MEGHAZ MEETINGS
...enrich your knowledge

IESRSE2023

International Experts Summit on

Renewable and Sustainable Energy

OCTOBER 04, 2023

Contact Us
Hyderabad, Telangana-500083
INDIA
Phone: +91-8886220590
Email: contact@meghazmeetings.com

About IESRSE 2023

We are pleased to invite all researchers, young scholars, delegates, experts and students from all over the world to attend the International Experts Summit on Renewable and Sustainable Energy (IESRSE2023) will be held in Dubai, UAE during October 04-06, 2023.

IESRSE2023 provides a platform of international standards where you can discuss and share knowledge on Renewable and Sustainable Energy to bring a unique forum for exchanging the information regarding the latest developments, finding solutions and enriching the knowledge. In addition to Presentations, Workshops, and Discussions, the conference also offers a unique venue for renewing professional relationships, and providing plenty of networking opportunities during the summit.

We're looking forward to Meghaz meetings with researchers from different countries around the globe for sharing innovative and great results in Renewable and Sustainable Energy.

Committees

Luisa Maria Arvide Cambra	*University of Almeria, Spain*
Jose Luis Barroso Aguiar	*University of Minho, Portugal*
Giuseppe Pulighe	*CREA-PB, Italy*
Rami Ahmad El-Nabulsi	*Chiang Mai University, Thailand*
Abdeltif Amrane	*Université de Rennes 1, France*
Żywiołek Justyna	*Częstochowa University of Technology, Poland*
Uqbah Iqbal	*Universiti of Kebangsaan, Malaysia*
Omid Akbarzadeh Pivehzhani	*University of Malaya, Malaysia*
Mohammad Arif Kamal	*Aligarh Muslim University, India*
Ramesh C Gupta	*Radha Govind University, India*
Subrata Mukhopadhyay	*Netaji Subhas University of Technology, India*
Rajesh Pindoriya	*Thapar Institute of Engineering & Technology, India*
Osman Adiguzel	*Firat University, Turkey*
Bachir Raho	*Mascara university, Algeria*
Hadi Erfani	*Islamic Azad University, Iran*
Ahmed Daabo	*University of Mosul, Iraq*
Fatemeh Boshagh	*Amirkabir University of Technology, Tehran*

Abstracts Plenary

Development Of Functionalized Construction Materials Using Nano-Engineering Approach

Denvid Lau[1],*
[1]*Department of Architecture and Civil Engineering, City University of Hong Kong, Hong Kong, China*

Abstract
In recent years, research articles involving molecular dynamics simulations of construction materials have grown significantly in number. The growth reflects an emerging need to understand microscopic physical and chemical processes, which are fundamental to further improve the macroscopic performance of construction materials. Nano-engineering, as a concept about manipulating material structures for creating new materials or modifying existing materials, highly depends on the understanding of materials at the nanoscale, where molecular dynamics simulation becomes an effective and powerful investigation tool. In this seminar, the applications of molecular dynamics simulations in understanding the fundamental deformation mechanism of various construction materials including concrete and cementitious composites, fiber-reinforced polymers and related bonded systems upon nano-engineering approach will be presented. In addition, the study on nature materials towards their structural morphology and functions at the atomistic level will be illustrated so as to inspire the future development of functionalized construction materials.

Keywords
Bottom-Up Approach; Functionalized Construction Materials; Molecular Dynamics Simulations; Nano-Engineering

Biography
Denvid obtained his Ph.D. in the field of structures and materials from MIT in 2012. He has become an associate professor with tenure at CityU since 2018. From January to July 2020, he was a visiting professor at MIT CEE. His research focuses on functionalized construction materials, multiscale modeling of organic-inorganic system, moisture-induced debonding, durability of concrete-epoxy system and fiber-reinforced polymer (FRP) composites in structural rehabilitation. He is currently the editorial board member of several international journals. He has published more than 160 referred journal and conference articles and has delivered more than 40 invited talks, which include plenary and keynote speeches in international conferences. Since 2018, Denvid has been nominated and selected as a Founding Member of the Hong Kong Young Academy of Sciences. He has received one of The President's Awards from CityU, in recognition of his remarkable academic achievement.

Solar Deployments within the EU Agenda in Albanian

Atty. Lorenc Gordani, PhD
Professor of Business and Public Law, Head of the Department of Professional Masters in the Faculty of Law at the Tirana Business University (TBU), Albania

Abstract
Since 2006, Albania has undertaken a series of mandatory reforms, among others, to implement the relevant EU legislation on Renewable Energy Sources (RES), Energy Efficiency (EE), electricity power, etc. In addition, the EU accession process has created financial opportunities and a strong imperative for the Albanian government to accelerate the green transition further.

The Green Agenda for the Western Balkans provides a roadmap for Albania's transition in line with the European Green Deal. The Economic and Investment Plan for the Western Balkans 2021-2027 offers a substantial package for supporting flagship investment. Among these more practical interests presents the plans that identify key investment objectives, including Objective 6, which aims to expand the "wave of EU renewal on the renovation of blocks of buildings, the installation of solar panels, etc., in the Western Balkans.

Advances in solar photovoltaic applications in Albania demonstrate the viability of solar energy production. However, families are finding it difficult to take advantage of this novelty. The study applies to legal framework analysis to identify barriers and opportunities for a comprehensive legal infrastructure to enable the Self-producers of renewable energy and the Renewable Energy Communities in Albania.

Then, the aim is to understand what elements of their regulatory regime contribute to their deployment. Both regulatory measures, horizontal measures and incentives will be needed to increase this indicator. Our recommendation could be summarized in three main pillars: macro and policy level, legal and regulatory level, and recommendation that aims to enable business stakeholders to invest in the energy transition. All to serve as recommendations for further steps in advocacy actions.

Stereolithographic Additive Manufacturing for Environmental Monitoring

S. Kirihara
Osaka University, Japan

Abstract
In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust the beam diameter. Fine or coarse beams could realize high resolution or wide area drawings, respectively. As the row material of the 3-D printing, nanometer sized metal and ceramic particles were dispersed into acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtain thixotropic slurry. The resin paste was spread on a glass substrate with 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted to 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was automatically changed for an adequate solidification depth for layer bonding. The composite precursors including nanoparticles were dewaxed and sintered in the air atmosphere. In recent investigations, ultraviolet laser lithographic additive manufacturing (UVL-AM) was newly developed as a direct forming process of fine metal or ceramic components. As an additive manufacturing technique, 2-D cross sections were created through dewaxing and sintering by UV laser drawing, and 3-D components were sterically printed by layer laminations with interlayer joining. Through computer-aided smart manufacturing, design, and evaluation (Smart MADE), practical material components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development Goals (SDGs).

