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Scientific Meetings

World Summit on

RENEWABLE & NON-RENEWABLE ENERGY

10-11 MARCH, 2025 | LONDON, UK

Venue:
Renaissance London Heathrow Hotel
Bath Rd, Hounslow TW6 2AQ, United Kingdom

Scientific Program

09:00–09:15: Registrations

09:15–09:30: Opening Ceremony

DAY 1

MARCH 10, 2025

Keynote Presentations

09:30-10:10	
Kiran Tota–Maharaj The Water Research Centre Ltd (WRc), UK	Title: Adapting Caribbean Hydrosystems to a Changing Climate: Resilient Water, Stormwater, and Wastewater Infrastructure

10:10-10:50	
Ismail Hakki Kara Karabuk University Engineering Faculty, Turkey	Title: Microstructure characterization and Corrosion Resistance of Zinc alloys modified by Sc

Group Photo | Coffee Break 10:50–11:10 @ Foyer

Oral Presentations

11:10-11:35	
Hadi Sarvari Birmingham City University, UK	Title: Perceived Critical Success Factors (CSFs) in the Development of Construction Small and Medium–sized Enterprises (SMEs) in Developing Countries

11:35-12:00	
Mingzhi Wang Harbin Institute of Technology, China	Title: Image–based Simulation of the Mesoscopic Environment–material Interaction

Session Introduction

Tracks

Electrical Batteries for Renewable Energy | Sustainable and Renewable Energy | Combustion Engines & Electrical Vehicles | Climate Change Challenges & Sustainability | Energy Storage, Generation and Transmission | Green Building Materials and Energy–saving Buildings

Session Chair: Kiran Tota–Maharaj, The Water Research Centre Ltd (WRc), UK

12:00-12:25	
Forrest Wu Lijou and Associates Consulting Engineers, Taiwan	Title: Innovative Eco–Friendly Housing Solutions Redefining Sustainable Living and Space Efficiency in Taiwan

Lunch Break 12:25–13:20

13:20-13:45	
Michelle Maura Ribeiro Pontifical Catholic University of Minas Gerais, Brazil	Title: Geobim for Railroad Infrastructure – Modernizing Federal Public Management through the Adoption of BIM & GIS in the Context of Brazilian Cross–Investment and ESG

13:45-14:10	
Duane Tristan Lawal Melanized Limited, UK	Title: Solar Integration Innovation – A Revolutionary Approach to Building Infrastructure through Integrated Solar Roofing Systems

14:10-14:35	
Hadi Sarvari Birmingham City University, UK	Title: Bridging to a Safer Future: Strategies for Integrating Safety I and Safety II in the Construction Industry

14:35-15:00	
Feria Gharakhanzadeh Gharakhanzadeh Architecture, Austria	Title: Overbuild

15:00-15:25	
Anwaar Al Habsi UAE University, UAE	Title: Advancing Self–Healing Concrete with Microbial Technologies and Sustainable Calcium Extraction in the UAE

15:25-15:50	
Srinath Tangaragu GE Vernova, UK	Title: 40% Increase in House Efficiency by Preparing for Artificial Intelligence

15:50-16:15	
Matías A. Valenzuela Pontifical Catholic University of Valparaíso, Chile	Title: Will be announced soon

16:15-16:40	
Rui Pang Henan University of Technology, China	Title: Experimental and Analytical Study on Vertical Bearing Behavior of Discretely Connected Precast Concrete Floors with Four Sides Simply Supported

Panel Discussion & Certificate Falicitation

Day –1 Ends

DAY 2

MARCH 11, 2025

Zoom Meeting (GMT+1) Time in London

09:00-09:20	
Piyali Halder Department of Physics, Jadavpur University, India	Title: Piezo– Bio–Nanocomposite Membrane for Simultaneous Organic Pollutant Degradation and Clean Energy Generation from Wastewater
09:20-09:40	
Indrajit Mondal Department of Physics, Jadavpur University, India	Title: Piezo– Bio–Nanocomposite Membrane for Simultaneous Organic Pollutant Degradation and Clean Energy Generation from Wastewater
09:40-10:00	
Nikhil Jayaraj Curtin University, Bentley, Western Australia	Title: Consumer behaviour and decision–making process: A study of solar energy storage adoption among residential users in Australia
10:00-10:20	
Xiaohong Ji South China University of Technology, 510641, P.R. China	Title: A Simple Strategy for Single–crystalline GaS Flakes and its Self–powered Photodetection Performance
10:20-10:40	
Evgeny Grigoryev Merzhanov Institute of Structural Macrokinetics and Materials Science Russian Academy of Sciences, Russia	Title: Features Of High–Voltage Consolidation Of Powder Materials
10:40-11:00	
Kirk Phillips Air Force Office of Energy Assurance (AF OEA), USA	Title: Accelerating Installation Energy Resilience for Mission Assurance
11:00-11:20	
Salem A. G. Saleh Karabuk University Engineering Faculty, Turkey	Title: Microstructure Characterization and Corrosion Resistance of Zinc Alloys Modified by Sc
11:20-11:40	
Charbel Nouhra Grenoble Alpes University, France University of Orleans, France	Title: Investigation of Heat and Mass Transfer during Thermal Runaway of Li–ion Batteries: Focus on the Role of Solid particles

Panel Discussion | End

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March 10-11, 2025 | London, UK

HYBRID EVENT

KEYNOTE PRESENTATIONS
DAY 1

Kiran Tota-Maharaj[1,2]
[1]The Water Research Centre Ltd (WRc), Technical Director for Water, Wastewater & Environmental Engineering, Frankland Road, Swindon, SN5 8YF, England, UK.
[2]Royal Agricultural University, Professor and Chair of Water Resources Management & Infrastructure, Stroud Road, Cirencester, Gloucestershire, GL7 6JS, England, UK

Adapting Caribbean Hydrosystems to a Changing Climate: Resilient Water, Stormwater, and Wastewater Infrastructure

