different engineering disciplines and apply the same to socially relevant projects in the form of startup ventures. The CESTRD mission is the upliftment of the lifestyle and living status of rural people through the intervention of JUIT scientists through sustainable technologies especially in the area of renewable energy and waste management. RESE-2021 looks forward to novel ideas in the domain of renewable energy. The best idea/research work under each theme will be given an opportunity to submit their ideas as a startup proposal to TIED Cell.

Dr. R.K. Sani
USA

Dr. Rameshprabhu R.
Thailand

Dr. Luciane Colla
Brazil

Dr. Sunil Kumar
India

Dr. Sanjeev Kumar
India

Dr. Fuaziah Marpani
Malaysia

Dr. Sunita Varjani
India

Dr. Yuwalee Unpaprom
Thailand

Dr. Vandana Vinayak
India

Dr. Prashant Botham
USA

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Prof. Sudhir Kumar & Prof. Ashish Kumar

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Student Coordinators

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Department of BT & BI

Mr. Devansh
Department of ECE

The Registration is Free of Cost!

For Registration CLICK HERE

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CONFERENCE PROGRAM SCHEDULE

	Date	Timing	Speaker	Topic	Session Chair
Day1	24/11/2021		**SESSION-1**		
		9:00am to 09:30am	Inaugural Address by Vice Chancellor, Dean Academics and Research,JUIT Waknaghat Thematic Address about CESTRD by Prof. SudhirKumar, HOD BT &BI, JUIT Waknaghat and Prof. Ashish Kumar, Chairperson TIED Cell	Opening Ceremony	Dr. Ashok Kumar Nadda (Convener)
		09:30 am-10:30 am	Prof. R. K. Sani, South Dakota School of Mines and Technology, USA (Keynote Speaker 1)	Rules of Life of sulfate-reducing biofilms grown on metal surfaces	Prof. Sudhir Kumar & Dr. Nishant Jain
		10:30 am-11:15am	Dr. Rameshprabhu R. Maejo University, Thailand (Keynote Speaker 2)	Biomethane as a transportation fuel	Dr. Garlapati Vijay Kumar & Dr. Nishant Jain
		11:15 am-12:15 pm	Dr. Vandna Vinayak India	Nanotechnological aspect of treating wastewater treated with microalgae and recovering value added metabolites"	Dr. Gopal Bisht & Dr. Poonam Sharma
		12:15 pm- 02:00 pm	e-Poster Discussion/ Lunch		Dr. Anil Kant Thakur Dr. Jata Shankar
			SESSION-2		
		02:00 pm-03:00 pm	Dr. Sunil Kumar CSIR NEERI Pune Maharastra (Keynote Speaker 3)	Waste Management and Renewable Energy for Sustainable Environment	Dr. Tiratha Raj Singh & Dr. Rahul Shrivastava
		03:00 pm-03:30 pm	Dr. Fauziah Marapani Malaysia	Biocatalytic membrane reactors: Applications, Challenges and Perspectives towards Sustainable Environmental Protection	
		03:30 pm-04:30 pm	Mikhail VAINSHTEIN Russian Academy of Sciences Russia	Oxidative additive for increasing microbial activities	
		04:00 pm -04:30 pm	Tea and Open Forum and Discussion Session		
	25/11/2021		**SESSION-3**		
		09:00 am-10:00 am	Dr. Luciane Colla Brazil (Keynote Speaker 4)	Effluent valuation, biothanol and high added value products from microalgae	Dr. Hemant Sood & Dr. Saurabh Bansal
		10:00 am-11:00 am	Dr. Yuwalee Unaprom, Thailand (Keynote Speaker 5)	Agricultural waste biomass as a renewable bioenergy – Resource for bioethanol production	Dr. Abhishek Chaudhary and Dr. Raj Kumar
		11:00 am-12:00 pm	Dr.Prashant Botham USA	Energy harvesting for small scale electronic operation	
		12:00 pm-02:00 pm	e-Poster Discussion/ Lunch		Dr. Jitendraa Vashistt & Dr. Udayabanu
			SESSION-4		
		02:00 pm-03:00 pm	Dr. Sunita Varjani, Gujarat Pollution Control Board, Gujarat, India (Keynote speaker)	Prospects on Integrated Municipal Solid Waste Management for Energy Generation	Dr. Ragini Raj Singh & Dr. Sumedha Arora
		03:00 pm-04:00 pm	Sanjeev Kumar IIT Roorkee	Improved biogas from algal biomass through fungi mediated harvesting and pretreatment	Dr. Harsh Sohal & Dr. Ashok Kumar Nadda
		04:00 pm-05:00 pm	Closing ceremony		CESTRD &TIEDC Team

Technical Support Committee:

Mr. Vineet Paliwal, Ms. Somlata Sharma, Mr. Baleshwar Prasad, Ms. Mamta Mishra, Ms. Sonika Gupta, Ismail Siddiqui

All timings are according to Indian standard time IST New Delhi

CESTRD and its Activities

Vision: The vision of CESTRD established at Jaypee University of Information Technology (JUIT) is to focus on the development of rural personnel and to benefit the people of all age groups irrespective of gender, race and financial category in Himachal Pradesh (H.P). The aim of the centre is to impart awareness about the recent sustainable technologies and Government aided scheme available for their convenient livelihood in H.P. The CESTRD will focus on the transfer the technologies to the rural people through their scientific taskforce and spread agricultural and environmental awareness. CESTRD is also determined to train the rural youth about use of upcoming technologies for skill development and to upgrade their acquaintance about self-employment and entrepreneurship. The centre will target the rural youth, women groups and rural development committees through continuous consultancy, training and workshop sessions.

Mission: The mission of CESTRD is to uplift the lifestyle and living status of rural people through intervention of JUIT scientists. The sustainable technologies in the area of renewable energy (Solar energy, Hydro-wind energy), landscape designing, crop harvest technologies, Biogas production, Biofertilizers, plastic waste management and economic activities such as approach to market and government bodies for financial assistance will be made easily understandable for rural people.

CESTRD - Chair-person & Coordinator

Prof. Sudhir Kumar (HOD)

Department of Biotechnology and Bioinformatics,JUIT, Waknaghat
Solan, H.P. sudhir.syal@juit.ac.in

Brief about TIED Cell

Jaypee University of information technology Solan established the incubation center in the campus in Dec 2016 with the name Technology incubation and entrepreneurship development cell, TIEDC. The incubation center aims to provide an entrepreneurial ecosystem in the university. Board of the Cell includes Chairman, Prof. Ashish Kumar and Faculty Members Dr. Nishant Jain, Dr. Ekta Gandotra, and Dr. Deepak Gupta. In May 2017, the university signed a MoU with the department of industries under CM Startup scheme to promote startup activities. Till date we have received more than 180 startup ideas out of which more than 20 ideas have been incubated by the cell and many of them are running their venture successfully. To provide mentoring support to our incubatees, TIED Cell has collaborated with experts from the industries and from Academics. For the development of the startup ecosystem, to upgrade the students and incubatees with different skills required for startup, and to nurture ideas from young brilliant mind, throughout the year, TIEDC organizes different events like E-Summit, Hackathon, Vicharna, Startup Simulators, webinars, and workshops.

TIED Cell welcomes innovative startup ideas throughout the year. Proposals can be submitted through TIED Cell website.

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  Founder chairperson, Jaypee Group
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  Executive Chairman, Jaypee Group and Pro-Chanceller, JUIT, Waknaghat

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- Maj. Gen. Rakesh Bassi (Retd.)
  Registrar and Dean of Student Welfare, JUIT

Programme Chair

- Prof. Sudhir Kumar HOD, Department Of Biotechnology and Bioinformatics
- Prof Ashish Kumar HOD, Department of Civil Engineering

Conveners

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- Dr. Nishant

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- Dr. Nishant, Dr. Harsh Sohal

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Speakers Profiles

1. Prof. Rajesh K. Sani

Title of talk: Rules of Life of sulfate-reducing biofilms grown on metal surfaces

Dr. Sani is a Professor in the Departments of Chemical and Biological Engineering and Applied Biological Sciences at South Dakota School of Mines and Technology, South Dakota, USA. His research expertise includes Rules of Life in Biofilms, Extremophilic Bioprocessing, Biocatalysis, Biomaterials, Gas to Liquid Fuels, Genome Editing of Extremophiles and Space Biology. Over the past 14 years, he has been the PI or co-PI on over $44.39 million in funded research. He has one patent, seven invention disclosures, and published over 93 peer-reviewed articles in high impact factor journals and has contributed to over 24 book chapters. In addition, he has edited eight books and one proceeding for Springer International Publishing AG, Wiley, and ACS publications. Dr. Sani has also been leading a research consortium funded by the NSF with the aid of 84 scientists and engineers.

