

Abstracts

Prof Robert Mokaya

"Porous Carbons as Sustainable Energy Materials"

The talk will explore the conversion of biomass and other waste carbonaceous matter to porous carbons with optimised properties for use in energy storage applications, and specifically the storage of CO₂, hydrogen or methane. The talk will describe how study of a wide range of biomass and non-biomass precursors has enabled the preparation of porous carbons with optimised properties for specific energy storage applications in a predictable and targeted manner.

Prof Kalwant Bhopal

"BME Experiences in Higher Education: Social Justice, Inclusion and White Privilege"

The talk will examine how ethnic minority staff and students remain marginalised in higher education. It will provide statistical data on the inequalities experienced by staff and students, followed by empirical research on Black and minority ethnic academics in UK and US higher education. The lecture will also explore how processes of whiteness and white privilege work to perpetuate the white space of higher education. The lecture will conclude by examining possible ways forward for higher education to engage with a socially just agenda for the inclusion of all groups.

Prof Olanrewaju Sorinola

"Female Pelvic Floor Dysfunction; Do we have all the answers?"

Even with great care during labour and delivery, significant postnatal morbidity, mostly from damage to the pelvic floor, has been observed to occur and many women are unaware of the possible impact of this on their future health. This talk seeks to challenge the commonly held notion that we already know everything about the female pelvic floor and how it functions during pregnancy, labour and delivery. It will also explore ways my research has led to different thinking and how the Urogynecology field has advanced to promote better pelvic floor care and improve women's health

Prof Karuna Sampath

"Building a Body Plan: Lessons From a Fish"

My group's research focuses on fundamental mechanisms that control development and differentiation of embryos using zebra fish as an animal model of human development and disease in addition to cultured human cells as experimental systems. Through experimental, computational and modelling analyses, the mechanisms that control progenitors in early embryos, and how these are disrupted in certain congenital diseases are explored. In this talk, focus will be on how the heart develops and is positioned.

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Dr Siri Chongchitnan

"Cosmology:
Modelling the
Universe"

This talk will explain how mathematics, statistics, physics and computing work together to bring us closer to understanding of the origin of the Universe.

Dr Lyla Latif

"Fostering African
Fiscal Voices"

This talk will focus on the establishment of a think tank to challenge dominant male white international tax law narratives. NB: A think tank is a research institute that performs research and advocacy concerning certain topics.

Dr Vishalakshi Roy

"Evaluation of
Cultural Leadership
Programme
AD:Vantage (2020)"

A study investigating the impact of the pilot project, Creative Leadership Programme AD:Vantage. The programme was delivered in Coventry (2020/2021) and placed the vantage point of d/Deaf, neurodivergent and disabled creative practitioners at the heart of leadership. Funded by Coventry City Council

Dr. Fayrouz Elmaddah

"Rapid Yeast-
mediated Cloning
and Engineering
of Natural
Product
Biosynthetic Gene
Clusters"

This talk explores the employment of Transformation-associated recombination (TAR) cloning to clone biosynthetic gene clusters (BGCs) for two antibiotics: Enacyloxin II and Vibroxin, which have promising activity against multidrug-resistant *Acinetobacter baumannii*. These antibiotics are biosynthesised by the bacteria *Burkholderia ambifaria* and *Vibrio rhizosphaerae*, respectively. Their biosynthesis involves a modular polyketide synthase (PKS), a multienzyme that assembles and modifies acetate-derived units to create a structurally complex hydrocarbon chain.

Dr Wei Hei

"Flexible Low-
carbon Energy
Solutions for
Using Renewable
Energy"

Achieving a net zero by 2050 is extremely challenging, as it requires drastic changes in how we use energy across sectors. Renewable energy sources are promising alternative green generation, but the intermittency of these energy sources presents a great challenge to the energy reliability and security in on-grid and off-grid energy systems. My research is looking at flexible low-carbon solutions in energy storage and demands for facilitating the integration of renewable energy generation.

Abstracts

Dr Munehiro Asally

"Bacterial
Electrophysiology
Makes Live
Bacteria Detection
Easier and Faster"

Bacteria are everywhere. They have various positive and negative impacts on human life. Therefore, detecting live bacteria is an important task in our society. We discovered that bacterial electrophysiological dynamics correlate with the cell's capacity to grow. Based on this finding, we formed a University spinout, Cytecom. I will present the story of making this discovery, starting a spinout, and future research of bio-electrical engineering.