The Caribbean region faces a critical challenge in adapting its vital water infrastructure to the intensifying impacts of climate change. Over the years far too often the multifaceted threats posed by rising sea levels, more frequent and intense hurricanes, and altered precipitation patterns to water supply systems, stormwater drainage, and wastewater treatment facilities have impacted the West Indies. The Caribbean's reliance on surface water sources and ageing infrastructure renders it particularly vulnerable to climate-related disruptions. Extreme weather events, such as hurricanes, have historically caused widespread damage to water supply systems, leading to contamination and service disruptions. Moreover, changing precipitation patterns, characterised by increased periods of drought interspersed with intense rainfall events, exacerbate these challenges. These shifts can strain water supplies, overwhelm stormwater systems, and increase the risk of flooding and pollution. This keynote presentation will delve into the strategies necessary to enhance the resilience of Caribbean hydrosystems. This presentation and key areas of discussion addresses the urgent need for critical infrastructure upgrades such as strengthening water supply systems through measures like diversifying water sources (e.g., rainwater harvesting versus desalination), improving water storage and distribution networks, enhancing leak detection and repair systems, and developing drought-resistant crops and water-efficient agricultural practices; implementing nature-based solutions (NbS) for stormwater management, such as green roofs and rain gardens, swales and bioswales, wetland restoration and creation, and improved stormwater drainage systems; and upgrading wastewater treatment plants to improve efficiency and resilience, exploring decentralised wastewater treatment options, such as on-site systems and constructed wetlands, and enhancing their capacity to handle increased rainfall volumes and potential flooding. Technological advancements are crucial, including utilising early warning systems for extreme weather events, real-time monitoring of water quality and quantity, remote sensing and Geographic Information Systems (GIS) for improved water resources management, and climate modelling tools to predict future water availability and demand. Developing and implementing robust water resource management policies and regulations, strengthening regional and national collaborations for knowledge sharing and resource mobilisation, and investing in research and development to advance climate change adaptation strategies for the Caribbean are essential. This presentation will emphasise the urgent need for a multi-faceted approach to building resilient water infrastructure in the West Indies. By integrating these sustainable engineering strategies and fostering strong partnerships among governments, researchers, and communities, the region can mitigate the impacts of climate change and ensure the sustainable availability of water resources for future generations.

Biography:

Professor Kiran Tota-Maharaj is a leading academic in Water Resources Management, Environmental Engineering, and Sustainable Infrastructure. He is Professor & Chair of Water Resources Management & Infrastructure at the Royal Agricultural University, Cirencester, England, UK as well as Technical Director of Water, Wastewater and Environmental Engineering at the Water Research Centre Ltd (WRc) based in Swindon, England, UK. Prof. Tota-Maharaj conducts pioneering research in water circularity, integrated water resources management (IWRM), and the Water-Energy-Food Nexus. His work focuses on developing nature-based solutions, enhancing urban water resilience, and advancing sustainable wastewater treatment. He has a strong track record of research publications, successful industrial collaborations, and prestigious awards. A passionate engineer and educator, Prof. Tota-Maharaj mentors aspiring scientists/engineers and is dedicated to fostering the next generation of water professionals.

Salem A. G. Saleh and Ismail Hakki Kara*
Karabuk University Engineering Faculty, Turkey

Microstructure Characterization and Corrosion Resistance of Zinc Alloys Modified by Sc

In this study, zinc-based alloys (Zn-Mg, Zn-Mg-Sc) were produced by conventional casting methods. The homogenization heat treatment for produced materials was applied for 4 hours at 300°C. Scanning electron microscopy (SEM) and X-ray Diffraction (XRD) methods investigated the microstructure of cast and homogenized materials. The corrosion of homogenized materials was measured in %3,5 NaCl solution at room temperature. SEM-EDX investigated the corroded surface of specimens to observe the corrosion mechanism. We observed the columnar and dendritic structure on the microstructure of homogenized materials. The addition of Sc on the Zn-Mg formed secondary phases that affected the corrosion resistance positively.

Biography:

SALEM A. G. SALEH is a PhD student at the Metallurgy and Materials Engineering Department at Karabuk University.

ISMAIL HAKKI KARA has completed his PhD study in 2019 at the Metallurgy and Materials Engineering Department at Karabuk University. He is the vice president of Department of the Metallurgy and Materials Engineering Department at Karabuk University. He has published more than 72 papers in reputed journals and Congress.

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HYBRID EVENT

SPEAKER PRESENTATION

DAY 1

Hadi Sarvari
Birmingham City University Department of Built Environment, B4 7XG, UK

Perceived Critical Success Factors (CSFs) in the Development of Construction Small and Medium-sized Enterprises (SMEs) in Developing Countries

An examination of the operations of small and medium-sized enterprises (SMEs) in developing countries demonstrates a strong and productive correlation between the socio-economic advancement of the nation and these entities. The increasing prevalence of SMEs in these countries, together with the implementation of supportive governmental policies in developmental issues, signifies that these enterprises present a distinctive opportunity for emerging societies. This study aims to analyse the critical success factors (CSFs) in the growth of construction SMEs in developing countries amidst the expansion of construction projects. The current research was carried out in 2024 utilising a descriptive survey methodology for applicable purposes. Consequently, the number of 40 experts from construction SMEs in developing countries was selected as a statistical sample based on snowball sampling. In this vein, a questionnaire encompassing four dimensions (project manager characteristics, project management and control, technology, and project environment) and comprising 38 CSFs was developed utilising two Delphi rounds following comprehensive literature review. The data analysis was done utilising SPSS and SmartPLS softwares through both descriptive and inferential statistics. The results demonstrated that all items and dimensions of the questionnaire are regarded as CSfs in the advancement of SMEs in developing countries. According to the Friedman test for dimensions ranking, the project manager's characteristics, technology, project management and control occupies, and project environment have the highest impact on the development of construction SMEs in developing countries. The study will assist major project stakeholders and SMEs in making development and innovation adoption decisions, particularly in developing countries.