2. Dr. Rameshprabu Ramaraj

Title of talk: Biomethane as a transportation fuel

Dr. Rameshprabu Ramaraj is an Assistant Dean at the School of Renewable Energy, Maejo University, Chiang Mai, Thailand. Also, he is working as an invited Professor at Nagasaki University, Japan. He received his Ph.D. degree from National Chung Hsing University, Taiwan. Dr. Rameshprabu received three master graduate diplomas,

- MEng (Renewable Energy Engineering), from Maejo University, Thailand.
- MPhil (Medical Entomology-Zoology) from Bharathiyar University, Tamil Nadu, India
- M.Sc. (Zoology) Vivekananda College, Madurai, Tamil Nadu, India and
- B.Sc. (Zoology ancillary of Chemistry & Botany), SBK College, Tamil Nadu, India
- Conference coordinator: International conference on Renewable Energy (2017, 2018, 2019 &2021), Chiang Mai, Thailand

Awards and Honors:

- Outstanding Reviewer Award, Ecological Engineering Journal, 2018
- Best Reviewer Award, Bioresource Technology, 2018
- Fig Anti-Aging Serum (by Yuwalee Unpaprom, Rameshprabu Ramaraj & Chutima Kongjaroon)
- Silver Prize of KIWIE 2018, Korea

- Special Award for the Excellent Investigation by Taiwan Invention & Innovation
- Industry Association at Korea
- Best research paper award, 2015 by Emergent Life Science Research
- Best research student awarded by KUO HSI-LIU FOUNDATION, 2011
- National Chung Hsing University Scholarship, 2009-2013
- Outstanding student awarded with Taiwan Government Scholarship, 2006-2009
- Editorial: Chief editor, Maejo International Journal of Energy and Environmental Communication (ISSN 2673-0537 ; ISSN: 2774-0064 (Online)).

Also, he is working as an editorial board member of over 15 journals. His current research interests include Biology and Ecology, aquatic insects, algae growth, fermenters and reactor systems, food science (pro/prebiotics), energy and sustainable resource engineering. He has authored 2 (ISBN) books and 3 book chapters and over 200 research articles with h-index 27 and i10-index 59.

3. Dr. Vandna Vinayak

Title of talk: Nanotechnological aspect of treating wastewater treated with microalgae and recovering value added metabolites

Dr. Vandana Vinayak belongs to Punjab and is M.Sc (P.A.U, Punjab) and PhD (K.U. Haryana) in Biochemistry with her work on enzyme kinetics, protein purifications, chromatography, value added products, random primers and microsatellites in DNA profiling while working in a plant tissue culture laboratory. she received appreciation letters from Director General of Police and Director Haryana Police Academy for her contributions in uplifting diatom research in Haryana. Besides winning 5 and above various best poster and oral presentations in various conferences, in 2017 she had been selected and fully funded with travel award as a one among 3 women from India to participate in International Conference at International Centre for Theoretical Physics, Trieste, Italy a UNESCO class 1, Institute. In 2018 she had been invited at University of Cambridge, United Kingdoms to chair a session at an International Workshop on Algal Biotechnology. In 2020, she had been awarded as Best women scientist award in an International Forensic summit. Her research accomplishments include about 9 research projects as Principal Investigator, which include sanctioned grants from DST(HSCST)-4.68lacs, UGC-BSR-6lacs, DBT-GOI-43lacs, DST NANOMISSION74.64lacs, INUP-IIT Bombay (fully funded and sponsored), NCPRE-IIT Bombay (fully funded and sponsored), ERASMUS-MUNDUS-1800euros, Indo-French

Centre for the Promotion of Advanced Research (IFCPAR/CEFIPRA)-GOI-GOF-59.63lacs; GIAN-MHRD-5lacs, BIG-BIRAC workshop-sponsored. Besides this she has one India patent granted (Diafuel), 2 filed and about 41 publications, 2 cover page.

4. Dr. Sunil Kumar

Title of talk: Waste Management and Renewable Energy for Sustainable Environment

Dr. Sunil Kumar is a well-rounded researcher with more than 20 years of experience in leading, supervising and undertaking research in the broad field of environmental engineering and science with focus on Solid and Hazardous Waste Management. His primary area of expertise is solid waste management (MSW, E-waste, Biomedical Waste etc.) over a wide range of environmental topics including contaminated sites and wastewater treatment. He has contributed extensively to these fields and has h-index of 44 and i10-index of 168 (Google scholar) with total citation of 8825. His contributions since inception at CSIR-NEERI in 2000 include 300 refereed journal publications, 05 books and 40 book chapters, 10 edited volumes and numerous project reports to various governmental and private, local and International academic /research bodies. Dr. Kumar is an Editorial Board member of Bioresource Technology and Associate Editors of Env. Chemistry Letter, Int J of Env Sc. & Technology and ASCE J. of Haz, Toxic and Radioactive Waste. The list of the collaborations of Dr. Kumar is long and includes key Indian universities as IIT Kharagpur, IIT Delhi and IIT Mumbai and prestigious regional institutes, such as Asian Institute of Technology (AIT) and Kasetsart University in Bangkok, Hong Baptist University, as well as universities in US (Columbia, Texas A&M), University of Calgary, Canada and Europe (UN University Dresden, and University of Uppsala, Sweden). He has contributed immensely to the advancement of environmental engineering/ science fields in India in the region and internationally by acting as editor/ editorial member of numerous journals, Expert committee member for revision of Solid Waste Management Rules, NGT members for Solid Waste rules, organizing workshops/conferences and delivering invited speeches at both Indian and international Venues. Dr. Kumar has immense potential for strategic R&D at national and international levels. He is involved in devising an implementation plan of next-generation solutions that will satisfy diverse needs in order to enhance the potential for sustainable technology development. Dr. Kumar has achieved much recognition and awarded as Outstanding Scientist in 2011 and 2016 at CSIR-NEERI for his Scientific Excellence in the field of Research & Development in

Solid Waste Management. Dr. Kumar was also awarded with the most prestigious award Alexander von Humboldt-Stiftung Jean-Paul-Str.12 D-53173 Bonn, Germany as a Senior Researcher for developing a Global Network and Excellence for more advanced research and technology innovation.

5. Dr. Fauziah Marapani

Title of talk: Biocatalytic membrane reactors: Applications, Challenges and Perspectives towards Sustainable Environmental Protection

Dr. Fauziah Marpani is a registered Chartered Engineer from The Engineering Council UK and a Chartered Chemical Engineer from the Institution of Chemical Engineers (IChemE), UK. She is now a Senior Lecturer at the School of Chemical Engineering, College of Engineering, Universiti Teknologi MARA, Malaysia. She received a prestigious scholarship from the government of Malaysia to continue her Ph.D. degrees in chemical and biochemical engineering at the Technical University of Denmark and was awarded in 2018. Her experiences surrounding the topic of catalyzing carbon dioxide into useful chemicals with a cascade of enzymes working in reverse in a membrane bioreactor which include synchronous membrane filtration & product separation (reactive separation technology), various non-covalent enzyme immobilization techniques, complex enzyme kinetics and catalysis and enzyme & cofactor utilization and efficiency. She successfully obtained several research grants amounting to USD100K to date and currently leading a research group at the university. Dr Fauziah is expanding her research interest in biocatalytic membrane and enzyme technology for CO_2 reduction, micropollutants removal and clean water reclamation.

6. Dr. Mikhail Vainshtein

Title of talk: Oxidative additive for increasing microbial activities

Mikhail VAINSHTEIN (Leader), G.K. Skryabin Institute of Biochemistry and Physiology of Microorganisms Russian Academy of Sciences (IBPM RAS), Laboratory of physiology of microorganisms.