Dr. Ojodomo Achadu

"Sustainable
Magnetoelectric
Nanogenerator to
Convert Ambient
Stray Magnetic
Noise to Electricity"

We are surrounded by low-frequency magnetic fields generated by electrical power lines and consumer electronics. As a by-product of electric current flow, the stray magnetic field causes electromagnetic interference and noise pollution, threatening data security and human health. Similar to sunlight and wind energy, the abundant electromagnetic waste energy can be renewably harvested by using electromagnetic nanogenerators and converted into kinetic energy and useful electricity. Recently, bio-inspired commodity polymer hybrids utilizing bacteria and DNA, as fillers, exhibit high power output and an impressive energy conversion efficiency. This shed light on the prospects of deploying bio-engineered piezoelectric polymers materials for fabricating energy generators and smart sensors. To overcome the current technical limitations of inorganic materials -based magnetic energy generators, our work develops soft and flexible magneto-mechano-electric (MME) generators by integrating novel 3D nanostructured magnetic materials to bio-organic-inspired semicrystalline organic piezoelectric polymers for efficient and sustainable magnetic energy harvesting and conversion.

Dr Modupe Jimoh

"My Water Story"

This talk is focused on the presenter's water research journey. It covers what informed their choice to specialise in water and environmental engineering, their research into sustainable water supply, human interactions with water and the relationship between water systems and healthy environments. The session hopes to inspire you to take a different approach to your choices around water issues.

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Shayantan Chaudhuri

"Computational and Spectroscopic Characterisation of Oxygen-Terminated Diamond (110) Surfaces"

Polished polycrystalline diamond predominantly exhibits (110)-texture, yet there are a lack of both experimental and theoretical studies on this surface. In this research, the oxygenation state of the (110) surface is determined using a combination of density functional theory calculations and X-ray photoelectron spectroscopy (XPS) experiments. It was found that in the 0-1000 K temperature range, the phase diagram of the (110) surface is dominated by a highly stable phase of coexisting adjacent carbonyl and ether groups, while the stability of peroxide groups increased at low temperatures and high pressures. These findings were further corroborated by comparing simulated core-level binding energies with experimental XPS data.

Dr. Sharmila Balamurugan

"Tomographic Entanglement Indicators from NMR Experiments"

In this talk, entanglement indicators in the case of spin systems are introduced. The entanglement indicators are computed from actual experimental data obtained from three liquid-state NMR experiments and compared with standard entanglement measures calculated from the corresponding density matrices, both experimentally reconstructed and numerically computed. The gross features of entanglement dynamics and spin squeezing properties are found to be reproduced by these entanglement indicators. However, the extent to which these indicators and spin squeezing track the entanglement during the time evolution of the multipartite systems in the NMR experiments is very sensitive to the precise nature and strength of interactions as well as the manner in which the full system is partitioned into subsystems.

Dr. Anjana Wijesekara

"Enhancing the Stability of Tin-halide Perovskite Photovoltaics"

This talk will present results relating to an unencapsulated organo-tin halide PPV device exhibiting exceptional stability when tested under continuous one sun solar illumination in ambient air under electrical load. This is made possible by the use of a bathocuproine | copper cathode in an inverted device architecture. In comparison to the conventional silver electrodes, compact copper electrodes were found to be far more resistant to corrosion by I₂ gas evolved when organo-tin halide decomposes. Results also showed resistance towards adverse morphological evolution and ingress of oxygen and water molecules through the top electrode into the device. The findings of this work therefore show that copper should be the metal of choice for the reflective cathode in inverted tin PPVs when the material interfacing the metal interacts strongly with it, enabling compact film formation and a stable interface towards copper diffusion into the adjacent charge transport layer.