Keywords
Additive Manufacturing; Ceramic Stereolithography; Environmental Sensor

Biography
Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation “Materials Tectonics as Sustainable Geoengineering” for environmental modifications and resource circulations, multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company “SK-Fine” was established through academic-industrial collaboration.

Contactless Magnetic Sensing in Condition Monitoring and Anomaly Detection for Smart Grid: New Possibilities and Alternatives

Abstract
Our physical and cyber environments are becoming increasingly intertwined with smarter sensing, communication, and data analytics. Our daily livings are indeed surrounded by a wide variety of sensors, IoT connectivity, and edge computing devices, constituting smart grid, smart city, smart transportation, and so on. The availability of sensing devices with measurement, communication, and processing capabilities is providing fine-grained data. Together with multimodal sensory data collection and sensor fusion can result in actionable insights and decisions. This synergy can lead to improved ways and quality of life in what we call smart living.

Magnetism is one of the six energy forms of measurands in sensing. Magnetic sensing plays a critical role in smart living due to various sources of magnetic fields such as magnetic fields from current-carrying wires and permanent magnets which are geometrically determined by Biot-Savart Law and Ampere's Law respectively. These magnetic fields can range from DC to AC, from low frequency to high frequency. Modern civilization heavily relies on electricity which are generated, transmitted, and utilized through various kinds of transmission medium and electrical machines that are composed of current-carrying conductors, electromagnets, and permanent magnets. As such, magnetic field sensing is an important source of data and thus information for condition monitoring of power generation, transmission, and distribution.

In this talk, we will discuss the various opportunities and alternatives magnetic field sensing can offer in condition monitoring and anomaly detection in smart grid and smart city. Since it is contactless sensing, its installation is easy and it can be easily retrofitted to the existing plant and equipment. This will minimize cost, avoid wear and tear, and meet stringent reliability requirement. Contactless magnetic sensing can complement the traditional contact measurement techniques and help to overcome the major obstacle towards pervasive sensing due to its scalability.

Biography
Philip W. T. Pong received a B.Eng. from the University of Hong Kong (HKU) in 2002 with 1st class honours. Then he obtained a PhD in engineering at the University of Cambridge in 2005. He was a postdoctoral researcher at the Magnetic Materials Group at the National Institute of Standards and Technology (NIST) for three years. Currently he is an Associate Professor in the Department of Electrical and Computer Engineering at New Jersey Institute of Technology (NJIT). His research interest focuses on the fault detection, predictive maintenance, and anomaly detection of power grid. He is the Founding Director of the Green Technology Research and Training Laboratory, leading the research and education activities of offshore wind energy at NJIT. Philip Pong is a Fellow of the Institution of Engineering and Technology (FIET), a Fellow of the Institute of Physics (FInstP), a Fellow of the Energy Institute (FEI), a Fellow of the Institute of Materials, Minerals and Mining (FIMMM), a Fellow of the Hong Kong Institution of Engineers (FHKIE), a Fellow of the NANOSMAT Society (FNS), a chartered physicist (CPhys), a chartered engineer (CEng), a chartered energy engineer, a registered professional engineer (R.P.E. in Electrical, Electronics, Energy), and a Senior Member of IEEE (SMIEEE). He serves on the editorial boards for several IEEE and SCI journals.

Major Hurdles in The Energy Transition from Fossil Fuels to Renewables

Volkan Ş. Ediger
Center for Energy and Sustainable Development Kadir Has University, Istanbul, Turkey

Abstract
With the UN Sustainable Development Summit and the UNFCCC COP21 Climate Conference in Paris, a new era has ushered in sustainability and global climate change since 2015. The SDG7 of the Sustainable Development Goals and the target of limiting global warming to 1.5oC in the Paris Agreement are related to energy consumption, which is one of the main causes of climate change. In 2020, The European Green Deal program has set --in line with these agreements-- the most ambitious goal for this century: a 50% reduction in CO2 emissions by 2030 and net-zero emissions by 2050, which requires stopping fossil fuel use and transit into 100% renewable energy. At present, more than 130 countries have already committed to reaching these targets. For many, these targets are quite reasonable and can be reached easily: We had such energy transitions from wood to coal and coal to oil and natural gas in the past and this would not be quite different from those.

However, there are several challenges, making the ongoing energy transition much more complicated than the previous ones. First, previous energy transitions did not stop the use of any energy source but resulted in the substitution of dominant energy sources from one source to another. The past energy transitions have always been as “energy additions”- one source atop another but the present one is supposed to be a complete switch from fossil fuels to renewables. This requires not only a simple energy transition but also an energy transformation as political economists invoked as an alternative term.

Energy substitutions in the past are determined by economic factors, and the dominant energy sources are always substituted by new ones with higher hydrogen-to-carbon ratios, which make fuels more energy efficient, easier to deliver and manage, and cleaner to burn. The new energy source would become dominant if it is “better” than the existing one. However, the current energy transition is driven mostly by political factors and policy support remains a major driving force. For this, each country promotes the transition because of some subjective reasons such as “energy security,” “climate change” or “sustainable development.”

One of the most important challenges of the new energy transition will be renewable energy technologies. Although there are serious improvements in the efficiency of these technologies, sufficient progress has not yet been made in many areas, especially in energy storage. Past experiences show that for an energy source to increase its share and become dominant, its technologies must be ready. Also, having technology instead of resources will be one of the factors that will determine the geopolitics of renewable energy. In the last decade, nearly half of the patents on renewable energy technologies have been received only by China.

In this new period, where the multi-energy transition will be effective, countries whose economies are overdependent on hydrocarbon rents will be increasingly important. Some of these countries will suffer serious income losses due to the decrease in global demand, facing serious social and economic problems. Whether humanity will succeed in energy transition, which is one of the most important problems it faces in the 21st century, will vary depending on its success in solving these problems.

Exploring New Electrochemical Energy Storage Systems of High Safety

Yuping Wu*
School of Energy and Environment, Southeast University, Nanjing 210096, China

Abstract
Energy is an indispensable factor for the sustainable development of human being. To increase the utilization efficiency of traditional coal-power plants and renewable energy such as solar and wind ones energy storage systems are highly desired. In this presentation, our edge-cutting work on novel electrochemical energy storage systems such as lithiumion batteries using nonporous separators, aqueous rechargeable lithium batteries, aluminum-, zinc-, and magnesium-based batteries, and hybrid capacitors will be introduced.