Prof. Dr. Mikhail Vainshtein began his carrier in water microbiology, IBWW RAS, then in biogeochemistry and as a head of bacterial section in All-Russian Collection of

Microorganisms (IBPM RAS). Currently he is deputy director in science and head of laboratory of physiology of microorganisms in the Skryabin Institute of Biochemistry and Physiology of Microorganisms (IBPM RAS, PSCBR RAS). His Ph.D. Thesis was on distribution of thionic bacteria in lakes, his Sc.D. thesis was on ecology of sulfate-reducing bacteria. His main field of interests is Environmental Biotechnology.

7. Prof. Dr. Luciane Maria Colla

Title of talk: Effluent valuation, biothanol and high added value products from microalgae.

Biography: Food Engineer, Ph.D. (2009) in Food Engineering and Science.

Main research topics in: cultivation of microalgae to obtain bioproducts and for environmental applications, especially in the production of third generation biofuels; submerged and solid state fermentation; production of bio surfactants and lipases and bioremediation of oily residues in soils. Professor at the University of Passo Fundo since 2002. Professor of Graduate Program in Civil and Environmental Engineering, and Graduate Programe in Food Science and Technology at UPF. H20 Index in November 2021. She is a CNPq Level 2 Research Fellow.

8. Dr. Yuwalee Unaprom

Title of talk: Agricultural waste biomass as a renewable bioenergy resource for bioethanol production

Yuwalee Unpaprom is an Assistant Professor at Program in Biotechnology, Faculty of Science, Maejo University, Chiang Mai, Thailand. She received her PhD (Horticulture) from National Chung Hsing University, Taiwan and her Graduate Diploma (Botany) from Kasetsart University, Bangkok, Thailand. She honoured “University First Rank”– M.Sc. Botany (Kasetsart University) and B.Sc. Plant Science (Maejo University). She was the sole recipient of the silver prize of KIWIE 2018, Korea for Fig Anti-Aging Serum; and received a Special Award for the Excellent Investigation by Taiwan Invention & Innovation Industry Association in Korea, 2018. Many antimicrobial topical treatments are used to treat acne and dandruff. The market for plant-based cosmetics is steadily growing. Thai fig fruits (*Ficus auriculata*) are filled with phytochemicals and latex. Latex acts as an anti-cancer substance without toxic effects on normal cells, high ellagic acid, and antioxidant concentrations of 4-5

times greater than other fruits. Serum mixes with fig extracts can be anti-aging skin products and can help skin appears brighter and smoother. According to these benefits in the cosmetics field, she received his Thai fig fruits anti-aging serum received Thai patent (Patent No: PI/PD/PP/301 (1803001047) by Patent Office, Department of Intellectual Property Ministry of Commerce, The Kingdom of Thailand)). She received the best research paper award, 2015 by Emergent Life Science Research journal and the National science day honor award (2015-2016), Maejo University, Thailand. She participated in 15 international training programs (Thailand, Taiwan, Japan, Korea, China, Macau and Myanmar).She has participated as a keynote and invited speaker 12 times in different international conferences. Her current research interest includes functional food, bioactive compound extraction, anti-aging serum, algae, biomass and biofuels. She has authored 2 ISBN books (in Thai), 5 book chapters and 140 research articles with h-index 21 and i10-index 39. ResearchGate score 29.14. Currently, she is working on Thai plants based cosmetic applications with 4 projects, especially skincare aspects.

9. Dr. Prashant Botham

Dr. Parshant Kumar is a life trainer, professional, innovator, and student. He has more than 15 years of proven experience in developing solutions in the different areas of Semiconductors, MEMS/BioMEMS, Brain-sensing and stimulation, Anti-tamper Hardware, Software, and Data management professional. He completed his MS – Physics -92 and Ph.D.- Microelectronics-99 from Panjab University Chandigarh while working at Central Scientific Instrument Organization, Chandigarh. Presently as a professional working at MACOM to develop solutions in Power electronics whereas, on the other front of learning, he is working on his III Degree black belt in Bagua Martial Art and teaching Medical Qigong. He is a senior member of IEEE and technical chair for New England IMAPS. He has three patents and 25 international publications.

10. Dr. Sunita Varjani

Title of talk: Prospects on Integrated Municipal Solid Waste Management for Energy Generation

Dr. Sunita Varjani is Scientific Officer at Gujarat Pollution Control Board, Gandhinagar,

Gujarat, India. Her major areas of research are Industrial and Environmental Biotechnology, Wastewater treatment & Process engineering, Bioprocess Technology and Waste Management. She has worked as visiting scientist at EPFL, Lausanne, Switzerland. Dr. Varjani has authored more than 330 publications, including research and review papers, books, book chapters and conference communications. She has been enlisted as Highly Cited Researcher (Top 2% in the World), Elsevier Citation Report (2021). She has won several awards, including Young Scientist Awards from Young Scientist Awards from The International Bioprocessing Association - An International Forum on Industrial Bioprocesses (2019-2020), Biotech Research Society, India (2018), Microbiologist's Society India (2018-19), Association of Microbiologists of India (2018), International Society for Energy, Environment and Sustainability (2018) and AFRO-ASIAN Congress on Microbes for Human and Environmental Health, New Delhi (2014); Highly Cited and Highly downloaded papers, *Bioresource Technology,* Elsevier*;* Top Reviewer Award - 2018, *Bioresource Technology*, Elsevier; Top Reviewer Award - 2017, *Bioresource Technology*, Elsevier and Best Paper Awards in national and international conferences in 2008, 2012, 2013, 2018, 2019 and 2021. She is associate editor for *Bioresource Technology, Bioengineered, Cleaner & Circular Bioeconomy (CLCB) and Sustainable Environment: An international journal of environmental health and sustainability journal(s).* She is member of editorial board *of Science of the Total Environment, Case studies in Chemical and Environmental Engineering, Journal of Energy and Environmental Sustainability, Journal of Environmental Science and Engineering, Biotech express* and has served as guest editor of special issues of *Bioresource Technology, Environmental Science and Pollution Research, ASCE- Journal of Environmental Engineering, Bioengineered, Industrial Crops and Products, Environmental Technology & Innovation* and *Journal of Experimental Biology*. She is Management Council Member of the BRSI and Executive Committee Member of International Society for Energy, Environment and Sustainability.

11. Dr. Sanjeev Kumar

Title of talk: Improved biogas from algal biomass through fungi mediated harvesting and pretreatment

Dr. Sanjeev Kumar Prajapti works as an Assistant Professor at Department of Hydro and Renewable Energy (HRED), IIT Roorkee, India. Dr. Sanjeev is among the leading expert in the area of algal biomass and biofuel production, in India. He has more than 10 years of

experience in the area of algal technologies including algal bioprocessing, biogas production, and commercial-scale biogas production. During his Ph.D., he worked on coupling algal biogas production with wastewater treatment. He has more than 40 research papers on various aspects of algal applications in wastewater treatment and biofuel production. At present, Dr. Sanjeev is handling 03 bioenergy-centric sponsored research projects and guiding 07 research scholars in his lab. For his outstanding research contribution, he has been awarded various prestigious awards including Excellence in Academic Research -IEI, India (2021), Distinction in Doctoral Research- IIT Delhi (2016), Early Career Research Award-SERB, Bioenergy-Awards for Cutting Edge Research (B_ACER)-DBT, and CSIR-Pool Scientist.

Keynote Speakers Abstracts

Biocommodity engineering: Roles of extremophilic deep biosphere microbes

Rajesh Sani*

Department of Chemical and Biological Engineering And Applied Biological Sciences

South Dakota School of Mines and Technology Rapid City, SD 57701

**Email: Rajesh.Sani@sdsmt.edu*

Abstract

This keynote talk will describe the limitations in exiting solid waste (e.g., lignocellulose) conversion technologies and possible ways to overcome those limitations using extremophiles and their enzymes. The influence of high temperatures on various existing solid waste conversion processes and those that are under development, including extremophilic consolidated bioprocess will be discussed. Integrated decentralized thermophilic biofuel production employing lignocellulolytic and fermentative thermophiles in a single step consolidated process will also be discussed. Roles of deep-biosphere extremophiles in generating fuels and value-added products from organic waste in space will also be presented. In addition, this talk will introduce the current status of BioGTL (Biogas to Liquid Fuel) technology in bioenergy sectors.