Abstracts

Dr Seley Gharanei

"Adipose Tissue Inflammation"

Excess adipose tissue accumulation and obesity are characterised by chronic, low-grade, systemic inflammation. Nesfatin-1 is a neuropeptide derived from the precursor protein nucleobindin-2 (NUCB2), which was initially reported to exert anorexigenic effects. The present study aimed to investigate the effects of an obesogenic diet (OD; high-fat, high-sugar) in NUCB2/Nesfatin-1 knockout (KO) mice and of nesfatin-1 treatment in LPS-stimulated 3T3-L1 preadipocytes. Our findings indicate that an obesogenic diet can induce significant inflammation in the ScWAT of NUCB2 KO mice, involving the HMGB1, NRF2 and NF- κ B pathways, whilst nesfatin-1 reduces the pro-inflammatory response in LPS-stimulated 3T3-L1 cells. These findings provide a novel insight into the metabolic regulation of inflammation in WAT.

Dr. Sreehari Perumanath

"Droplet Coalescence: from the Beginning to the End and Beyond"

Droplet-based systems appear in various aspects of our daily lives: from atmospheric storm cloud formation to next-generation micro/nano-fluidic devices. Coalescence of droplets and their wetting of various surfaces in these systems are very common and aid in processes such as mixing and heat transfer. In this talk, a new understanding of droplet dynamics pertaining to their coalescence, wetting and jumping is provided and their potential to various engineering applications - such as nanoscale heat transfer and self-cleaning surfaces - are exhibited.

Dr. Anusuya Pal

"Drying Droplets of Human Blood: Fundamentals to Disease Diagnosis"

A bio-colloidal drying droplet (such as blood, tear, saliva, etc.) has the potential to predict an individual's risk of a pathological condition by tracking the evolving drying patterns within the droplet and the final dried film morphology. This presentation focuses on the physics of different pattern formations in a complex whole human blood droplet by varying the initial concentration from 100 (undiluted) to 12.5% (v/v) using bright-field optical and scanning electron microscopy.

Jungyeon Kim

"Poly (2-Oxazoline) Graft Copolymers with Vinyl Monomers via a Grafting From Approach"

The combination of two polymerisation techniques can be an advantageous route for incorporating monomer classes which would otherwise not be compatible, an example being 2-oxazolines and vinyl monomers. Poly (2-oxazoline)s are incredibly versatile and a powerful class of polymers that have been used in biological applications, as well as industrial applications in adhesives and lubrications. Here, we demonstrate that the cationic polymerisation of 2-oxazoline can be coupled with controlled radical polymerisation (CRP) through functionalisation of a 2-oxazoline monomer with either an initiator or chain transfer agent for CRP.

Abstracts

Dr. Mahender Kumar

"Cloud-centric Internet-of-Medical-things-enabled Smart Healthcare Systems"

This talk presents a state-of-the-art secure and efficient cloud-centric IoMT-enabled smart healthcare system with public verifiability. The system novelty implements an escrow-free identity-based aggregate signcryption (EF-IDASC) scheme to secure data transmission, which is also proposed in this article. The proposed smart healthcare system fetches the medical data from multiple sensors implanted on the patient's body, signcrypts and aggregates them under the proposed EF-IDASC scheme, and outsources the data on the medical cloud server via smartphone. The system does not reveal any information about the identity and medical data of the patient.

Wilgner Lima da Silva

"Hydrothermal Synthesis of a Novel Rutile $\text{Fe}_{0.8}\text{Nb}_{1.5}\text{O}_{4.6}$ and its Orthorhombic Polymorph as Negative Electrodes for Li-ion batteries."

With electrification of society, the discovery of materials with higher energy densities, Li-ion storage capacities, and substantial stability at low voltages compared to graphite (theoretical capacity of $372 \text{ mA}\cdot\text{h}\cdot\text{g}^{-1}$) is essential, but greener synthetic routes must also be the way forward. In this talk, we report the hydrothermal synthesis of a novel rutile $\text{Fe}_{2+/3+0.8}\text{Nb}_{1.5}\text{O}_{4.6}$ at 240 C for 48 hours in basic solution using stoichiometric ratios of Nb/Fe precursors.

Sabeeha Malek

"The Role of Cell Mechanobiology in the Pathogenesis of the Ehlers-Danlos Syndromes"

The Ehlers-Danlos Syndromes (EDS) are a group of 13 multisystemic and debilitating connective tissue disorders, which affect the fragility and elasticity of the tissues and the stability of joints. They are categorised as disorders of collagen since most EDS subtypes are caused by mutations in collagen-related genes. However, no EDS-specific collagen abnormality has yet been identified, and the mechanism of the disease remains poorly understood. In this talk, I will describe our proposal for the first ever scientifically defined patho-mechanism for EDS. We hypothesise that the disease-specific collagen abnormality in EDS lies in a fault with the way collagen binds to cell membranes. This may trigger an abnormal cytoskeleton response which could have consequences for the mechanobiology of EDS cells, and in turn, could affect the mechanical properties and integrity of the connective tissue. Preliminary observations supporting this theory will also be discussed.