Keywords
Lithiumion Battery; Nonporous Separator; Aqueous Rechargeable Battery; Zinc; Aluminum; Magnesium; Hybrid Capacitor

References
1. W. Tang, Y.S. Zhu, Y.Y. Hou, L.L. Liu, Y.P. Wu, K.P. Loh, H.P. Zhang and Kai Zhu, Energy Environ. Sci., 6, 2093 (2013).
2. F.X. Wang, X.W. Wu, X.H. Yuan, Z.C. Liu, L.J. Fu, Y.S. Zhu, Q.M. Zhou, Y.P. Wu, and W. Huang, Chem. Soc. Rev., 46, 6816 (2017).
3. Qi Zhou, Xiaoyan Yang, Xiaosong Xiong, Qianyu Zhang, Bohao Peng, Yuhui Chen, Zhaogen Wang, Lijun Fu, Yuping Wu, Adv. Energy Mater., 2022, 12: 2201991 (2022).

Biography
Dr. Yuping Wu is a full professor of Southeast University and Nanjing Tech University, Fellow of RSC, and corresponding member of Sachschen Academy of Science and Arts, Germany. He got Ph. D. degree from Institute of Chemistry, CAS in 1997, and then worked at Tsinghua University, Waseda University, and Chemnitz University of Technology (AvH Fellowship), separately. In 2003 he became a full professor of Fudan University.

His research is focused on energy storage systems and their key materials. He published over 410 papers with H-index over 89 (WoS) and 9 books with sales above 50,000 copies. His researches led to some edge-cutting technologies such as pore-free separators for lithium batteries, and aqueous rechargeable lithium batteries. He achieved quite some awards including One of the Most Influential Minds over the World in 2015 from the Most Cited Researchers by Thomson Reuters.

Abstracts Keynote

Electric Load Forecasting using Multiple Output Gaussian Processes and Multiple Kernel Learning

A. Ghasempour*
[1]*University of Applied Science and Technology; Tehran, Iran*

Abstract
Electric load forecasting refers to forecasting the electricity demand at aggregated levels. Utilities use the predictions of this technique to keep a balance between electricity generation and consumption at each time and make accurate decision for power system planning; operations; and maintenance; etc. We have very short-term; short-term; medium-term; and long-term electric load forecasting based on prediction time horizon. We propose multiple output Gaussian processes with multiple kernel learning to predict short-term electric load forecasting (predicting 24 load values for the next day) based on load; temperature; and dew point values of previous days. The performance of the proposed method is evaluated through simulations and compared with the persistence method. The results showed that the proposed method has a very good prediction accuracy.

Keywords
Smart Grid; Probabilistic Electric Load Forecasting; Machine Learning Techniques; Gaussian Processes; Multiple Linear Regression; Multiple Kernel Learning; Mean Absolute Percentage Error; Persistence Method.

Abstracts Invited

Developing a New Global Curriculum for Sustainability Environmental Education for Secondary Students (Example of Dust Trace Elements)

Abdullah Aydın
[1]*Department Head of Department of Mathematics and Science Education, Kırşehir Ahi Evran University, Kırşehir, Turkey*

Abstract
The objective of this study aimed developing a new global curriculum for sustainability environmental education for secondary school students (example of dust trace elements). For this purpose – a conceptual framework was established for dust trace elements. This conceptual framework is presented below:

"The Mann-Whitney U test found there were higher trace element concentrations in road dust (Co, Ni, and Cu), kindergarten dust (Al, V, Mn, Co, Ni, and Zn), and house dust (V, Co, Cu, As, and Cd) in Guiyu than in Haojiang and Shantou urban areas ($P < 0.05$)" (Xu et al., 2021: 148). "This study suggests trace element exposure via dust poses a health risk for children living in e-waste recycling areas" (Xu et al., 2021: 148).

Because of this health risk is important to develop a New Global Curriculum Framework for this topic. This conceptual framework will be used in the development of the mentioned curriculum. In this way the environmental risk awareness of the mentioned students will be increased.

References
Xu, R., Zheng, X., Lin, Y., Lin, C., Guo, Y., Huo, X. (2021). Assessment of dust trace elements in an e-waste recycling area and related children's health risks. Science of The Total Environment.791(15October2021),148-154.

Biography
Abdullah Aydın is a Professor of Science/Chemistry Education at Kırşehir Ahi Evran University, Turkey. He received his Master's in Analytical Chemistry from Uludağ University in 1995. He received his Ph.D. in science / chemistry education from Gazi University in 2004. He is a member of the editorial team of 44 international journals (disciplinary and interdisciplinary). He has 11 excellence awards [Excellence in reviewing]. He has outstanding contribution award [Journal of Cleaner Prudiction - ELSEVIER]. He has committee memberships (SciTech Nanosciences 2019 & Nanotech-2021 & GECAET-22 Global Experts Conference on Applied Science,EngineeringandTechnology).

Development of an Enforcement Programme to Control Nitrogen Oxide Emission From In-Use Diesel Vehicles Using Roadside Remote Sensing Device And Transient Chassis Dynamometers

Casey K.C. Lee[1] *

[1]Environmental Protection Department of the Hong Kong SAR Government, Rm[3402] Revenue Tower, [5] Gloucester Road, Wan Chai, Hong Kong, China.

Abstract

Transient emissions tests with the aid of chassis dynamometers are the preferred method to measure nitrogen oxide emission from in-use vehicles. However, it is impractical and unnecessary to include a transient emission test in the periodic inspections for every in-use vehicle due to the high testing cost. Roadside vehicle emission screening using remote sensing device is an effective method to single out only the vehicles emitting excessively for follow-up transient emission tests. The Hong Kong Environmental Protection Department has been adopting such a screening-for-follow-up emission control programme to effectively control the emissions from in-use liquefied petroleum gas and petrol vehicles. This presentation summarises the recent findings showing that it is possible to extend the programme to control the nitrogen oxide emission from in-use diesel vehicles by adopting fuel-specific nitrogen oxide emission (gram of NO emitted per kilogram of fuel consumed) as the remote sensing measurement metric.