Keywords: Solid waste, Lignocellulose, Biofuel, Thermophiles, BioGTL

Caffeine removal by *Spirulina platensis*, effects on growth and biochemical composition

Samuel Teixeira Lopes[1], Gabrielle Nadal Biolchi[1], Alan Rempel[2] and Luciane Maria Colla[2]

[1] *Chemical Engineering Course, University of Passo Fundo (UPF), Passo Fundo, Rio Grande do Sul, Brazil.*

[2] *Postgraduate Program in Civil and Environmental Engineering, University of Passo Fundo (UPF), Passo Fundo, Rio Grande do Sul, Brazil.*

Abstract

Caffeine is an emerging contaminant (EC) that can have adverse effects on ecosystems. Caffeine is found in foods and medicines consumed daily, which makes this CE identified in wastewater treatment plants. Conventional treatments are ineffective for caffeine removal, and microalgae bioremediation has been an alternative treatment. The objective was to determine the removal efficiency of caffeine and its influence in microalgal growth and biochemical composition. *Spirulina platensis* was cultivated in Zarrouk 50% and caffeine concentrations ranging from 20 (C20) to 40 mg.L-1 (C40). A control experiment (C0) was carried out with the absence of caffeine. Cultivations were carried out in greenhouse under natural, temperature 20-30°C, in 10 L raceways stirred by pumps. Biomass and caffeine concentrations were determined every 1 and 5 days, respectively, by spectrophotometry. The final biomasses obtained were characterized by determinations of carbohydrates and proteins. The microalga was able to remove 25.64% and 13.33% of caffeine in C20 and C40, respectively. Furthermore, caffeine showed toxicity to microalgae at the beginning of cultivation, evidenced by the lower specific growth rate compared to C0. However, the final biomass concentration obtained in the experiments was not statistically different, demonstrating that *S. platensis* managed to adapt to caffeine. Protein content in C20 biomass was 41.25%, the highest among C0 (39.56%) and C40 (34.35%). Highest carbohydrates content was found in C40 biomass (21.32%), and the lowest in C20 (11.72%). *S. platensis* was able to remove caffeine, thereby is promising for ECs bioremediation. Protein indices are interesting in the synthesis of biofertilizers.

Keywords: Caffeine, Environment pollution, Sustainability, Bioremediation.

Chemical assisted treatment of water hyacinth and buffalo dung for biogas generation using laboratory-scale bioreactor

Burassakorn Tongmee[1], Rameshprabu Ramaraj[2], Yuwalee Unpaprom[3, *]

[1]*The Prince Royal's College, Chiang Mai 50000, Thailand*

[2]*School of Renewable Energy, Maejo University, Chiang Mai 50290, Thailand*

[3]*Program in Biotechnology, Faculty of Science, Maejo University, Chiang Mai 50290, Thailand*

**Corresponding author: yuwalee@mju.ac.th , yuwaleeun@gmail.com*

Abstract

Aquatic plants and cattle manure have both been found to emit methane, which has been linked to global warming. Therefore, the objective of this study was to measure methane production from the aquatic plant (water hyacinth) and livestock manure (buffalo dung).In this study, we evaluated the effect of chemical pretreatment on the rate of biogas production using water hyacinth mixed with buffalo dung as a biogas source. The time of alkaline pretreatment of water hyacinth was the primary focus of the experiment. pH was used to distinguish between the pretreated substrates. The chemical pretreatment of 48 hours with a 1:1 ratio of water hyacinth to buffalo dung resulted in the highest biogas production rate compared to the other treatments. With an equal ratio of water hyacinth and buffalo dung in the alkaline treatment of days, the most fantastic methane composition was measured at 65.91%, resulting in the highest methane composition. The chemical pretreatment boosts the rate of biogas production and the methane yield compared to when the water hyacinth is left to grow naturally. The proportion of water hyacinth to buffalo dung significantly impacts the rate of biogas production and the content of biogas produced from chemically processed substrates.

Keywords: Water hyacinth, Chemical pretreatment, Buffalo dung, Biogas production, Global warming

Improved biogas from algal biomass through fungi mediated harvesting and pretreatment

Sanjeev Kumar Prajapati*

Environment and Biofuel Research Lab (BREL) Hydro and Renewable Energy Dept.

Indian Institute of Technology (IIT) Roorkee, Uttarakhand, India

Abstract

In recent years, significant research attention has been drawn toward biogas production utilizing algal biomass. However, the process of algal biomass-based biogas production is not feasible due to hurdles related to the harvesting and pretreatment of algae. The present work was therefore focused on systematic and multifarious interventions for the pretreatment and harvesting of algal biomass. The work towards optimization of indigenously produced fungal crude enzymes showed great potential for low-cost algal pretreatment. This strategy coupled with co-digestion resulted in a significant enhancement in digestibility and methane yield was increased by > 63 %. In the parallel attempts, algal biomass harvesting, which is another major hurdle in algal biofuel commercialization, was dealt with. A novel approach involving the use of pellet-forming fungi was investigated for simultaneous harvesting and pretreatment of algal biomass. The fungi showed efficient harvesting (nearly 100 % in 6 h) and incubation of the harvested algal biomass with fungi under controlled conditions resulted in its pretreatment and the methane yield was eventually enhanced by >50 %. This approach can greatly simplify and offer efficient coupling between algal wastewater treatment and biogas production. Further, an interesting concept of the “Closed Loop Process” for algal wastewater treatment and bioenergy production utilizing Rural Sector Wastewater and Livestock waste has been validated. Feasibility analysis for a typical village (population ≈ 4000 adults) showed that the proposed process had renewable power generation potential up to 5413 kWh–1. It also could treat & gt; 0.5 MLD of RSW.

Keywords: Fungi, Algae, Biogas, Pretreatment, Bioharvesting, Anaerobic digestion.

Biocatalytic membrane reactors: Applications, Challenges and Perspectives towards Sustainable Environmental Protection

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Abstract

Biocatalytic membranes exhibit great potentials in production, processing, and treatment operations, attributed by its synergistic effect between enzyme catalysis and membrane separation. The trend towards sustainable environmental protection makes biocatalytic membrane reactors particularly attractive because they do not require additives, are able to function at moderate temperature and pressure, and reduce the formation of by-products. The catalytic action of enzymes is extremely efficient and selective compared with chemical catalysts; these enzymes demonstrate higher reaction rates, milder reaction conditions and greater stereospecificity. This seminar will summarize the research in biocatalytic membrane reactors from the perspective of membrane modification methods to make them favourable to enzyme microenvironment and the different techniques for enzyme immobilization on membranes. Finally, the limitations and challenges in the existing processes and the potential areas for further investigations are discussed. This seminar aims to provide a detailed overview of the synergies that are possible by combining membrane and enzyme technology.

Keywords: Biocatalytic membranes, Sustainable Environmental protection, Enzyme immobilization, Biocatalysis.

Oxidative additives for increasing microbial activity

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Abstract

The most common methods of environmental biotechnology are provided with aeration to fast effective processes of biooxidation / bioleaching. This enhancing microbial oxidation can be supported with additional ventilation, aeration or supplementing oxygen. The most known biotechnological sources of oxygen for microorganisms are: gaseous oxygen, electrolytic oxygen, hydrogen peroxide. We studied effects of persulfate additives on various microbial cultures and find that this compound also can replace hydrogen peroxide by its effects. Additives of sodium persulfate or ammonium persulfate to aerated culture medium provided additional oxygen sources and increased the medium redox potential. The optimal persulfate concentration depended on: 1) medium composition, 2) microbial growth phase, and 3) time of exposure. In our experiments, small persulfate supplementations in rich nutrient medium (0.3-0.5 g/L) resulted in a lasting redox increase for 150-200 mV and, accordingly, significantly increased biotechnological effects of oxidation.

Acknowledgement: From Russian side, the presented work was supported with grant No. 075-15-2021-968 provided by the Ministry of Science and Higher Education of the Russian Federation.

Keywords: Environmental biotechnology, Biooxidation, Bioleaching.