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Shaumica Saravanabavan

"Solar-assisted Oxygen Production for Long-term Space Travels"

For the realisation of long-term space travels, a 90% oxygen recovery target is necessary. This poster discusses the use of monolithic solar devices to split water into hydrogen and oxygen products via electrochemical reactions (e.g. the hydrogen evolution reaction - HER). Different design aspects are assessed including the use of a tandem/triple cell as a means to provide enough photovoltage to drive the HER reaction. The choice of electrode material, electrocatalysts and performance of the devices under free-fall is also examined.

Folusho Balogun

"Untangling Free Carrier and Exciton Dynamics in Layered Hybrid Perovskites using Terahertz and Transient Absorption Spectroscopy"

Progression in the field of metal halide perovskites have resulted in highly efficient solar cells with 25.7 % power conversion efficiency (PCE). However, a challenge that affects progress of metal halide perovskites is their chemical stability in the presence in UV light, water, and heat. An alternative approach is using Layered perovskites (LPKs), also called 2D metal halide perovskites), which have interlayers of hydrophobic insulating organic cations which prevent degradation caused by water. In this poster, optical-pump/THz-probe (OPTP) spectroscopy is used to analyse the underlying mechanisms occurring within LPKs.

Gurneet Dhanoa

"Investigation of the Localisation of FtsZ in Pathogenic E. coli upon Bacteriophage Addition in a Human Cell Model as a Biomarker for Antibacterial Agents"

Escherichia coli is one of the most common Gram-negative pathogens and is responsible for infection leading to neonatal meningitis and sepsis. The FtsZ protein is a bacterial tubulin homolog required for cell division in most species, including E. coli. Agents that block cell division have been shown to mis-localise FtsZ, including the bacteriophage λ encoded Kil peptide, resulting in defective cell division and a filamentous phenotype, and therefore FtsZ may be an attractive target for new antimicrobials. My research therefore explores the localisation of FtsZ in pathogenic E. coli so as to establish how/if localisation changes upon infection. The effect and/or mechanism of E.coli specific bacteriophages on the localisation of FtsZ in a human cell environment is also examined.

Claire Geng

"VR in Social Media"

This poster explores the popularity and application of Virtual Reality in traditional education based on public opinion expressed on mainstream social platforms.

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Kemi Fagbenro

"Olaplex"

Olaplex is a commercial hair company founded by chemists who advertised that their products could help restore damaged hair. In this poster, SEM was employed to assess how some of these product work. The efficiency of these products on diverse hair samples has also been evaluated.

JJ Awodipe

"Invade and conquer:
Understanding the Host-pathogen Interactions that Allow Staphylococcus aureus to Enter and Survive Within Osteoblasts"

Bone and joint infections (BJIs) are severe infections commonly associated with the bacterial pathogen, *Staphylococcus aureus*. The bacterial factors required for *S. aureus* survival within osteoblasts, the bone-forming cells, and the intracellular host responses to the pathogen remain understudied. To characterise this process, we have optimised an in vitro *S. aureus* intracellular infection model in human osteoblasts (MG-63 cell line). The bacterial invasion, intracellular replication and host cell escape were tracked over 48 hours using confocal imaging, time-lapse microscopy and by counting internalised bacteria. Our findings will provide more information about the interactions between intracellular *S. aureus* and osteoblasts which may have potential in the development of new biomarkers

Munira Ali

"The Identification of the Role of MicroRNAs in Skin Development"

Keratinocytes, make up around 90% of the cells located in the epidermis. During differentiation, keratinocytes proliferate from the innermost layer of the epidermis towards the outermost layer, whilst changing in morphology. This process is regulated by microRNA expression and in this poster, the role miR-148a expression during keratinocyte differentiation is discussed. Initial findings suggest that miR-148a likely plays a very important role in skin development and a further understanding of this role can help advance skin cancer research.