

STRUCTURAL INNOVATIONS BREAKOUT 11:20-16:00

11:20-11:50 Plenary C1	<b>Prof. Raymundo Arroyave</b> <i>Texas A&amp;M University</i>	Metallurgy-Informed Bayesian Optimisation: Rethinking alloy discovery and design
11:50-12:10 Talk C2	<b>Gill Thornton</b> <i>Globus Metal Powders</i>	World Class Powder Metals through Materials and Process Innovation
12:10-12:30 Talk C3	<b>Wisdom Asotah</b> <i>Materials Processing Institute</i>	Synergy between Cement and Steel Industries for Low-Carbon Construction
12:30-12:50 Talk C4	<b>Dr. Will Pulfrey</b> <i>University of Sheffield</i>	Enhancing Hot Rolling of Metallic Materials through Advanced Sensing and Materials 4.0
12:50-14:10	Lunch and Exhibition Viewing	
14:10-14:40 Plenary C5	<b>Dr. Martin Strangwood</b> <i>WMG</i>	Sustainable Steel
14:40-15:00 Talk C6	<b>Dr. Matt Bailey</b> <i>Aerospace Technology Institute</i>	Opportunities for Materials Innovation in Civil Aerospace
15:00-15:20 Talk C7	<b>Dr. Mia Maric</b> <i>University of Manchester</i>	Developing a novel method to characterise the multidimensional nature of zirconium hydrides by employing 3D-EBSD
15:20-15:40 Talk C8	<b>Dr. Oriol Gavaldà-Díaz</b> <i>Imperial College London</i>	Understanding Fracture of Ceramic Composites at Different Length Scales
15:40-16:00 Talk C9	<b>Prof. Pedro Rivera-Díaz-del-Castillo</b> <i>University of Southampton</i>	AI Enabled Multi-Material Join Design



**PROFESSOR RAYMUNDO ARROYAVE**

PROFESSOR | TEXAS A&M UNIVERSITY

**METALLURGY-INFORMED BAYESIAN OPTIMISATION: RETHINKING ALLOY  
DISCOVERY AND DESIGN**

How metallurgy-informed Bayesian optimization framework with integrated domain knowledge, physics-based modeling, and microstructure-aware learning can accelerate alloy discovery. Applied to complex, constrained, multi-objective spaces, our approach dramatically reduces experimental burden while navigating chemistry-processing-property design spaces— realizing >100× gains in efficiency and establishing a pathway towards autonomous metallurgical discovery.



**GILL THORNTON**

RESEARCH AND DEVELOPMENT MANAGER | GLOBUS METAL POWDERS

**WORLD CLASS POWDER METALS THROUGH MATERIALS AND PROCESS INNOVATION**

Globus Metal Powders are proud to supply excellence in every particle of metal powder we supply which we achieve through extensive materials and process innovation. This paper gives a snapshot of some of these innovations – many with valuable collaborations in academia. (Co-author: Xinjiang Hao)



**WISDOM ASOTAH**

SENIOR ENGINEER | MATERIALS PROCESSING INSTITUTE

**SYNERGY BETWEEN CEMENT AND STEEL INDUSTRIES FOR LOW-CARBON CONSTRUCTION**

Steel and cement industries are an indispensable part of the global economy. However, the production of these materials contributes significantly to global greenhouse emissions, about 15%. Collaboration between these two industries in areas such as waste utilisation as alternative binders and carbon capture could reduce emissions and accelerate low-carbon construction.



**DR. WILL PULFREY**

TECHNICAL MANAGER | UNIVERSITY OF SHEFFIELD

**ENHANCING HOT ROLLING OF METALLIC MATERIALS THROUGH ADVANCED SENSING  
AND MATERIALS 4.0**

This talk explores how enhanced sensing and 'high-frequency' data capture in hot rolling improve understanding of metallic material behaviour. By integrating advanced sensors with Materials 4.0 principles, we can accurately calculate flow stress, capture transient events, and unlock new possibilities for process optimisation and control.





**DR. MARTIN STRANGWOOD**

ASSOCIATE PROFESSOR | WMG

**SUSTAINABLE STEEL**

To reduce carbon dioxide emissions in the steel sector greater reuse, remanufacturing and recycling is required. A consequence of scrap steel use is an increase in residual element content (for example copper, tin, chromium and nickel) in the produced steel, which affect microstructure development and final product properties.



**DR. MATT BAILEY**

LEAD TECHNOLOGIST | AEROSPACE TECHNOLOGY INSTITUTE

**OPPORTUNITIES FOR MATERIALS INNOVATION IN CIVIL AEROSPACE**

The presentation will explore design and manufacturing trends for the next generation of large civil aircraft. Understanding their respective challenges and needs for materials, and the potential opportunities for innovation and collaboration across sectors.



**DR. MIA MARIC**

RESEARCH FELLOW | UNIVERSITY OF MANCHESTER

**DEVELOPING A NOVEL METHOD TO CHARACTERISE THE MULTIDIMENSIONAL NATURE OF ZIRCONIUM HYDRIDES BY EMPLOYING 3D-EBSD**

Hydride precipitation in zirconium claddings was investigated using 3D EBSD to address limitations inherent in conventional 2D analysis. Hydride orientation, morphology, distribution, and misorientation were characterised and compared across both dimensions. Crystal plasticity modelling identified correlations between cooling-induced residual stresses and hydride precipitation sites, advancing our understanding of precipitation behaviour in zirconium alloys.





**DR. ORIOL GAVALDÀ-DÍAZ**

ASSISTANT PROFESSOR | IMPERIAL COLLEGE LONDON

**UNDERSTANDING FRACTURE OF CERAMIC COMPOSITES AT DIFFERENT LENGTH SCALES**

My talk will focus on failure mechanisms in ceramic composites observed across various length scales. I will present how we use in-situ SEM and TEM testing to understand the role of microstructure in fracture behaviour. Additionally, I will demonstrate how this data can be used in high-throughput approaches to support the rational development of stronger, tougher ceramics.



**PROF. PEDRO RIVERA-DIAZ-DEL-CASTILLO**  
PROFESSOR | UNIVERSITY OF SOUTHAMPTON

**AI ENABLED MULTI-MATERIAL JOIN DESIGN**

The challenges faced by joining dissimilar systems have traditionally been predicted by a combination of finite element modelling and thermodynamics. Here we present novel techniques for a thermodynamic-centred microstructural design of builds and welds, and the introduction of deep learning to accelerate the discovery of novel multi-material solutions.