Keywords

Transient Emission Tests; Remote Sensing Device; Emission Control Programme; Nitrogen Oxide Emission; In-Use Diesel Vehicles; Fuel-Specific Nitrogen Oxide Emission

References

1. Re-evaluating effectiveness of vehicle emission control programmes targeting high-emitters, Yuhan Huang, Nic C. Surawski, Yat Shing Yam, Casey K.C. Lee, John L. Zhou, Bruce Organ, Edward F.C. Chan, Nature Sustainability 3, 904 - 907 (2020).

Biography

Mr Casey K.C. Lee is an Acting Senior Environmental Protection Officer of the Environmental Protection Department of the Hong Kong SAR Government overseeing the emission control programme for in-use petrol and LPG vehicles using remote sensing equipment. After graduating with a mechanical engineering degree from the University of Hong Kong, Casey holds other academic degrees and has acquired extensive working experience in vehicle diagnostic and engine emission measurements using remote sensing equipment, engine test cell, chassis dynamometers, and Portable Emission Measurement Systems (PEMS).

Grid-Connected Tidal Stream Turbine System: Power Smoothing and Fault Tolerant Control

E. Elbouchikhi[1]*
[1]ISEN Yncréa Ouest, LABISEN, Nantes Campus, France.

Abstract
Tidal stream energy is highly predictable renewable energy resource and is considered as a promising technology to lower greenhouse gas emissions for sustainable development. Unfortunately, the extracted electrical power experience severe fluctuations, which is not suitable for main grid integration. Two main types of marine currents fluctuations can lead to the reduction of power quality injected to main grid:
Marine current variation related to tide phenomenon of about 6 hours period.
Marine current variation due to swell effect with few seconds period.

To deal with this issue, energy storage systems are used to smooth the power fed to the grid. These energy storage systems, used for power smoothing, are chosen based on power and energy density. This presentation provides a thorough and consistent step-by-step modeling and fault-tolerant control design methodology for a direct-drive tidal stream turbine (TST) associated with energy storage devices for power smoothing. The designed experimental platform could be used for education and research purposes and addresses the TST energy conversion system timely topic.

Keywords
Tidal Stream Turbine; Power Smoothing; Fault Tolerant Control

References
1. Sana Toumi, Elhoussin Elbouchikhi, Yassine Amirat, Mohamed Benbouzid, Gilles Feld, Magnet failure-resilient control of a direct-drive tidal turbine, Ocean Engineering, Volume 187, 2019, 106207.
2. Elhoussin Elbouchikhi, Gilles Feld, Yassine Amirat, Mohamed Benbouzid, Franck Le Gall, Design and experimental implementation of a wind energy conversion platform with education and research capabilities, Computers & Electrical Engineering, Volume 85, 2020, 106661.

Biography
Elhoussin Elbouchikhi is a Professor in Electrical Engineering and Automatic Control at ISEN Yncréa Ouest and a member of the LABISEN laboratory, Nantes. He is an IEEE Senior Member, an Associate Editor for IET Generation, Transmission & Distribution, and a member of the Editorial Board of MDPI Energies journal. He authored more than 100 papers in national and international journals and conferences and five book chapters. He regularly serves as a reviewer for national and international journals and conferences. He was named in the World's Top 2% Scientists ~ Stanford-Elsevier B.V. Ranking two years in row: 2021 and 2022. His main current research interests include signal processing and machine learning for power systems condition monitoring, fault tolerant control, energy management systems in microgrids, and power electronics for EV's charging stations and offshore wind and tidal stream turbines.

A Case Study on Enabling Efficient Energy Management for HVAC Optimization in Commercial Buildings: Exploring the Potential of OpenADR-based Transactive Demand Response Systems

[1]Mehdi Seyedmahmoudian, [1]Gokul Sidarth Thirunavukkarasu, [2]Elmira Jamei, [3]Ben Horan, [1]Saad Mekhilef, and [1]Alex Stojcevski.

[1]School of Science, Computing and Engineering Technologies, Swinburne University of Technology, VIC [3122], Australia.
[2]College of Engineering and Science, Victoria University, VIC 3011, Australia
[3]School of Engineering, Deakin University, Waurnponds, VIC 3216, Australia

Abstract
The increasing integration of renewable energy systems into the power grid presents significant technical and operational hurdles that impact the grid's resilience, but these can be overcome through demand response and peer-to-peer (P2P) energy exchange. Efficient load planning for HVAC control is crucial in commercial buildings to manage grid issues. The open-TDR ontology is a multi-agent-based framework proposed in this research that coordinates HVAC control based on occupancy and indoor conditions, increasing energy efficiency at the building level. Moreover, the openTDR framework enables neighbouring buildings to participate in a community microgrid energy market, sharing surplus renewable energy and promoting system interoperability. This P2P energy exchange enhances overall resilience and reliability by optimizing renewable energy utilization across multiple entities within a community illustrated using the two buildings on the campus. A community microgrid emulator was developed to evaluate the efficacy of this approach of P2P energy sharing adhering to the limitation of the grid code to facilitate the direct energy exchange. A case study at the Swinburne University of Technology showcased a functional implementation of the OpenADR-based openTDR framework, focusing on HVAC control in two commercial buildings integrated with the community microgrid emulator. By integrating community microgrid energy sharing into the open-TDR framework, a sustainable and efficient energy management system is established, addressing technical and operational challenges while fostering collaboration and energy resilience within the community. The study's results demonstrate the effectiveness and potential benefits of this approach, providing valuable insights for real-world implementation of transactive demand response systems.

Biography
Associate Professor Mehdi Seyedmahmoudian is the Director of the Siemens Swinburne Energy Transition Hub (SEET-Hub) and Discipline Leader for Electrical and Electronics at the School of Science Computing and Engineering Technologies, Swinburne University of Technology (SUT). He is an early-career researcher specializing in renewable energy integration, Microgrids, energy conversion and management, and AI-based inverter control systems. A/Prof Mehdi has completed successful energy-focused projects internationally and holds over $8.2 million in research funding. He has co-authored 180 research articles, including 140 highly-ranked journal papers. With a ranking in the top 2% of researchers worldwide, he has received numerous research awards.