Sustainable utilization and management of food wastes of pineapple for bioethanol production

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Abstract

Waste disposal is one of the most real challenges that most food processing enterprises encounter. Fruit and vegetable processing, for example, generates a significant amount of industrial wastes, which are typically utilized as feed or fertilizer. Agricultural uses of these wastes are no longer considered viable. Green energy sources, such as bioethanol, are non-fossil fuel alternatives that improve air quality while lowering greenhouse gas, nitrogen oxide, and hydrocarbon emissions. Bioethanol has traditionally been manufactured through fermentation by yeast, using sugary raw materials. This study aimed to investigate the potential of thick pineapple juice as raw materials for bioethanol production as renewable and sustainable energy sources. This study investigated ethanol production from free sugar-containing juices obtained from pineapple juice, which is the most attractive choice because of their cost-effectiveness and feasibility. The batch fermentation process was employed in ethanol production from pineapple sugar juice. The most common microorganism (*Saccharomyces cerevisiae*) was used in this fermentation. The total sugar and reducing sugar were 47.67 and 40.63 g/L, respectively. After 48 hours fermentation period, the highest bioethanol yield (17.36 g/L) was achieved. Identifying the pineapple byproducts that produce juice will also help commercial ethanol production. Several technological breakthroughs have been studied, but the majority are still in the lab.

Keywords: Sustainable utilization, Food wastes management, Pineapple, Bioethanol production.

Abstracts

Use of supernatant from a microalgal culture in medium with pharmaceuticals mixture

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Abstract

Emerging pollutants (EPs) are substances detected in surface water, soils, and effluents. Bioremediation with microalgae is an alternative to complement the treatment of EPs as they are resistant to extreme environments. The remaining supernatant after separation is disposed of as an effluent but could be used in plant fertigation. The objective of this work was to evaluate the effect on microalgal growth in mixtures of pharmaceuticals and the phytotoxicity of effluents in plant bioindicators. The microalgae *Spirulina platensis* and *Scenedesmus obliquus* were exposed to mixtures of three pharmaceuticals: acetylsalicylic acid (ASA), paracetamol, and caffeine. Two assays were carried out with *Spirulina*, one with ASA and caffeine (ASA+C) and a Control. For *Scenedesmus*, the same assays were carried out with the addition of one composed with paracetamol, ASA, and caffeine (ASA+C+P). Cucumber and lettuce seeds were incubated with supernatant obtained at different times of cultivation. *Spirulina* did not show a statistical difference between the Control and ASA+C assays. The ASA+C+P assay showed a statistical difference with the *Scenedesmus* Control, while the ASA+C assay was statistically equal. The *Spirulina* supernatant inhibited lettuce seed germination and was phytotoxic to cucumber seeds, which presented GI lower than 15%. In the *Scenedesmus* effluent, both seeds germinated, with GI statistically equal between the assays. The results demonstrate the possibility of microalgae being used in the treatment of these drugs because they managed to develop in the toxic environment and as an alternative use, the supernatant obtained after microalgal cultivation can be used in seed fertigation.

Keywords: Emerging pollutants, *Spirulina, Scenedesmus*, Microalgae, Pharmaceuticals.

Implementation of tasar silkworm (*Antherea mylitta)* pupae for biodiesel production-a green approach

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Abstract

The overuse of fossil fuels has led to an exponential upsurge in its cost. This has pushed the scientific community to think about measures to bring down our dependence on fossil fuels and maximize the use of renewable and eco-friendly fuels from viable biomass. Biodiesels, has garnered a lot of attention and its one of the major sources is found in silk reeling industries. The sericulture industry generates huge quantities of dry waste from dead pupae as a major chunk and obligatory residues in the environment after taking the commercial by product as raw silk. The tasar silkworm *Antheraea mylitta Drury* is a commercial and a wild sericigenons insect. Tasar cocoons are reported to be the largest among all the silk producing insects in the world. The present study reports a method to utilize this waste by converting the lipid part of the waste pupae to biodiesel through transesterification. The physiochemical properties of *Antheraea mylitta* like saponification value, iodine number and viscosity were found to be 226.35mg/g, Iodine value 116.8 mg /g of sample and 34.3 mm2 /s respectively. The results were on par with the studies done in other varieties of silkworm pupae. The yield of oil from waste tasar pupae was 20.5% on an average on dry weight basis and the percent yield of biodiesel produced was found to be fairly high (78%). The experimental results concluded that waste tasar silkworm pupae can be well suitable resource in future to extract useful energy tanks for diesel vehicles by yielding a 78% successful completion from bio-oil to biodiesel. Since, tasar is a wild variety so obtaining such a yield is noteworthy. The results indicate that Fatty Acid methyl esters obtained by transesterification meets the requirements for a good quality biodiesel. The biodiesel yield may be improved further by changing the reaction condition or the catalyst concentration.

Keywords: *Antheraea mylitta,* Biodiesels, Fatty acid, Ethyl esters, Transesterification, Saponification.

Renewable energy resources development for energy security in India

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Abstract

India being second most populated country in the world may face critical energy shortage in coming years due to limited availability of non-renewable energy resources in the continent. Development of sustainable energy resources is indispensable for economic development, enhanced energy security, improved access to energy and to mitigate climate change. Strong government support, policies, programmes, and a liberal environment is needed to increase renewable energy resources of the country. Hydropower, bio-energy, geo-thermal energy, wind energy, solar energy, ocean energy are potential renewable energy sources for sustainable energy development of the country. Renewable energy resources development must carry out though future energy demand analysis, selection of location based most viable renewable energy technologies. Renewable energy sources could become the major energy supply option in low-carbon energy economies. Disruptive alterations in all energy systems are necessary for tapping widely available renewable Energy sources. Creation of global opportunity through international cooperation that supports least developed and developing countries towards the accessibility of renewable energy, energy efficiency, clean energy technology and research and energy infrastructure investment will reduce the cost of renewable energy, eliminate barriers to energy efficiency (high discount rate) and promote new potentials towards climate change mitigation. Efforts that aim at increasing the share of renewable energy and clean fossil fuel technologies into global energy portfolio will help reduce climate change and its impacts.

Keywords: Renewable energy, Sustainability, Solar energy, Fossil fuels.

Apple pomace: A potential source of energy and its management

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Abstract

India has around 500 apple processing industries which are responsible for production of variety of juices and 1.3 million tons of apple pomace annually. A rapid increase in the production of juices and ciders has generated a large amount of apple pomace and now its disposal is a huge problem. More than 12 million tons of apple pomace are produced in India from which only 10,000 tones is utilized. That's why its utilization becomes a necessity. Moreover, apple is directly related to rural economy of states like Himachal Pradesh, Jammu & Kashmir and N. eastern states. HPMC (Himachal Pradesh Horticulture Produce Marketing and Processing Corporation) which is one of the major apple juice producing industries in India generates thousand tons of apple pomace, which remains duped outside its industries. Due to its high moisture content it results in its rapid destruction thereby causing nuisance. Apple pomace is about 25% of its original mass and is a rich source of pectin, carbohydrates, crude fiber. It also contains small fractions of minerals, proteins and vitamins. Therefore, it is often utilized as animal feed or as fertilizer. The production of apple pomace as a by-product offers a wide range of alternative substrates. Generally, it is used as animal feedstock or thrown away but several attempts has shown its big potential in renewable energy i.e. in production of bio ethanol (by solid state fermentation), biogas (by process of anaerobic digestion) and other value added by- products such as organic acids (by solid state fermentation), biopolymers (by submerged and solid state fermentation), hetero polysachharides, aroma compounds etc. Researchers have shown successful production of bioethanol with fermentation efficiency of 89%. The potential of 80% of apple pomace into biogas has been experimentally carried out by researchers with viable economic cycle. Biopolymer such as fungal chitosan can also be produced from apple pomace. It is widely used in tissue engineering, medical devices, pharmaceutical industries etc. All these techniques further helps to promote a more systematic and non- expendable conduction of this under- utilized and overgrowing waste. The present study is aimed at estimating methane

emission so as to gain an insight into energy recovery. The main objective is critical assessment of methane estimation from apple pomace, effects on energy and finding out global warming potential, to observe the trends on utilization of apple pomace, current limitations and recommendations for future research. The motive of this study is to enhance waste reuse and improvement in order to promote renewable source of energy and zero waste initiative. All of which will finally contribute to integrated apple pomace waste management and food economy.

Keywords: Renewable energy, Bio fuels, Bio products, Biomass.