Biography:

Dr Hadi Sarvari is presently a senior researcher at Birmingham City University. His research area focuses on construction safety and health and sustainability. He has also served as a researcher at the Hong Kong Polytechnic University and as an assistant professor in construction management at the Islamic Azad University Isfahan (Iran). In 2018, he was awarded the Best Lecturer Award in the educational field. He was also awarded as a distinguished researcher in 2021. He authored and co-authored more than 80 scientific articles and books in the following fields: PPP projects, safety and risk management, BIM, and maintenance management.

Mingzhi Wang*[1,2,3], Yushi Liu[1,2,3], Xu Yang[1,2,3], Liang Li[1,2,3]
[1]School of Civil Engineering, Harbin Institute of Technology, Harbin, C.N.
[2]Key Lab of Structures Dynamic Behavior and Control of the Ministry of Education, Harbin Institute of Technology, Harbin, C.N.
[3]Key Lab of Smart Prevention and Mitigation of Civil Engineering Disasters of the Ministry of Industry and Information Technology, Harbin Institute of Technology, Harbin, C.N.

Image-based Simulation of the Mesoscopic Environment-material Interaction

The latest development of 2D and 3D image recognition suggests a new path to investigate environment-material interaction during remediation. Porous media modelling is now available through image-based reconstruction, which provides a realistic boundary condition for chemical processes including dissolution, precipitation and reaction. This presentation demonstrates the algorithmic techniques including image segmentation, particle packing, computational fluid dynamics and computational chemistry in mesoscopic environment-material interaction. An innovative architecture is presented to efficiently establish a natural rock database with individual 3D printable volumes and surfaces. The database can be used to perform heterogeneous modelling with realistic aggregate input and distributive analysis of a specific constituent of interest. The necessity of customizing computer vision in the application of concrete composite is discussed with evidenced digital damage in the non-destructive measurement. A comparison with available reconstruction methods with feasibility is performed to demonstrate that characterizing practical porous media with detailed information on each constituent can provide a more realistic representation of the composite. The feasibility of such a proposal is evidenced by a discrete particle packing simulation scheme, which enables the generation of random 3D pore structures. The discrete packing model adopts a pre-existing algorithm and an improvement of pseudo-contact mechanics is introduced. An image-based model of heavy metal immobilization in wooden media is further presented as a well-established example. Digital testing methods are presented to calculate the surface area, specific surface area, density, porosity and immobilization amount. Three types of media are constructed for a comparison of immobilization capacity and efficiency. The computational approach provides a quantitative evaluation of the immobilized ions in arbitrary media. The proposed digital testing is feasible for both experimentally obtained images and structures from algorithm generation. In the end, the perspective of artificial intelligence is generally discussed based on data compatibility.

Keywords: Porous Media; Heavy Metal Immobilization; Heterogeneous Model; Image Segmentation; Multiphase Fluid.

Biography:

Dr. Wang studied Civil Engineering at the Harbin Institute of Technology (HIT) and the University of Birmingham. He received his double B.Eng in 2012. He then joined the Geotechnical and Environmental Research Group under the supervision of Prof. Abir Al-Tabbaa at the Engineering Department, University of Cambridge. After receiving his Cantab PhD degree in 2017, he began to conduct research and teaching under the supervision of Prof. Wei Wang in the School of Civil Engineering, HIT. He is now serving as an Associate Professor at HIT. He has published more than 20 research articles in SCI (E) journals.

Forrest Wu
[1]Happy Mareta, Lijou Engineering Consulting Co., Ltd, Hsinchu County, 30744, (ROC) Taiwan.
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[3]Daphne P L Chan, Lijou Engineering Consulting Co., Ltd, Hsinchu County, 30744, (ROC) Taiwan.

Innovative Eco-Friendly Housing Solutions Redefining Sustainable Living and Space Efficiency in Taiwan

The housing market in Taiwan reflects a critical need for affordable housing, compounded by a shortage of available land and an increasing demand for living space, which have caused housing prices to skyrocket. Despite these challenges, the growth of recent building technologies offers a distinctive opportunity to explore modular design as a potential solution. Such a design approach focuses on space-saving, affordability, and sustainability, providing a fresh perspective on addressing the housing crisis.

This research aims to address housing more thoughtfully, exploring new living styles that allow users to transform and personalize their spaces within budget and need constraints. By emphasizing rapid and affordable construction, this approach provides an innovative solution capable of relieving some of the current housing crisis symptoms. It enables households to access affordable, mobile, and environmentally friendly housing modules that suit their needs. Additionally, this modular design model promotes home ownership while simultaneously offering an attractive, profitable investment.

In the future, this modular housing concept could evolve into prefabricated housing to meet the growing demand for efficient living spaces in urban areas that are becoming increasingly crowded. A critical element of this design process is the inclusion of consumers in both design and assembly, creating new opportunities for personalizing living spaces. This consumer-focused strategy ensures that these homes are tailored to individual lifestyles while maintaining practicality and affordability.

Ultimately, the modular housing system is designed to allow occupants to live comfortably in relatively small spaces without compromising on essential conveniences such as a kitchen, bathroom, and bedroom. By combining sustainability, affordability, and adaptability, this project aims to redefine urban housing and create inclusive, innovative solutions that respond to modern needs.

- Enhanced Design Efficiency: Learn how modular design techniques can simplify the construction process, reduce costs, and save time while maintaining quality.
- Practical Sustainable Solutions: Understand how modular housing integrates environmentally friendly practices, addressing the demand for sustainable and responsible construction.
- Teaching and Research Applications: Faculty and researchers can use this framework to expand their studies or enrich curriculum materials related to urban housing, sustainability, and innovative design methods.
- Scalable Urban Housing Solutions: Discover how modular housing offers scalable solutions to meet growing urban housing demands, providing an approach that is adaptable to various market needs.

Keywords: Innovative Housing Technologies, Prefabricated House, Sustainable Housing, Compact Living, Green Construction

Biography:

Dr. Forrest Wu earned an MSc (1996) and PhD (2000) in Civil and Structural Engineering from the University of Sheffield. With over 20 years of experience, he is the Executive Director at Lijou Engineering Consultants and Assistant Professor at Minghsin University of Science and Technology. He specializes in foundation and bridge design, having worked as a structural engineer on Taiwan High-Speed Rail projects. Dr. Forrest Wu also holds leadership roles in professional associations, including President of the Hsinchu County Civil Engineering Association and Executive Director of the Taiwan Soil and Water Conservation Association, contributing significantly to academia and industry.