Energy Recovery of Discharges and Waste from Industrial Slaughterhouses

Montserrat Perez, Leonor Sillero, Juana Fernandez-Rodriguez and Rosario Solera

Department of Environmental Sciences, IVAGRO- Campus Puerto Real, 11510, Universidad de Cádiz

Abstract

The main objective is to examine the biodegradability of samples of sludge and pouring from a slaughterhouse and mixtures of both residues. For this, anaerobic codigestion with phase separation, both microbiological and temperature, is applied to different proportions of these residues in batch reactors. In the first thermophilic-acidogenic stage, hydrogen production is evaluated through biochemical hydrogen potential (BHP) tests, and in the second mesophilic-methanogenic stage, methane production is evaluated through biochemical methane potential (BMP) tests. The most significant results of the study reveal low yields in the production of hydrogen in the BHP by all the substrates, pouring being the most efficient substrate. On the other hand, the yields related to the production of methane in the BMP are very high, thus demonstrating the efficacy of an acidogenic pretreatment in the Anaerobic Digestion (AD) process. The highest methane production is associated with slaughterhouse sludge, reaching a volume of 1,85 L biogas in 40 days and a yield of 521,76 ml CH4/gSV0.

Biography

Montserrat Pérez García has a degree in Chemistry from the University of Granada and a PhD in Chemical Engineering from the University of Cádiz. She is currently a University Professor in Environmental Technologies at the University of Cádiz since 2010. Research activity has focused mainly on the field of biological treatments applied to wastewater and solid waste treatment, emphasing on the aspects of valorisation through the production of energy vectors (methane and hydrogen) associated with anaerobic technologies and, more recently, to obtaining value-added end products such as Class A biosolids and struvite.

Analysis of the Top-7 Modern Projects of Ship Wind Systems

V. Nastasenko
Kherson State Maritime Academy, Ukraine

Abstract
One of the main threats to modern humanity is the threat of global warming of the Earth's climate. His consequence is the melting of the glaciers of the Northern Ocean and Antarctica, which contain 1.81% of fresh water from its total amount of 2.46%, since the basis of 97.54% of water on Earth is salt water of oceans and seas. The fresh water of the glaciers dissolves in it and is lost forever. One of the causes of the threat to the climate is emissions of greenhouse gases CO and CO2. The transition of the transport fleet to alternative energy sources can reduce annual CO2 emissions by 3% or 41% of the total annual requirement of 7.4%.

Among the main types of alternative ship energy is wind energy, which was the main one in the fleet until the beginning of the 20th century. Since the 60s of the 20th century, in the face of the threat of exhaustion of traditional fuels, the revival of the sailing fleet began, but no significant progress was made, which indicates the difficulty of solving this problem. In such conditions, it is important to determine the best projects of ship sailing systems, which allows you to avoid spending money and resources on the development of unpromising projects, which is an important task for the development of ship alternative energy. In 2019, Captain Watson highlighted the TOP-7 projects of ship wind systems. However, over the past 4 years, these projects have developed, which changed their old positions in the TOP-7. Therefore, the main goal of the work being performed is to determine the new TOP-7 projects, taking into account the best modern achievements in this field. The scientific novelty of the work is the development of recommendations for choosing the best projects and determining the most promising ways of their development. Work results. On the basis of developed criteria and analysis of modern projects of ship wind systems, the basic rating of Captain Watson has been significantly changed and the most promising projects in the new TOP-7 have been clarified [1]. **Conclusion**s. The new TOP-7 rating eliminates unproductive waste of money, time and resources on unpromising projects.

Keywords
Modern Ship Wind Systems; The Best Options and their Analysis

References
1. V. Nastasenko, V. Protsenko, M. Babii. Modern development of ship wind systems within the new rating of Top-7 projects / Journal of Maritime Research. Vol 20. No. 2 (2023) pp 77–88 ISSN: 1697-4040, , https://www.jmr.unican.es/index.php/jmr/article/view/716-741

Biography
Nastasenko Valentyn. Doktor of Technical Sciences, Professor of Transport Technologies Department, Kherson State Maritime Academy (Ukraine). Area of interest – alternative ship energy. I have more than 100 publications and 20 technical inventions in this field.

Biochemical Methane Potential (BMP) Tests of Slaughterhouse Effluents and Sludge

Rosario Solera[1], Leonor Sillero[1], Juana Fernández[1] and Montserrat Pérez[1]
[1]Department of Environmental Technologies, IVAGRO, Faculty of Environmental and Marine Sciences. University of Cadiz, Puerto Real (Cádiz), Spain.

Abstract
Anaerobic co-digestion (ACoD) presents many advantages, including shared treatment facilities, reducing initial investment and operating costs, buffering of the variations in the composition of the waste over time and dilution of toxic compounds. In the Project Slaughterhouse biorefinery: from waste to energy and value-added products (BioREF-TPAD) (Ministry of Science and Innovation (PID2021-123174OB-I00) AEI/10.13039/501100011033/ FEDER, EU), the joint valorisation (ACoD) of by-products and sewage sludge from the meat sector (slaughterhouses) is addressed, taking advantage of both their energy potential and the nutrient flows of the different streams under the concept of biorefinery.

In this context, the biodegradability of some slaughterhouse sludge:effluent mixtures will be studied. Tests for methane (BMP) generation potential shall be carried out at mesophilic temperature (35ºC): samples will be incubated in 250 ml vials and an orbital shaker with thermostat and stirring device. The pH, volume and composition of the biogas (% CH4) shall be determined daily. Volatile (VS) and Total (TS) solid, Chemical Oxygen Demand (COD), Volatile Fatty Acid (VFA), total acidity and alkalinity of the sludge shall be determined at the beginning and at the end of the test.

The results show that the ratio 75:25 slaughterhouse sludge:effluent is the most biodegradable (total and volatile solid removal 34% and 37%, respectively) with the greatest biomethanization potential (60 mL of CH4/gSV). The addition of effluent improves the biomethanization potential of the sludge by more than 14% (46 mL of CH4/gSV). The mesophilic co-digestion of slaughterhouse sludge and waste improves the yields of the monodigestion of slaughterhouse sludge.

Biography
Rosario Solera is Full professor. Department/Center Environmental Technologies. Faculty of Environmental and Marine Sciences, Institution: University of Cadiz, (Spain). The scientific and professional activity is mainly developed in the field of recovery of waste and effluents of high organic load through anaerobic treatments aimed at the production H2 and CH4. Researcher in 39 research projects with a global budget of over 4,000,000 euros: 2 international, 24 National R + D + I Projects and 11 regional and provincial projects. Merits of Research (CNEAI): 5 (31-12-2020); Direction of Doctoral theses:7; CITATIONS (2017-2022): 1658; Publications indexed: 57 (1STQ); H index:24: i10index: 35.