Microalgae: On the way to biological carbon capture with simultaneous production of bioelectricity

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Abstract

The impending climate change has become a matter of environmental concern. Increasing concentration of CO_2 has fueled interest in generating ways to reduce the alarming environmental concern. Although many physical and chemical carbon capture and storage methods have been worked upon, still their economy and environmental safety is a big concern. Therefore, microalgae have emerged as a potential candidate for the bio-sequestration of CO_2. Micro-algal cell factories via photosynthesis arrest CO_2 into biomass which is further used for the production of bioenergy and other valuable products. Further, to make the process economically feasible integrated biorefinery approach is being utilized in which each valuable component can be extracted and used further. Recently, enzymatic conversion (carbonic anhydrase) of CO_2 and its utilization for improved microbial biomass for the production of valuable products are being of keen interest. Simultaneous production of bioelectricity and value-added pigments using photosynthetic algal microbial fuel cell is a promising approach as the process utilizes cost-free solar radiation and microalgae which has numerous industrial applications. Further, to enhance the aforementioned enzymatic conversion, various nanostructured immobilization materials are being used for stabilizing enzyme activity. Lastly, selection of algal strain and system design is of great importance for maximizing the CO_2 reduction. The techniques used should be cheap, efficient and well-defined for large scale bio-sequestration. Therefore, it can be concluded that technical expertise is required in developing large scale bio-sequestration technology.

Keywords: CO_2 bio-sequestration, Bioelectricity, Integrated biorefinery, Carbonic anhydrase, Immobilization, Nanostructure.

Biofuel from Microalgae for a sustainable environment

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Abstract

It is necessary to achieve targets for biodiesel production from Algae for the climate change mitigation and economic growth. According to life cycle analysis, microalgae based biofuel is identified as one of the major renewable energy sources for sustainable development, with potential to replace the fossil-based fuels. In this content produced from microalgae, offer greatest opportunities in the society. This paper explains the current status of microalgae use for biofuel production and the cultivation, harvesting and processing of algae. Although, the present state of technology processes does not economically support sustainable for a large-scale production Yet Microalgae-based biofuels have the potential to reduce the pollution. This paper examines the various production, process and parameters via statistical methods, across microalgae production stages. The main benefit of such analysis is the identification of the key contributing factors, useful to improve system design, operation and process economics. The effects of Nutrient supplement, effect of nitrogen concentration and effect of addition of carbon source (Glucose and Glycerol) on the growth rate was studied in this paper. The life cycle assessment methodology allows for a sustainable evaluation of the production of microalgae biomass to biodiesel.

Keywords: Lipids; Biofuels, Sustainable, Biomass, Microalgae.

Polyphenol mediated synthesis of gold nanoparticles for improving enzymatic activity of alpha-amylase

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Abstract

Enzymatic catalysis is beneficial in a variety of industrial and manufacturing processes because of its efficiency and selectivity. Recent studies have demonstrated that incorporating nanoparticles into enzyme carrier systems can improve the activity of immobilised enzymes. Based on same hypothesis current study was aimed for the synthesis of gold nanoparticle using polyphenol (ferulic acid) as reducing as well as stabilizing agent. The synthesized gold nanoparticles were characterized through UV-vis spectrometry, and transmission electron microscopy (TEM). UV-vis analysis revealed that synthesized gold nanoparticles exhibited a single absorption maximum at 544 nm. TEM studies highlighted that synthesized gold nanoparticles were spherical in morphology with approximately 10 nm in size. The conjugation of alpha-amylase with gold nanoparticles was found to enhance enzymatic activity of alpha-amylase by 26% as compared to equivalent concentration of alpha-amylase (control).Literature studies shows that the size and surface chemistry of nanoparticles, as well as the orientation and density of mounted enzymes, all contribute to improved enzyme–nanoparticle conjugate performance[1], [2]. However, current study requires more work to find out functional groups on nanoparticle surface, stability of enzyme-conjugate system at various pH, and temperature conditions, and reusability of nanoparticle-conjugate system.

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Microbial Biodegradation of Low-Density Polyethylene (LDPE)

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Abstract

In the present Scenario, overexploitation of polyethylene accentuates the necessity of environment friendly disposal policies formulated for the biodegradation of synthetic plastics, considering the hazardous impact of widely used packaging material like Low Density Polyethylene on the environment. Plastic (polyethylene) pollution is one of the major causes of deterioration of a healthy environment as it has been considered as nonbiodegradable for decades. Various conventional methods of polyethylene degradation include UV photooxidation, thermal oxidation, incineration, chemical oxidation and landfill are being practiced. But still, these methods are less feasible, costlier and not an impactful solution for this global issue. Therefore, an alternative solution for this issue is biodegradation. Microbes such as bacteria, fungi and algae are being utilized in polyethylene degradation in its natural habitat. These microorganisms ingest these materials as the sole carbon and energy source. Biodegradation of plastic waste has more advantages than other conventional methods of plastic waste disposal as it is an economically cheaper process and more efficient in degrading LDPE. The main objective is to enhance the efficacy rate of plastic degradation in an eco-friendly way.

Keywords: Low density polyethylene, Biodegradation, Incineration.

Enzymatic remediation of environmental waste

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Abstract

Accumulation of phenols and its derivatives leads to serious environmental and health problems which must be eradicated and controlled. Different industries like paper, chemical, textile, mining, coal and petroleum industries, etc. produce wastewaters that contain phenols and substituted phenolic contaminants. These contaminants impose several risks on human health and are speculated to represent carcinogenic, mutagenic, and teratogenic properties. Remediation of contaminants in the ecosystem by utilization of enzymes is an eco-friendly, quick, easy, and acceptable strategy. Various enzymes like tyrosinase, oxygenase, peroxidase, etc are potent to perform bioremediation. The application of tyrosinase enzyme for the removal of phenol and its derivatives is proven to be an effective method. The tyrosinase enzyme can oxidize phenols into insoluble substances which can be further eliminated. Furthermore, tyrosinase can also be employed for developing biosensors and detecting phenolic contents in the sample. Whereas oxygenases are the major enzymes involved in the bioremediation of aromatic materials due to their region selectivity and stereoselectivity on a wide range of substrates. This enzyme helps in denitrification, hydroxylation and dehalogenation of phenolic compounds.

Keywords: Bioremediation, Tyrosinase, Biosensors, Oxygenases.

Sustainable management of biomass for energy generation

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Abstract

In the recent scientific world biomass is the most prominent alternative to fossil fuel; it isused to make bioenergy and biofuel. 9.7% of total energy generation is contributed biomass which is even larger then hydropower (2.5%), solar (1%), wind (3.4%), nuclear (4.9%). Energy produced from biomass is renewable form of energy that reduces GHG's emission. The biomass in order to be used for energy production has to undergo management system called waste biomass supply chain that includes collection of biomass and pretreatment, storage, transport, and energy conversion. According to estimate India produces 500 million turns of agriculture waste but this is usually burnt to clear land, if this waste managed can produce power off 18000MW per year. According to house hold food waste estimate, 68 million tons of waste is produced every year, some amount of it it is used to make compost while other is simply left for degradation, if carefully managed it can produce 2448MW of power per year. Hence the management of biomass is essential to reduce our dependence on fossil fuels and save our future from innumerable risks underlying fossil fuels.

Keywords: Biomass, Energy, Biofuel, Power, Food waste.

Plant Extracts as potential natural antimicrobials

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Abstract

The emergence and spread of antibiotic resistance, as well as the evaluation of new strains of disease causing agents, are of great concern to the global health community. Effective treatment of a disease entails the development of new pharmaceuticals or some potential source of novel drugs. Commonly used medicinal plants of our community could be an excellent source of drugs to fight off this problem. Herein we observed that extracts of *Aloevera* leaves, *Guava* fruit, *Black night shade* fruit, and *Drumstick bark* showed antifungal properties as well as antimicrobial activities against Gram-positive and Gram-negative bacteria. Further screening and evaluation is warranted and these properties could be exploited in developing natural antimicrobials, which could be safe and less toxic to the patient as well as environment.

Keywords: Antimicrobials, Antibiotic resistance, Antifungal agents, Environment.

Future of packaging industry: Biopolymers

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Abstract

The world is moving towards globalization exponentially because of which sustaining the environment has become a necessity. However, the non-biodegradable materials used in the packaging eventually contribute to the pollution index as it can survive without degrading for thousands of years. Enzyme designing technologies are used to break down the plastic polymers but are insufficient as the rate of production of these materials is far greater than the development and practice of enzyme technology. The degradation of plastic by artificial ways releases many unwanted toxic by-products, which prove to be harmful to nature and life. Therefore, biopolymers (PLA, PHA, etc.) are being used for their competitive properties to replace the use of PET (polyethylene terephthalate). Nano-particle infused biopolymers serve as an alternative approach towards decreasing and eliminating the use of non-biodegradable plastics used in packaging industries. In addition, nanocomposites technology is another approach being used to make packaged food better and provide additional benefits contributing to the consumption of costumer by infusing them with antimicrobial, antibiotic, and probiotic-like properties. Biopolymers with their merits also have some demerits of premature degradation and high-temperature instability. However, new advancement in the sectors is developing to ensure that these problems may not interfere with their benefits.