Michelle Maura Ribeiro
Pontifical Catholic University of Minas Gerais, Brazil

Geobim for Railroad Infrastructure – Modernizing Federal Public Management through the Adoption of BIM & GIS in the Context of Brazilian Cross-Investment and ESG

The Ferrovia de Integração Centro-Oeste (FICO), a strategic center west Brazilian railway spanning 383 kilometers, forms a key segment of Transcontinental Railway project, which aims to connect the Atlantic and Pacific Oceans, fostering economic integration and regional development across South America. The construction of FICO is enabled by an innovative cross-investment model involving Infra S.A. (Valec), ANTT, and the private mining company VALE. This groundbreaking financing approach blends public and private efforts to realize large-scale railway projects in Brazil.

Digital transformation in public management has become indispensable, particularly in this context, enhancing transparency and efficiency in project execution. Central to this transformation is the application of GeoBIM, integrating Building Information Modeling (BIM) and Geographic Information Systems (GIS). For FICO, GeoBIM consolidates technical, legal, environmental, and construction data through the Portal GeoBIM FICO+, an innovative platform that enables centralized and transparent lifecycle management of the project.

The adoption of these methodologies and technologies goes beyond innovation, aligning with ESG (Environmental, Social, and Governance) principles to promote environmental and social responsibility while modernizing governance in both public and private sectors. This digitized and integrated model optimizes processes related to engineering and environmental management, meeting the logistical demands of a growing economy.

The FICO GeoBIM successful use case exemplifies how technological innovation combined with strategic PPP public-private partnerships can transform Brazil's railroad infrastructure, establishing a new benchmark for future projects.

Keywords: GeoBIM, GIS, ESG, PPP, Railroad

Biography:

Michelle Maura Ribeiro, BIM Specialist, Master BIM Infra, Civil Engineer, Global BIM Manager, Digital Engineer. She is a Researcher, Professor, and Coordinator of the GeoBIM Infrastructure Postgraduate Program in Brazil and a speaker at renowned international institutions. She manages Multidisciplinary BIM Projects for High-Speed Trains in Europe in 4 languages, residing in Paris, France. She was Head of BIM and GIS Manager at Infra SA (VALEC) Ministry of Transport, implementing GeoBIM for Road-Rail Infrastructure in the Brazilian Federal Government. She wrote the first BIM Appendix for Rail Tendering in Brazil (Ferrogrão) by EPL and launched the first BIM Manual for Railways in Brazil in Public Consultation by Infra SA. She works directly with OpenBIM in the CoPIL of buildingSMART France and is part of BuildingSmart PT&BR, a BIM mentor at Infra Women BR, WIB Europe, IRAP's Women in Engineering, and SAEBrasil.

Duane Tristan Lawal
Melanized Limited, United Kingdom

Solar Integration Innovation - A Revolutionary Approach to Building Infrastructure through Integrated Solar Roofing Systems

The global transition to sustainable energy faces a critical challenge: the integration of solar technology into existing infrastructure without compromising architectural integrity or economic feasibility. This paper introduces the Integrated Solar Roofing System (ISRS), a revolutionary approach that transforms conventional roofing by seamlessly incorporating solar generation capabilities. The innovation lies in a proprietary roof casing system that doubles as both structural roofing and an energy generation platform, accommodating both operational solar panels and aesthetic dummy panels. This modular design allows for scalable implementation, enabling users to expand their energy generation capacity as needs grow by simply converting dummy panels to operational ones.

Our research demonstrates that this integrated approach achieves 20-22% solar conversion efficiency while maintaining complete architectural harmony. The system's power output of 400-600W per panel, combined with its weather-tight design and 25–30-year lifespan, presents a compelling solution for both developed and developing markets. The paper discusses how this technology addresses key market barriers, including initial cost constraints through innovative financing models, aesthetic concerns through seamless integration, and accessibility challenges through modular expansion capabilities.

Ongoing simulation and testing data indicates that the ISRS can reduce energy costs by 60-80% while increasing property values by 4.1%. Furthermore, the system's potential impact on global energy justice is significant, with particular relevance for the 789 million people currently lacking electricity access. The paper concludes by examining the technology's role in achieving sustainable development goals and its potential to revolutionize building-integrated photovoltaics.

Biography:

Duane embarked on his doctorate studies in Aerospace Science and Engineering at the University of Glasgow in 2011, and also holds Master degrees in Satellite Engineering and Geographical Information System from the Universities of Surrey and Manchester Metropolitan University respectively. He is the founder of Melanized Limited, a startup company heralding the sustainable engineering construction sector. He has published more several journal papers and remains committed to driving the presence and relevance of developing and emerging nations in space related activities. His current innovative work in sustainable energy solutions focuses on bridging the global energy access gap through technological innovation. Leading the development of the Integrated Solar Roofing System (ISRS), his vision combines technical excellence with social impact. Mr. Lawal's expertise spans renewable energy integration, sustainable infrastructure development, and innovative financing solutions for clean energy access.

Hadi Sarvari*[1], David J. Edwards [2], Iain Rillie [3]
Birmingham City University Department of Built Environment, B4 7XG, UK

Bridging to a Safer Future: Strategies for Integrating Safety I and Safety II in the Construction Industry

The construction sector is among the most hazardous sectors, with workers facing several dangers and hazards on a daily basis. Industrial safety management has conventionally emphasised a reactive strategy, referred to as Safety I, which seeks to mitigate accidents and incidents by identifying and controlling dangers. Safety II has a proactive approach on safety by emphasising the strengths and competencies of workers while promoting ongoing enhancement. Both Safety I and Safety II have faced criticism for their excessive emphasis on compliance (Safety I) and for the constraints imposed by executives (Safety II). This article intends to review, classify, and assess the potential integration of Safety I and Safety II within the construction industry. Therefore, a comprehensive literature review was done to identify and analyse the strategies for the integration of Safety I and Safety II. This evaluation emphasises the beneficial results attainable through the amalgamation of Safety I and Safety II within the construction sector. Furthermore, obstacles to implementing Safety I and Safety II plans were identified and examined. Extensive global research is necessary to comprehensively understand the obstacles to implementing Safety I and Safety II in practice; neglecting to investigate these factors will lead to a failure to reduce incidents. Adopting both Safety I and Safety II approaches is an optimal approach for the construction sector to guarantee worker welfare and project success..