Energy-Efficient Atmospheric Water Generation Using Hybrid Nanofluids

Venkateswara Rao Kode*
Research Division, Genesis Systems LLC, 5402 W Tyson Ave., Tampa, FL 33611, USA.

Abstract
Various global initiatives are currently underway to develop active atmospheric water generation (AWG) or atmospheric water extraction (AWE) systems. These systems utilize direct air-cooling technology to extract water from the surrounding air. However, this traditional method is highly energy-intensive and can only operate effectively when the local dew point is above the freezing point of water. Additionally, it does not have the capacity to generate sufficient water to meet the needs of industries, services, or agriculture.

On the other hand, liquid-desiccant-based AWG methods offer several advantages and provide a versatile solution to address the thermodynamics, health risks, and geographical limitations faced by conventional AWG systems. In this study, we conducted a techno-economic analysis of a continuous operating liquid-desiccant-based AWG system. The analysis focused on a specific design configuration that utilized a LiCl liquid desiccant loaded with multiwalled carbon nanotubes (MWCNTs).

Our findings indicate that incorporating MWCNTs doped in LiCl enhances heat transfer during water desorption, resulting in a reduction of approximately 49% in the sensible heat load of the AWG system. By adjusting the inlet desiccant stream concentration of MWCNT-doped LiCl under the specified conditions, the specific energy consumption (SEC) of the system can be as low as 0.67 kWh per US gallon. It is worth noting that the cost of water production (COW) exhibits regional variations. Nevertheless, based on the 2021 average wholesale electricity cost of USD 0.125 per kWh in the U.S.A., the economic analysis demonstrates that water can be produced at a minimum selling price of USD 0.085 per US gallon. These findings provide a solid foundation for future research aiming to achieve desirable and competitive water costs by 2026, but no later than 2031.

Keywords
Atmospheric Water Generation; Liquid Desiccant; Carbon Nanotubes; Hygroscopicity; Nanofluid.

Biography
Dr. Venkateswara Kode is a Senior Scientist at Genesis Systems. He helps with leading applied product R&D with more than 10 years of combined experience in both academic and industrial settings. Before joining Genesis Systems, Dr. Kode was a Postdoctoral Fellow in the Membrane Research Center at the University of Arkansas. Earlier, he earned his bachelor's degree in chemical engineering from Jawaharlal Nehru Technological University in India. In 2015, he began his master's in chemical engineering at Cleveland State University. He continued his advanced engineering education with a Ph.D. program at Cleveland State to understand nanomaterials research in BioNano Materials Lab. He successfully graduated with his Ph.D. in Chemical Engineering in 2021 with multiple awards. He has also authored and co-authored several peer-reviewed journal publications, and patents on atmospheric water generation processes aimed at improving system efficiencies. Additionally, he also serves as an Editorial Board Member for 'Sustainable Chemical Engineering' Journal, Guest Editor for Frontiers in Materials Journal, and a trusted scientific reviewer for MDPI Journals.

Experimental Study on CO_2 Separation from Flue Gas by Membrane Separation-chemical Absorption Methods

Xiaojiang Wu[1], Zhongxiao Zhang[1]*, Yanchi Jiang[2], Chengdong Kong[1] Baoming Chen[3], Junjie Fan[3], Jian Liu[1]

[1]School of Mechanical Engingeering, Shanghai Jiaotong University, Shanghai [200240], P.R. China
[2]College of Smart Energy, Shanghai Jiaotong University, Shanghai [200240], P.R. China
[3]School of Environment and Architecture, University of Shanghai for Scienc& Technology, Shanghai [200093], P. R. China

Abstract
The combustion of fossil fuels is one of the major resources of global carbon emission (greenhouse gas), among which coal is contributed more than 40%. In order to ensure the survival and development of human beings, carbon capture and storage (CCS) is crucial to reduce global CO2 emission yielded from coal combustion. Thereinto post-combustion capture method is currently a practical method approach for CCS due to it's suitable for the existing combustion equipment. Until now, the most restricting factors for its large-scale application are the cost of carbon capture and energy consumption due to the low CO2 concentrations in flue gases (around 11~13 vol.%) and huge flue gas flow. In this study, a hybrid method combining membrane separation and chemical absorption was proposed and tested in a lab-scale test facility. The experimental and calculation results have shown that the CO2 capture efficiency of the hybrid method was at least 1.0% higher than that of pure chemical absorption method, and the flow rate of MEA solution consumed was 33.3% lower than that of pure chemical absorption method. Furthermore, the steam consumption of desorption process was around 27.8% less than that of pure absorption method.

Keywords
Carbon Capture; Membrane Separation; Chemical Absorption

Economical DC Interruption Technology: Development and Prospect

Yifei Wu
School of Electrical Engineering, Xi'an Jiaotong University. No.28, West Xianning Road, Xi'an, Shaanxi, 710049,P.R. China.

Abstract
The DC circuit breaker is an indispensable equipment for constructing the DC grid and ensuring the reliability and flexibility of the DC power supply. Although the existing DC interruption technology has achieved staged research results, there are still problems such as high cost, large volume, and complicated control, which is difficult to meet the needs of large-scale application of DC grids in the future and becomes a bottleneck restricting the development DC grid. Therefore, it is necessary to fundamentally change the interruption principles of existing DC circuit breakers, and seek high-performance, low-cost, and miniaturized new technologies and methods. In view of the above problems, the economical DC interruption technology based on vacuum arc control is studied. The arc voltage can be rapidly increased by regulating the vacuum arc with a magnetic field, which can be used to commutate the current in the main branch fast. Firstly, the principle of arc control and the method of increasing arc voltage are introduced, and the key influencing factors affecting arc voltage and post-arc dielectric recovery are obtained. Secondly, the topology of economical DC circuit breaker based on arc control is analyzed, in which the specific design parameters are obtained. Finally, a series of DC circuit breaker prototypes are developed and applied to several DC power distribution demonstration projects.

Biography
Yifei Wu was born in Zhejiang, China, in1985. He is now a professor in Xi'an Jiaotong University (top young talent) and supported by the national youth talent plan. He has hosted over more than 10 scientific research projects including the NSFC, the 13th Five-Year National Defense Pre-research Project, the Key R&D Program of Shaanxi Province, and the State Grid Corporation's Science and Technology Project. He also published more than 70 SCI/EI papers in high-level journals at home and abroad, including 30 SCI papers as the first/corresponding author. He is a senior member of IEEE, authorized 19 national invention patents, 10 U.S. patents, 2 European patents. He won the Second Prize of Science and Technology of Shaanxi Province.