Keywords: Biopolymers, PLA, PHA, Environment, Biodegradation.

Pine needles and agricultural wastes: A sustainable alternate for pulp or paper

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Abstract

Today world is searching for renewable sources of energy. It's searching alternatives to plastic, cutting of trees, to cut down pollution, elimination agriculture waste, combating climate change etc. One of the best alternatives to these problems can be pine needles and agricultural wastes. Pine needles considered as brown gold collected from *Pinus longifolia* trees composed of 43% lignin, 52% holocellulose and 5.7% extractive contents. Whereas agricultural residues generated from cultivation of crops include crop leaves, stalks, seeds, fruits etc. This study is aimed at providing a low-cost and sustainable alternative to wood pulp primarily for developing paper sheets for making articles like packing bags, paper table mats etc. The experiment was conducted initially by collecting dried pine needles and converting them into pulp and further different concentrations of waste paper (10% to 40%) and agricultural residues (10 to 40%) was experimented with different concentrations (10% to 50%) of grinded pine needles added into the pulp for making durable paper sheet. The best result in order to develop durable paper sheets has been achieved in paper having concentration of 50% pine needles with 20 % waste paper and 30% agriculture residues. This study provides a way to eliminate the grave danger of forest fires, increase in local economy, elimination of agriculture waste, recycling of waste paper and a lot of other environmental problems by utilizing these dried pine needles as a potential alternative, moreover, this study is in terms with the United Nations SDGs 11 (sustainable communities and cities), 13 (climate action). Furthermore, its focus on Atama Nirbhar Bharat and self-reliant Himachal Pradesh.

Keywords: Agricultural wastes, Renewable energy, Environment, Pine needles.

Immobilization Strategies for Carbonic Anhydrase

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Abstract

Carbonic anhydrase is a metalloenzyme with zinc ion in its active core. The interconversion of CO_2 and bicarbonate is catalysed by carbonic anhydrase, a fundamental physiological process with fast kinetics. However, the extreme conditions of the industries push the enzyme towards the tendency of destabilization which can reduce its use or life span for industrial use. Immobilization is one of the most innovative, efficient, and cost-effective solutions for addressing the industry's considerable cost impact at every stage of the process. The enzyme immobilization technology helps in enhancing the stability, catalytic properties of enzymes and also shortening the downstream processing of the product Electrospun nanofibers, magnetic nanoparticles, MOF composites, polyvinylidene fluoride membranes, and other support materials may be available for the immobilisation of the CA. Adsorption, covalent bonding, encapsulation, entrapment, and cross-linking are some of the techniques used for immobilization. Some of the immobilization strategies for carbonic anhydrase include carbonic anhydrase nanoflowers, Carbonic anhydrase cross-linked enzyme aggregates, Carbonic anhydrase immobilization through Enzyme Precipitate Coating, carbonic anhydrase complexes, etc.CA may be coupled with a variety of insoluble supports to generate water-insoluble immobilised CA. Immobilization of carbonic anhydrase has the advantage of greatly improving its properties such as activity resumption, catalytic performance, thermal stability, durability, and denaturant tolerance. In addition, immobilised CA can be employed in the production of biomimetic materials involving cascade reactions.

Keywords: Enzymes, Immobilization, Biodegradability, Carbonic anhydrase, Support material.

Nano-biotechnology for sustainable energy

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Abstract

Bioenergy and Biofuels reserves are an essential part of our life, with time they are rapidly being consumed and are on the verge of extinction. To overcome these challenges and to regulate the use of these biofuels, alternatives need to be developed. Nanotechnology has the potential to withstand these challenges. By the use of cost-effective and less time-consuming reactions, mass production of biofuels can be done. Lignocellulose or *Microalgae can be used for bioenergy production and Nano-additives or* MFC for biofuel productions. Nanotechnology has suitable properties for energy and fuel production and can provide a suitable environment too. Nano bio-catalysts play an important role in biofuel production. By use of catalysts like Prefluoro alkyl sulfonic (PFS) and alkyl sulfonic (As) acid-functionalized magnetic nanoparticles Biofuel production can be enhanced and thus help in the Improvement of biomass pre-treatment and hemicellulose hydrolysis

Keywords: Bioenergy, Biofuels, Sustainable energy, Nanoparticles, Biofuel.

Glucose metabolism in Hepatocellular carcinoma

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Abstract

HCC is the most common liver cancer and 4th leading cause of the death caused by cancer. To meet their demand for survival cancer cells uses reprogrammed glucose metabolism. In the recent years, glucose metabolism in cancer has become an attraction site for cancer biologists. The following oncogenes and tumor suppressor genes could be targeted viz. HIF 1[HK2, GLUT1, GAPDH, PKM and LDHA], Myc [GLUT1, HK2, PFK1, LDHA and MCT4] and tumor suppressor gene p53 [GLUT1, HK2 and PFK1].

Keywords - HCC, Glucose metabolism, Cancer therapy, HIF1, Myc, p53.

Solar power plant project

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Abstract

It is a pollution less project. Now these plants are very popular. Solar power is harnessed using Solar Photovoltaic (PV) technology that converts sunlight (Solar radiation) into electricity by using semiconductors. When the sun hits the semiconductor within the PV cell, electrons are freed and bus bars collect the running electrons which results in electric current. Use: in simple home and factory

Keywords: pn junction diode, Glasses, Coating, Solar heat.

Waste Not, Want Not: Use a microbial fuel cell to create electricity from waste

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Abstract

"Gross! What is *that* in the toilet?" But maybe it's not just gross. Did you know there are bacteria that digest organic waste and create electrons? What if there was a way to collect those electrons to power a circuit? In this science fair project, you will make a microbial fuel cell to collect the electrons that the bacteria—anaerobic bacteria—create...only, you'll be using mud, which is much safer to handle than wastewater. If you would like to learn how to reuse and recycle an unlikely substance, this is the science fair project for you!

Keywords: Benthic mud samples, Assembling and testing the fuel cell, Electrode, Salt bridge.

Utilization of market waste material with cow dung manure to produce biogas by using different types of biogas plant as per habitat

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Abstract

As we are seeing, in cities, pollution is spreading very much. Due to which people are facing lot of problems. We go to the markets and see, vegetables are rotting all around, due to which many harmful gases are released into the environment. For example, Carbon dioxide ($C0_2$), Ammonia (NH_3), Sulphur dioxide (SO_2). We can reduce these emissions by using different types of biogas. In this paper we study about different types of biogas system with a focus on environment and energy. The main aim of this paper is to increase the knowledge about biogas system in the world.

Keywords: Cow manure, Rotting vegetables, Biogas.

Vitamin D2 and its importance

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Abstract

Vitamin D deficiency remains a global public health issue. The major function of vitamin D in vertebrates is maintenance of calcium homeostasis, but vitamin D insufficiency has also been linked to an increased risk of hypertension, autoimmune diseases, diabetes, and cancer. Natural sources of vitamin D (dietary and UVB exposure) are limited, and thus mechanisms are needed to allow individuals to achieve the new dietary recommendations. The two forms of vitamin D are ergocalciferol (vitamin D_2) synthesized by exposure of ergosterol in fungi to UVB radiation and cholecalciferol (vitamin D_3) synthesized in the skin of human by UVB radiation. However, the efficacy of vitamin D2 is less as compared to Vitamin D3. As Vitamin D3 is derived from animal based sources, vegans and vegetarians may not prefer animal sourced supplements. For this reason, D2 derived from fungi and other non animal based sources is a good choice and investigations to increase the efficacy of Vitamin D2 would be interesting.

Keywords: Vitamin D, Hypertension, UVB radiation, Human environment.