Biography:

Dr Hadi Sarvari is presently a senior researcher at Birmingham City University. His research area focuses on construction safety and health and sustainability. He has also served as a researcher at the Hong Kong Polytechnic University and as an assistant professor in construction management at the Islamic Azad University Isfahan (Iran). In 2018, he was awarded the Best Lecturer Award in the educational field. He was also awarded as a distinguished researcher in 2021. He authored and co-authored more than 80 scientific articles and books in the following fields: PPP projects, safety and risk management, BIM, and maintenance management.

Anwaar Al Habsi[1,2]*, Salah Al Toubat[3]
[1] Department of Geoscience, UAE University
[2] National Water and Energy Center, UAE University
[3] College of Engineering, University of Sharjah

Advancing Self-Healing Concrete with Microbial Technologies and Sustainable Calcium Extraction in the UAE

The construction industry plays a pivotal role in global structure, yet it faces challenges such as material inefficiencies, maintenance costs, and environmental impact. One significant advancement is self-healing concrete, a transformative technology that enhances durability and reduces the need for repairs. In UAE, with its commitment to sustainable innovation and resource efficiency, this concept aligns perfectly with national development strategies such as UAE Vision 2030.

Traditional approaches to microbially induced calcium carbonate precipitation (MICP) technique in concrete crack repair rely on chemical calcium sources, which can be costly and environmentally taxing. Moreover, the management of by-products from microbial healing processes remains underexplored. Addressing these gaps, this research investigates the potential of MICP bacteria in conjunction with a natural, abundant calcium source from Jebel Hafeet—a unique geological feature of the UAE. Calcium ions are extracted through an innovative process using ammonium chloride, synthesized from recycled ammonium by-products generated during the MICP process. This closed-loop approach not only reduces waste and reliance on external chemicals but also enhances the environmental sustainability of self-healing concrete technologies.

To optimize bacterial viability and efficiency, this study employs freeze-drying techniques to encapsulate the bacterial spores, as this encapsulation ensures activation only upon crack formation, preserving the integrity of the concrete mix while maintaining the self- healing mechanism. The methodology integrates MICP with sustainable calcium extraction, ammonium recycling, and encapsulation techniques, creating a robust framework for green construction practices.

The proposed system is expected to significantly reduce material costs, environmental impact, and maintenance demands. By leveraging local resources and circular economy principles, this research aligns with the UAE's commitment to innovation and sustainability, offering a scalable solution for enhancing structure resilience. This study provides a unique framework for integrating local resources with microbial technologies, advancing self-healing concrete as a key contributor to the future of sustainable construction.

Keyword: Self-Healing Concrete, Microbially Induced Calcium Carbonate Precipitation (MICP), Calcium Sources, Ammonium Recycling, Encapsulation Techniques

Biography:

Anwaar Alhabsi, a master's student and research assistant at the United Arab Emirates University, has made her mark in material science and environmental sustainability. Her passion lies in exploring the interplay between concrete technology, soil formations, and bacterial processes, reflecting her drive to tackle pressing environmental challenges. Anwaar's academic journey has been shaped by her dedication to bridging disciplines, from hydrology to sustainable construction. A researcher at the National Water and Energy Center (NWAEC) at the UAEU, she aspires to reshape the future of civil engineering by promoting innovative, eco-friendly practices that inspire progress and address real-world challenges globally.

Srinath Tangaragu
Senior Project Engineering Manager – GE Vernova, United Kingdom

40% Increase in House Efficiency by Preparing for Artificial Intelligence

Artificial Intelligence, we have seen massive growth with many solutions being shared and provided. In reality all the organizations are relying on the contractors or 3rd party software provider to get it moving. The basic of Ai is to ensure all the basic are ready and incorporate to Ai when the time allows.

There are many factors and ways this can be achieved. The readiness of Ai will be able to optimize the cost to launch or introduce Ai in the organization. Additionally, the readiness will able to share the ultimate truth of the organization. This enables visibility of areas of improvement.

The readiness and preparation will than gain OPEX and CAPEX savings. This will generate a lean operating organization.

Biography:

UK chartered engineer with advisory (UK and US standards) and senior leadership experience of more than 20 years in experience in Oil & Gas, Renewables Energy & Engineering. Extensive working with diverse culture & leadership. Strong data analytical skills & proven track record in operations, maintenance, engineering & projects.

Rui Pang*[1,2], Tianpeng Zhang[1], Guangkai Song[1], Lanbo Zhang[1], Longji Dang[1], Wenkang Wang[1]

[1]College of Civil Engineering, Henan University of Technology, No. 100 Lianhua Street, Gaoxin District, Zhengzhou, China

[2]Henan Key Laboratory of Grain and oil storage facility & safety, No. 100 Lianhua Street, Gaoxin District, Zhengzhou, China

Experimental and Analytical Study on Vertical Bearing Behavior of Discretely Connected Precast Concrete Floors with Four Sides Simply Supported

Floor is a horizontal load–bearing member in a building designed to bear and transmit gravity and lateral loads to the vertical load–bearing members. In order to transmit internal forces generated by vertical and horizontal loads through its slab joint connections, a creative discretely connected precast concrete floor (DCPCF) was proposed. The slab joint connections utilize hybrid connectors containing hairpin connectors (HPC) and cover-plate connectors (CPC). The validity of this design concept was confirmed through Previous studies. However, the mechanical properties of DCPCF are not very clear.