Likely Accelerated Weakening of Atlantic Overturning Circulation Emerged in Optimal Fingerprint

Z. Liu[1]*, C. Zhu[2], S. Zhang[2] and L. Wu[2]
[1]The Ohio State University, Columbus, OH43210, USA.
[2]The Ocean University of China, Qingdao, China.

Abstract
The long-term response of Atlantic meridional overturning circulation (AMOC) to anthropogenic forcing has been difficult to detect from the short direct measurements available due to strong interdecadal variability. Here, we present observational and modeling evidences for a likely accelerated weakening of AMOC since the 1980s under the combined forcing of anthropogenic greenhouse gases and aerosols. This likely accelerated AMOC weakening signal can be detected in the AMOC fingerprint of salinity pileup remotely in the South Atlantic, but not in the classic warming hole fingerprint locally in the North Atlantic, because the latter is contaminated by the "noise" of interdecadal variability. Our optimal salinity fingerprint retains much of the signal of long-term AMOC trend response to anthropogenic forcing, while filtering out shorter climate variability dynamically. Given the ongoing anthropogenic forcing, our study warns potentially a further acceleration of AMOC weakening and its climate impact in the coming decades.

Keywords
AMOC; Fingerprint; Global Warming

Protection of Fossil Groundwaters In The Albian Aquifer - Southern Algeria-

Dr. DIAB Hamida

Abstract
The Albian aquifer is the largest reservoir of fresh water in the world. It straddles three countries, Algeria, Libya and Tunisia. 70% of the aquifer is in Algerian territory in the southeast of the country.

The Albian aquifer is largely located in the Algerian Sahara; it contains more than 50,000 billion cubic meters of fresh water, the equivalent of 50,000 times the Beni Haroun dam which is located in the east of the country and which supplies six neighboring districts. it was made, in the sixties, as the final solution to aridity and underdevelopment in the region. This water is the result of the accumulation, which has taken place during the wet periods, which have followed one another for 1 million years.

The aquifer extends in an area almost twice the size of France, between Libya, Tunisia and mainly Algeria. The territorial distribution is estimated at for Algeria: 70%, for Libya: 20% and finally for Tunisia: 10%.

The decision taken by the Algerian government in favor of the exploration of unconventional gas, including shale gas, makes us fear an acceleration of the depletion of the water reserves contained in the Albian aquifer. A process that is not only the consequence of the significant water needs required by the gas extraction process. There is also a significant risk of pollution with serious consequences for the population dependent on the water table, in particular, following the release of chemicals, the result of the hydraulic fracturing used for the process.
The main purpose of this study is to define the consequences of the exploitation of shale gas on the Albian aquifer, and try to find solutions to protect this natural treasure.

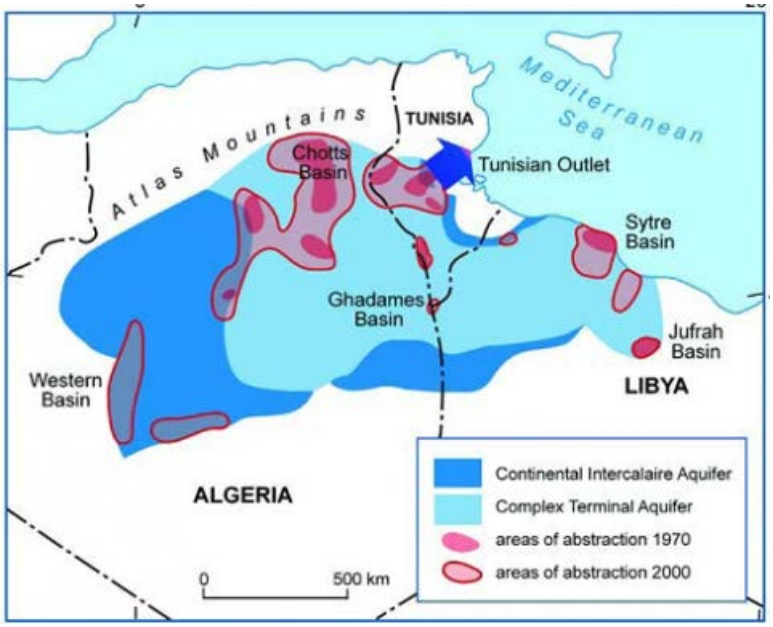

Fig. 01: Distribution of Albian aquifer in Algeria

Algeria amended the Hydrocarbons Law in January 2013 to pave the way for the exploitation of unconventional energy resources. According to the US Energy Information Administration (EIA), Algeria holds the third largest recoverable shale gas reserves, after China and Argentina. Already, Eni, Shell and ExxonMobil have held talks with the national company Sonatrach for the extraction of shale gas, despite the enormous environmental impact it could have on the groundwater of the Sahara.

The last EIA report dates back to 2004, according to Professor Chems Eddine Chitour, director of the fossil energy laboratory at the Polytechnic Institute of Algiers. He argues that the 2013 report is a copy of a 2004 version. In addition, we do not know in which area or in which basins the explorations are carried out, not to be confused with the term exploitation, which has not started yet. Today, Total and Schlumberger are exploring in the In Salah region, particularly in the Ahnet 1 and 2 basins.

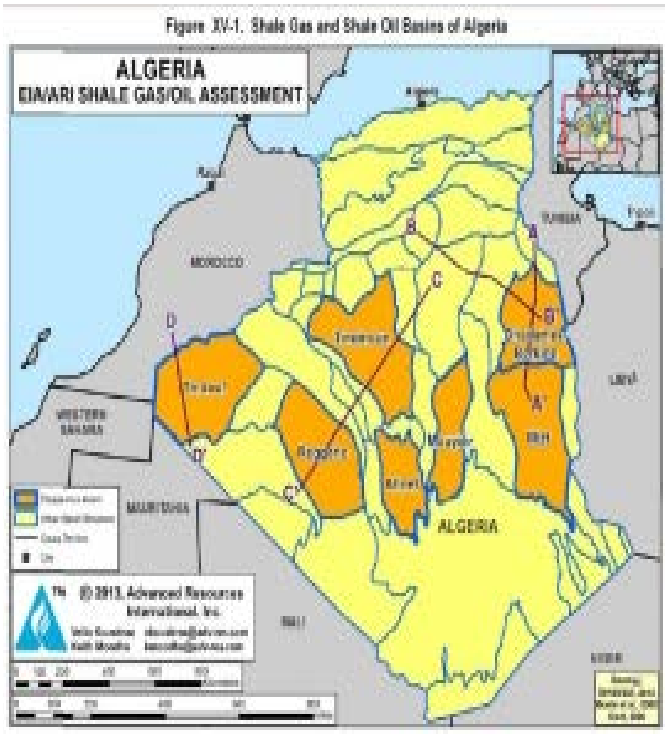

Fig. 02 : Shale Gas Basin in Algeria (EIA/ARI, 2013)

The environmental risks.