Solar card will be used to generate electricity

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Abstract

Renewable energy plays an important role in reducing the CO_2-emission as it will decrease the load on coal thermal power plant. So basically our idea will work on small solar panel which can easily fit on plastic playing cards and we know how plastic is destroying our environment so our idea will work on two basic problems firstly on energy source and second the environmental problem. so firstly we will collect the waste plastic cards or playing card or we may convert PET plastic into the flat surface then we will paste the small solar panel to each cards then these cards or panel will connect to each other in series and connect to get the electricity .basically we will fix these cards on the wall of houses so that the sunlight that are falling on the wall house can also be used to generate electricity. These cards are of various color so it make the wall more attractive and impressive. one of the best this about this is that in the night the wall of house will also glow because of LED that have been fixed on the wall for pattern . This idea can also increase the security of the area where generally street light are not available

Keywords: Small Solar panels (6V), Playing plastic card, LED lights.

A New Frontier in Technology: Nanobiotechnology

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Abstract

Studies in the field of Nanoscience play a vital role in shaping the future of science. Its novelty lies in its capability to manipulate the chemical properties of substances at the molecular level. Nanobiotechnology is an interdisciplinary field that applies the techniques of biotechnology and nanotechnology to ease the many avenues of life sciences. This technology possesses the potential to remove the boundaries between physics, chemistry, and biology to some extent. Its applications lie in drug delivery systems, biosensors, cosmetics, food industries, agricultural production, diagnostic and more. However, nanobiotechnology has drawbacks, for example as potential hazards to the environment and human health. For eliminating the potential risk, nanoparticles are made using modern techniques of green synthesis. The prospects of nanobiotechnology are potentially huge. For example, nanomedicines will play a crucial role in the treatment of human diseases in the future. Furthermore, it is predicted that nanobiotechnology will play a significant role to enhance human physiology. As nanobiotechnology is still in its early stages, it has a lot in store for future generations. If things run smoothly, we can expect nanotechnology, as a whole, to bring the almost incomprehensible idea of a miniature device closer to reality.

Keywords: Nanobiotechnology, Nanoscience, Drug delivery, Biosensors, Cosmetics, Food industries, Agriculture.

Hydration of CO_2 using Carbonic Anhydrase and utilization by microalgae

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Abstract

The rising concentration of atmospheric carbon dioxide appears to be the primary source of global warming, leading to disastrous effects for the ecosystem and climate and is thus a significant concern today. Therefore, reducing the CO_2 levels and switching to renewable fuels and valuable compounds might be a viable option to mitigate the greenhouse gas emissions. The biological conversions of CO_2 into an intermediate state is one of the methods. Carbonic anhydrase is metalloenzyme that can convert CO_2 into beneficial intermediate such as bicarbonate ions. CO_2 gas is known to dissolve in water and produce carbonic acid in presence of carbonic anhydrase, that subsequently dissociates to generate bicarbonate ions by releasing H+ ions into solution. Microalgae are far more productive and efficient than other terrestrial plants for converting CO_2 into organic molecules. The other benefits of this biological system can be ascribed to autotrophic growth of the microalgae during which they assimilate CO_2, thereby generating biomass which can be utilized for several purposes, together with bioenergy purposes. Other uses of improved microalgal growth have aided the expansion of industries such as medicines, cosmetics, nutraceuticals, and microalgae bio-refinery. In a nutshell, combining CO_2 hydration with microalgae for applications like biofuel generation and wastewater treatment might be a highly promising alternative to present CO_2 mitigation efforts.

Keywords: Carbonic anhydrase; Hydration; Microalgae; Biological conversions; Microalgal refinery.

Environmental pollution and wind energy, for sustainable development

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Abstract

Development of any nation depends upon the exploitation of natural resources for manufacturing, construction and transportation and building up revenue. Socio-economic development of human is leading to advancement in industrial processes, urbanisation, and mechanisation. These advancement and mismanagement of non-renewable sources is leading towards global warming as a consequence of release of pollutants in air, water, soil, and oceans. Government agencies, NGO's, economists and environmentalists are looking for the divergence from utilizing non-renewable sources towards use of renewable sources. The aim of present study is to achieve the sustainable development by utilizing renewable energy sources for minimising causes of pollution and generation of energy for economic development. Wind energy is one of the fastest growing source of efficient, reliable and clean energy worldwide. While looking at environmental, economic, and social viewpoint wind energy is very cost effective. The present study is concerned to reduce the carbon footprint associated with small scale wind turbines and enhance their sustainability.

Keywords: Pollution, Development, Renewable energy sources, Sustainability.

Optimization of cultural conditions for the esterase production from bacterial isolate EST4

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Abstract

Esterase plays a significant role in bioremediation processes of recalcitrant compounds and pesticides containing ester carbamates and organophosphate. Toxicity of these chemicals are very well reported in animals and humans. The given study was based on uncovering the cultural conditions to achieve maximum esterase production from bacterial isolate EST-4. We found that, esterase produced in medium containing peptone 10.0 g/l, NaCl 2.5 g/l beef extract 10.0 g/l, yeast extract 10.0 g/l, gum acacia 5.0 g/l) and cottonseed oil (1.0%, v/v) showed considerable activity compared to rest of media under investigation. Further optimization of various production parameters, one at a time resulted in maximum production of eastease with, inoculum age of 24 hr, inoculum size 1% (v/v), temperature 40ºC, pH 8.0, cotton seed oil (5.0%, v/v), peptone (2.0%, w/v) and maltose (1.0%, w/v). Enzyme production was enhanced by 1.96-fold after optimization of production parameters.

Keywords: Esterase, Bacterial isolate, EST4, Enzyme production.

Manufacturing of Tiles and Paints using cow manure as an ecofriendly and sustainable product

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Abstract

Dumping waste, as well as inefficient waste management in various areas of manufacturing, has led to a high level of air pollution, as well as water and soil. This is not only environmentally dangerous but produces a significant economic burden. On spite of this, appropriate recycling of waste can convert it to a usable and useful resource that saves materials, prevents climate degradation, and promotes sustainable change. Cow manure and other old ceramic materials are reused as an additive or as a substitute in the production of tiles. Cow manure has given a decent amount of attention in the recent times due to the various applications in the society. In this paper research focuses on cow manure to garage tile conversion to provide an alternative process in the creation of tiles using old tiles ceramics. During Production mixing, grinding, milling of old materials and molding cow manure as well as the compressive strength of the produced tiles were considered and passed under the set standard. The evaluation results based on functionality, reliability, usability, efficiency and maintainability of the tiles using cow manure was 3.20 which signify a neutral acceptance of the respondents. In this paper we have observed that using cow manure with additives in paints reduces the cast by Rs. 20 per kg and it is also helpful to reduce radiations up to 20C, which are quite helpful to reduce electricity as maintaining the temperature during all seasons. This cow manure based insulating coating can be easily prepared at home or at local level due to their ease of availability. It is also cheaper than the conventional paint. With a holistic view regarding the holistic system and technology, the final product of tiles and paints using cow manure produced be durable and possess the qualities needed to serve the purpose for which it has been produced. As a concern of mutual fulfilling we are focusing on sustainable material rather than chemical substance. The materials used for preparing the paint are environment friendly, benign and sustainable.

Key Words: Cow manure, Tiles, Paint, Economic, Ecofriendly.

Potential of biomass for the production of biofuel

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Abstract

Recently, in order to achieve future economic prosperity and energy security, it has become important to achieve sustainability in renewable energy systems; so many efforts have been made to assess their sustainability. It is important to also consider social and environmental aspects along with economic and technological factors. As a renewable alternative source of energy, biomass has gained a lot of attention. Without compromising the production of food, biofuels can be derived from biomass such as bioenergy crops and crop residues. An increase in population has resulted in an increased demand for fuels. It leads to an increase in fuels prices. It is possible to reduce biodiesel expenditures by utilizing low-cost feedstocks like rendered animal fats in the production of biodiesel. Poultry feathers are one of the low-cost feedstocks that can be used for the production of biodiesel. It is stated that every year poultry industry generates an enormous amount of feather meal, researchers can yield 593 million gallons of biodiesel worldwide and 153 million gallons in the U.S. annually. In this review, we discuss the importance of biomass for energy generation mainly feathers (chicken), their advantages in the production of biofuels, and different techniques for the production of biofuels. The biofuel generated from waste chicken fat can be used as a replacement for vegetable oil because of its abundant nature, low-cost, and other properties. Moreover, further research is required for the advancement of cycles of catalyst reusability, purity of biodiesel, and cost-effectiveness of the production of biodiesel.

Keywords: Biomass, Feather, Biofuels, Sustainability, Renewable source.

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