In order to further investigate the load transfer mechanism and vertical bearing capacity of DCPCF, and the influence of factors such as the number of connectors, the number of PC slabs, and the type of connectors, a two-stage research program was conducted. The first step involved assessing the vertical bearing capacity of DCPCF in the OSL direction under the condition of simple support at two ends. Six DCPCF specimens and two cast-in-situ (CISS) specimens were tested and analyzed. During this stage, the influence of parameters such as the number of slab joints and connectors on the force transfer performance of DCPCF in the OSL direction was analyzed, providing a basis for establishing the bending stiffness of DCPCF in the OSL direction. The second step focused on assessing the vertical bearing capacity of DCPCF under the condition of simple support at four sides. Two DCPCF specimens and one CISS specimen were tested and analyzed. During this stage, the primary focus was on the two-way load transfer mechanism and vertical bearing capacity of DCPCF, with the main goal being to establish the calculation method for DCPCF's bearing capacity and deformation under four-sided support conditions. This paper primarily presents the results of the second stage of research.

The results showed that DCPCF had high bending stiffness and bearing capacity, which the same as those of CISS basically. The discrete slab connectors of DCPCF specimens exhibited good force transmission performance throughout the loading process, and no obvious local failures were observed. The flexural deformation shape, failure mode, and crack distribution of DCPCF were similar to those of CISS, which indicating that the slab joint connections can effectively transfer internal force in the orthogonal slab laying direction (OSL direction), and giving DCPCF the characteristics of a typical two-way slab floor. In addition, the initial stiffness and deformation of DCPCF specimens was slightly smaller than that of the CISS specimen, which shown that DCPCF had better deformation recovery ability. Compared with the CISS specimen, DCPCF specimens exhibited no obvious plastic stage and entered the nonlinear working stage earlier. A problem worthy to be pointed out was that simplified formulas for the equivalent bending stiffness

of DCPCF in the OSL direction were derived by using the conjugate beam method. Furthermore, the vertical bearing capacity and deflection equations of DCPCF with simply supported on four sides under a uniform distributed load were derived based on the small deflection theory of orthotropic elastic thin slabs, and the theoretical calculation values were in good agreement with test values.

Biography:

Prof. Rui Pang received his Ph.D. from Southeast University in January 2012. He is now the deputy director of the science and Technology Department of Henan University of Technology. His research focuses on prefabricated concrete structures, steel structures, super-high-rise buildings, and new warehouse structures. He has led 3 National Natural Science Foundation projects, 3 provincial-level projects, and over 10 industrial research projects. He has published more than 80 papers, including over 40 SCI/EI-indexed articles, and holds over 10 national invention patents. He has also edited and co-authored several national standards and textbooks.

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HYBRID EVENT

Zoom Meeting (GMT+1) Time in London, UK

VIRTUAL PRESENTATIONS

DAY 2

Piyali Halder[1]*, Indrajit Mondal[1]*, Sukhen Das[1]
Department of Physics, Jadavpur University, Kolkata-700032, India

Piezo- Bio-Nanocomposite Membrane for Simultaneous Organic Pollutant Degradation and Clean Energy Generation from Wastewater

Amidst the growing global energy crisis and environmental degradation, the development of innovative materials that can simultaneously address energy generation and wastewater treatment is crucial[1]. Herein, we have designed a durable, flexible, and reusable composite membrane incorporating chitosan (CHS), one-pot hydrothermally synthesized phosphorene nanosheets (BP), and CTAB-assissted hydrothermally synthesis zirconium oxide (ZO) nanoparticles. This ternary bio-nanocomposite was fabricated using the solvent casting method, and its structural integrity was confirmed through comprehensive characterizations, highlighting the successful integration of polar phases, BP, and ZO. This piezo-responsive membrane demonstrated remarkable energy harvesting capabilities, generating a piezoelectric voltage of 4.1 V and a current of 1.5 μA under the perpendicular flow of water droplets, with a power density of 50 Wm-3. Beyond energy generation, the membrane exhibited superior piezocatalytic activity under ultrasonication, effectively degrading carcinogenic dyes such as methylene blue (MB, 89.93%), Congo red (CR, 99.2%), methyl orange (MO, 82.37%), and a 1:1 MB-CR mixture (76.35%) within 35 minutes. Optimized conditions of alkaline pH, 60 W ultrasonic power, and 2.5 ppm dye concentration further enhanced its degradation efficiency. Field tests demonstrated its practical viability, achieving 96.21% degradation in drinking water and 98.23% in wastewater. Additionally, a water flow-driven piezoelectric catalytic system consumed only 1.2% of the energy required by traditional ultrasonic systems, emphasizing its energy efficiency and scalability for practical applications. Degradation mechanisms were investigated through LC-MS analysis and frontier molecular orbital theory, and reduced ecological toxicity was verified using phytotoxicity assays on tulsi (Ocimum tenuiflorum) plants. The membrane also achieved over 90% degradation of pharmaceutical pollutants like ciprofloxacin and tetracycline within 60 minutes of ultrasonication and displayed over 99% antibacterial activity against both Gram-negative (E.coli) and Gram-positive (E. faecalis). ROS quantification confirmed the synergistic role of BP in enhancing the piezocatalytic performance of the ZO composite membrane compared to membranes with only CHS or CHS-BP. This novel, multifunctional membrane provides a sustainable solution to the dual challenges of energy scarcity and water pollution. Its energy-efficient, scalable design positions it as a promising candidate for large-scale environmental remediation and renewable energy generation

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Piezo- Bio-Nanocomposite Membrane for Simultaneous Organic Pollutant Degradation and Clean Energy Generation from Wastewater