Algeria has about 60,000 billion m 3 of fresh water with low salinity. The use of more than 500 chemicals in the hydraulic fracturing process seriously threatens groundwater and Albian aquifers, because the wells that will be drilled will cross all the aquifers. Moreover, the Algerian basins are interconnected. Therefore, if you pollute in In Salah, the chemicals that enter the water will spread and even reach the hydraulic basins of Ouargla or Biskra (600 to 900 km respectively), which gives rise to other risks. The agricultural regions of southern Algeria, such as the palm groves, will be destroyed. This will create more poverty and force people to migrate (rural exodus).

References

- PNUD-UNESCO, “Etude des ressources en eau du Sahara Septentrional. Rapport sur les résultats du projet Reg 100. UNESCO, Paris, 78p.,” 1972.
- A. Khadraoui, “Eaux et sols en Algérie,” Gestion et impact sur l’environnement. ANRH, 2006.
- J. Gonçalvès, J. Petersen, P. Deschamps, B. Hamelin, and O. Baba Sy, “Quantifying the modern recharge of the “fossil” Sahara aquifers,” Geophysical Research Letters, vol. 40, pp. 2673-2678, 2013.
- Abdellah El Hadj, Mohamed Amine (2006), Aquifers protection and drilling activities. A risk based approach, Washington, University of Aberdeen.
- Abdellah El Hadj, Mohamed Amine, et Okba Dhina (2007), Groundwater Vulnerability Mapping: A New Mapping Method as a Useful Decision-Making Tool for Oil and Gas Industry. Texas, SPE E&P Environmental and Safety Conference held in Galveston, Texas, U.S.A.
- African Economic Outlook (2013), Algeria – African Economic Outlook – 2013. En ligne à http://bit.ly/1Q1sTHm, consulté le 24 février 2014.
- Ainas, Yanis, Nacer Ouarem et Saïd Souam (2012), « Les hydrocarbures : atout ou frein pour le développement de l’algérie ? » Revue Tiers Monde, vol. 2, no 210, p. 69-88. DOI : 10.3917/rtm.210.0069
- Agence nationale pour la valorisation des ressources en hydrocarbures (ALNAFT) (2013), The Hydrocarbon Law 05-07. En ligne à http://bit.ly/1MOe23d, consulté le 10 janvier 2014.
- Yousfi, Youcef (2013b), Présentation du Projet de loi sur les hydrocarbures à l’APN. [En ligne]: http://bit.ly/200SOBj, consulté le 10 octobre 2013.
- Zerguine, Abdelhamid (2012), Sonatrach : Conférence de presse du 7 février 2012. En ligne à http://www.sonatrach.com/discours-conf-press-2012.htm, consulté le 11 novembre 2013.

Microbial Fuel Cell Technology: Waste Bioremediation, Energy Recovery and Biofertilizer

Muaz Mohd Zaini Makhtar[1],[2]*, Muhammad Najib Ikmal[1], Kavita Pusphanathan[1], Mohamad Farhan Mohamad Sobri[1], Nur Atiqah Abdul Rasik[1], Muhammad Lutfan Aiman Zamri[1], Nurul Atiqah Shamsuddin[1]

[1]School of Industrial Technology, Bioprocess Technology Division, Universiti Sains Malaysia, 11800 Gelugor, Penang, Malaysia

[2]Centre for Innovation and Consultation, Universiti Sains Malaysia, 11800 Gelugor, Penang, Malaysia

Abstract

Based on the statistic, Malaysians consume about 1.8 million chickens, and each chicken produces an average of around 3.5 kg of chicken manure per month (CM). According to the Malaysian Veterinary Council (2019), broiler growth occurs around 30 to 42 days before being marketed, with an average sale weight of around 2.3 kg. During this period, a broiler produced around 3.5 kg of manure. Roughly, a broiler produces around 42 kg of manure annually. The chicken farmer still lacks a waste recovery system for energy and treatment. Chicken farms have a frequent practice of just passing chicken manure to the garden for fertilizer purposes without further improving the chicken manure to be a better biofertilizer. This has resulted in the wastage of highly potential energy and chances to have high yield crops. The Microbial Fuel Cell (MFC) technology uses electrogenic bacteria (EB) to further simplify CM and be a high-quality biofertilizer (2-fold increment in leaf number) at the same time it generates electricity (2.4 W/m2). Our EB enhances stress tolerance in their plant hosts by inducing the expression of stress-response genes, phytohormones, and stress-related metabolites. The activity of EB in the rhizosphere, its role as a root colonizer, its biocontrol potential, the associated mechanisms of biocontrol, and the ability of EB to increase crop productivity.

Keywords

Microbial Fuel Cell; Bioremediation; Energy recovery; Chicken Manure

Biography

Dr. Muaz bin Mohd Zaini Makhtar is a senior lecturer in the Bioprocess Technology Division at the School of Industrial Technology, Universiti Sains Malaysia (USM). Currently, he is the deputy director of the USM Center for Innovation and Consultation (CIC). He is also the Head of Sustainable Development Goal #15: Life on Land under the Center for Global Sustainability Studies (CGSS) in USM. Dr. Muaz's core research interests are in bioprocess technology and bioconversion of waste, focusing on biological treatment technologies, microbial fuel cells (MFC) for waste treatment and energy recovery, and electricity. His enthusiasm and dedication towards his research works have been reflected in his achievements in winning numerous scientific invention awards in international exhibitions, including the Gold Medal in the International Conference and Exposition on Inventions by Institutions of Higher Learning 2019 (PECIPTA'19 and PECIPTA2022) and the Gold Medal in the Malaysia Technology Exhibition (MTE2020 and MTE2021), which both invention awards were MFC-based projects. His active participation in scientific research has also been exhibited by his being the recipient of multiple research grants in various disciplines sponsored by the government of Malaysia.

2nd International Experts Summit on Renewable and Sustainable Energy

IESRSE2024

05-07 August, 2024 | Lugano, Switzerland