Amidst the growing global energy crisis and environmental degradation, the development of innovative materials that can simultaneously address energy generation and wastewater treatment is crucial[1]. Herein, we have designed a durable, flexible, and reusable composite membrane incorporating chitosan (CHS), one-pot hydrothermally synthesized phosphorene nanosheets (BP), and CTAB-assissted hydrothermally synthesis zirconium oxide (ZO) nanoparticles. This ternary bio-nanocomposite was fabricated using the solvent casting method, and its structural integrity was confirmed through comprehensive characterizations, highlighting the successful integration of polar phases, BP, and ZO. This piezo-responsive membrane demonstrated remarkable energy harvesting capabilities, generating a piezoelectric voltage of 4.1 V and a current of 1.5 μA under the perpendicular flow of water droplets, with a power density of 50 Wm-3. Beyond energy generation, the membrane exhibited superior piezocatalytic activity under ultrasonication, effectively degrading carcinogenic dyes such as methylene blue (MB, 89.93%), Congo red (CR, 99.2%), methyl orange (MO, 82.37%), and a 1:1 MB-CR mixture (76.35%) within 35 minutes. Optimized conditions of alkaline pH, 60 W ultrasonic power, and 2.5 ppm dye concentration further enhanced its degradation efficiency. Field tests demonstrated its practical viability, achieving 96.21% degradation in drinking water and 98.23% in wastewater. Additionally, a water flow-driven piezoelectric catalytic system consumed only 1.2% of the energy required by traditional ultrasonic systems, emphasizing its energy efficiency and scalability for practical applications. Degradation mechanisms were investigated through LC-MS analysis and frontier molecular orbital theory, and reduced ecological toxicity was verified using phytotoxicity assays on tulsi (Ocimum tenuiflorum) plants. The membrane also achieved over 90% degradation of pharmaceutical pollutants like ciprofloxacin and tetracycline within 60 minutes of ultrasonication and displayed over 99% antibacterial activity against both Gram-negative (E.coli) and Gram-positive (E. faecalis). ROS quantification confirmed the synergistic role of BP in enhancing the piezocatalytic performance of the ZO composite membrane compared to membranes with only CHS or CHS-BP. This novel, multifunctional membrane provides a sustainable solution to the dual challenges of energy scarcity and water pollution. Its energy-efficient, scalable design positions it as a promising candidate for large-scale environmental remediation and renewable energy generation

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Consumer behaviour and decision-making process: A study of solar energy storage adoption among residential users in Australia

Australia's renewable energy target (RET) has significantly driven the nation's transition to renewable energy, making it a global leader in residential solar adoption. This proliferation has naturally led to an increased interest in the next wave of consumer-driven technology: solar energy storage (SES) Understanding the motivations behind the adoption of Solar Energy Storage (SES) is crucial. This study involves conducting semi-structured interviews with 30 participants. The study reveals that several key factors motivate end-users to adopt SES. Primary among these is the desire to reduce electricity bills and the desire to achieve energy independence. Positive experiences with solar panel installations significantly impact the decision to adopt SES. Trust in the brand and the reputation of the installation company also emerge as crucial factors. Government incentives are highlighted as major drivers of adoption, making the initial investment more palatable and financially feasible for consumers. However, the study also identifies several barriers to SES adoption. A significant barrier is the lack of information and awareness about battery storage technologies. Despite a growing interest in SES, many consumers remain uninformed about the benefits and functionalities of these systems. The study underscores the need for comprehensive consumer education to bridge the awareness gap and facilitate informed decision-making. Concerns about cost and the return on investment are also prevalent. Potential adopters often struggle with understanding the long-term financial benefits of SES. However, barriers such as lack of information, concerns about cost and return on investment, and the credibility of companies must be addressed to accelerate SES adoption.

Keywords: Residential solar; Solar energy storage (SES); End-users; Adoption

Biography:

Dr. Nikhil Jayaraj is the Managing Director of Regen Power Pty Ltd, a leading renewable energy solutions company in Australia. With 14 years of experience in renewable energy, he has developed expertise in sustainability, solar energy, and energy storage. He completed his DBA from Curtin University, focusing on "Transition towards Solar Energy Storage: A Multilevel Perspective." Academically, he has published in journals such as Energy Policy and participated in international conferences. Notably, he received the Best Speaker award at the World Renewable Energy Conference 2023. Additionally, he serves as an Adjunct Researcher at Curtin University's School of Management and Marketing.

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A Simple Strategy for Single-crystalline GaS Flakes and its Self-powered Photodetection Performance

Gallium sulfide (GaS), one of the MX (M= Ga, In, X = S, Se, Te) layered metal monochalcogenides semiconductors, has been the subject of extensive research. The band gap of GaS ranges from 3.05 eV to 2.6 eV as the number of layers increases from monolayer to bulk, which renders GaS more suitable for blue-ultraviolet photodetection applications. However, the "bottom-up" production process of GaS faces significant challenges due to the ease formation of nanostructures, generation of by-products such as Ga2S3, and/or the overall high production costs. Herein, high quality GaS were obtained directly on Ga metal surfaces via the chemical vapor deposition strategy. The single-crystalline characteristic of the fabricated GaS was demonstrated by X-ray diffraction, Raman spectroscopy, and transmittance electron microscope analysis. Metal- semiconductor-metal structured photodetectors based on GaS nanosheets were constructed. The device exhibits self-powered photodetection performance with a responsivity as high as 40.1 mA/W and a detectivity of 1 × 1010 Jones, respectively, under a 365 nm light illumination. The work provides a viable reference for the preparation of GaS and the advancement of photodetectors for other monochalcogenides.

Biography:

Xiaohong Ji has completed her PhD from Nanyang Technological University in 2006. She is currently a professor at the School of Materials Science and Engineering, South China University of Technology. Her research activity focuses on low-D functional materials, including III-V nitrides, 2D transition metal dichalcogenides, MXenes, for opto-electronic and new energy storage applications.

Evgeny Grigoryev
Merzhanov Institute of Structural Macrokinetics and Materials Science Russian Academy of Sciences, Russia

Features Of High-Voltage Consolidation Of Powder Materials

The main features of the method of high-voltage consolidation of powder materials and the resulting advantages and limitations of this method are considered. The short duration of high-temperature exposure in the process of high-voltage consolidation makes it possible to preserve the structural-phase state of the initial powder material in the consolidated compact material. A feature of this method is the high density concentration of the released energy in the area of contacts between powder particles. The formation of the structure of a powder material during high-voltage consolidation is determined by processes of different scales occurring at interparticle contacts, in powder particles and in the bulk of the entire sample. Further development of this method is associated with a detailed experimental study of thermal processes during high-voltage consolidation of powder materials using pulsed photometry. Registration of the parameters of a high-voltage current pulse and the intensity of thermal radiation of the consolidated powder materials was carried out using a measuring complex developed by the authors. This complex includes: a Rogowski coil with an integrating circuit, which registers the parameters of a high-voltage current pulse; photodiode sensors that register the intensity of thermal radiation, which is transmitted through a special optical waveguide from consolidated powder compacts; systems for triggering and synchronizing the components of the measuring complex. The analysis of the emerging thermal electromagnetic radiation from the surface of the consolidated powder sample in the process of high-voltage consolidation is carried out in the visible radiation range

Biography:

Dr. Evgeny Grigoryev studied theoretical nuclear physics at Moscow Engineering Physics Institute, Russia and graduated as MS in 1975. He received his PhD degree in 1980 at the same institution. He has the next work experience In Moscow Engineering Physics Institute: from Researcher, to Chief of Key Laboratory of Electromagnetic Field-Assisted Methods for Processing of Novel Materials. Since 2017 to the present, Grigoryev is the Head of the Laboratory of High-Energy Methods for the Synthesis of Ultrahigh-Temperature Ceramic Materials in ISMAN. He has published more than 180 research articles in SCI(E) journals, 23 patents.

Kirk Phillips
Air Force Office of Energy Assurance (AF OEA), USA

Accelerating Installation Energy Resilience for Mission Assurance

The Air Force Office of Energy Assurance (AF OEA) strives to deliver reliable, resilient base load energy to power installations and ensure mission success by addressing energy challenges with impactful combination solutions utilizing cutting-technologies renewable energies such as solar, wind, geothermal, microgrids, and geologic hydrogen. The execution of sustainability efforts is made possible through the development of strong partnerships with technology innovators, energy suppliers, and energy service companies (ESCOs). AF OEA will highlight how these stakeholders can continue working closely with the Air Force through mutually beneficial third-party financing methods, including Energy-as-a-Service (EaaS) which enables ESCOs to design, build, own, and manage assets that reduce energy consumption and deliver resilience; ultimately the service provider utilizes the savings to pay off capital costs and earns profit from multi-decade contracts (EPCs). Additionally, we will present on and encourage more ground-breaking pilot demonstrations of new technologies, including new nuclear and long-duration energy storage, and share how these new innovations achieve national security mission in a carbon-pollution-free manner.

Biography:

OEA). AF OEA serves as the integrator of energy and water resilience efforts by ensuring projects align with installation needs and with the three goals of the Department of the Air Force (DAF) Installation Energy Strategic Plan — identify enabling system vulnerabilities, improve resilience planning, and ensure resilience results.

Prior to his current position, Kirk was the Health Safety and Environmental Practice Leader and Vice President at LJB Inc. and worked as a thought leader with the American Industrial Hygiene Association on Total Exposure Health.

Salem A. G. Saleh and Ismail Hakki Kara
Karabuk University Engineering Faculty, Turkey

Microstructure Characterization and Corrosion Resistance of Zinc Alloys Modified by Sc

In this study, zinc-based alloys (Zn-Mg, Zn-Mg-Sc) were produced by conventional casting methods. The homogenization heat treatment for produced materials was applied for 4 hours at 300°C. Scanning electron microscopy (SEM) and X-ray Diffraction (XRD) methods investigated the microstructure of cast and homogenized materials. The corrosion of homogenized materials was measured in %3,5 NaCl solution at room temperature. SEM-EDX investigated the corroded surface of specimens to observe the corrosion mechanism. We observed the columnar and dendritic structure on the microstructure of homogenized materials. The addition of Sc on the Zn-Mg formed secondary phases that affected the corrosion resistance positively

Biography:

SALEM A. G. SALEH is a PhD student at the Metallurgy and Materials Engineering Department at Karabuk University.

ISMAIL HAKKI KARA has completed his PhD study in 2019 at the Metallurgy and Materials Engineering Department at Karabuk University. He is the vice president of Department of the Metallurgy and Materials Engineering Department at Karabuk University. He has published more than 72 papers in reputed journals and Congress.

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Investigation of Heat and Mass Transfer during Thermal Runaway of Li-ion Batteries: Focus on the Role of Solid particles

Li-ion batteries are valued for their high energy density, efficiency and long life, making them essential for electric transportation, portable devices and renewable energy storage. Despite these advantages, they pose significant safety risks, as incidents of fires have been reported. These risks arise when batteries are exposed to external factors or manufacturing defects, which can lead to thermal runaway (TR) - an internal exothermic reaction between the anode, the cathode and the electrolyte. This results in a sudden energy release, flammable gases and particles released, and eventually explosion of the cell. The literature review reveals that numerous studies have investigated the heat and mass transfer during TR under various test setups and operating conditions, resulting in significant variability in the data. However, determining the potential risks remains challenging due to this variability. Therefore, there is a need to study the same cell in different experimental setups using the same methodology. This is the aim of this study, where energy and mass transfer are compared between two experimental setups with different volumes: a small tube calorimeter and a larger volume calorimeter, under two environmental conditions air and vacuum. The primary finding of this study is that the TR energy is independent of the experimental set-up when oxygen is absent, preventing the combustion of ejected gases and particles. The second finding is that combustion of the ejected gases and particles, as observed in the larger volume calorimeter, results in a threshold increase in TR energy. In this study, the focus is on the physical and chemical compositions of the ejected particles collected in both devices, including particle size distribution, morphological analysis, specific surface area, chemical bond analysis and phase identification. The feasibility of predicting particle composition by means of a numerical study conducted at thermodynamic equilibrium is also being investigated, in order to gain a better understanding of the phenomenon.

Biography:

Charbel NOUHRA obtained a bachelor's degree in mechanical engineering from the Lebanese University and a Master 2 in fluid dynamics from INSA Toulouse in 2022. I then started my PhD in November 2022, at CEA LITEN in collaboration with ICARE CNRS France. My research focuses on the experimental study of heat and mass transfer during thermal runaway of Li-ion cells.

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