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Materials and
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Research Institute

25
YEARS

MERI Research Symposium 2015

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Welcome

This year's MERI Research Symposium has a special significance as we celebrate our 25th anniversary. The Materials Research Institute was officially inaugurated on May 1st 1990. We can be justifiably proud of our progress since then. We have grown considerably not just in terms of full time staff and post graduate research students but also in the range of research disciplines, knowledge transfer activity and our reputation for internationally excellent and world leading research. Indeed, the results from the 2014 Research Excellence Framework ranked us as the number one modern university for research power.

It is fitting therefore, in this our 25th anniversary year, for us to also be celebrating the opening of our new £5.2 million state-of-the-art laboratory and office accommodation.

The MERI Research Symposium, which is a joint venture between MERI and the Department of Engineering and Mathematics,

is an excellent opportunity for both staff and students who are either active researchers, or who are interested in engaging in research, to meet with colleagues from across the Faculty, to raise awareness of current research projects and help thin the membrane between research and teaching.

The event will incorporate talks from academic staff and second year MERI PhD students, with poster presentations from final year undergraduate engineering and first year MERI PhD students.

I hope that you enjoy the event.



Professor Alan J Smith
CEng, CSci, FIMMM, Ph.D
Director, Materials and
Engineering Research Institute

Cover image: Golden Coral

The image shows the typical microstructure of Ba_2CoTeO_8 ceramics. This compound has shown promise for use as a high temperature thermoelectric material. Thermoelectrics can directly convert waste heat into electricity.

Winning image by Anees Abdul Aziz (MERI PhD Student)

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DAY ONE - Tuesday 19th May				
Time	Location	Event	Title	Speaker
9.30	Cantor 9130	Welcome		Prof Alan Smith
Session 1 - Chair Prof Alan Smith				
9.40	Cantor 9130	Talk 1	Soft solids and modelling research – the medical perspective	Prof Chris Breen
10.00	Cantor 9130	Talk 2	Numerical simulation and modelling of Al/SiC	Syed Asim Ali Shah
10.20	Cantor 9130	Talk 3	Adaptive noise cancelling and time-frequency techniques for rail and wheel surface defect detection	Dr Bo Liang
10.40	Cantor 9130	Talk 4	Gripping and handling technology for flexible materials	Shakeel Ahmed
11.00	Cantor Atrium	Refreshments		
Session 2 - Chair Prof Chris Breen				
11.20	Cantor 9130	Talk 5	From the very big to the very small	Dr Nick Farmilo
11.40	Cantor 9130	Talk 6	Development of mono- and multi-junction device structures using electroplated II-VI binary compound semiconductors	Olajide I. Olusola
12.00	Cantor 9130	Talk 7	Consideration of elastic follow-up effect (strain accumulation / stress relaxation processes) in structural integrity assessment	Dr Saeid Hadidimoud
12.20	Cantor 9130	Talk 8	Friction stir welding of steel	Montadher Al-Moussawi
12.40	Cantor 9130	Talk 9	Functional analysis in investment theory: applications to the nigerian stock market	Chimezie P. Nnanwa
13.00	Cantor Atrium	Lunch and poster viewing session		
Session 3 - Chair Dr Nicholas Farmilo				
14.00	Cantor 9130	Talk 10	Optimisation and planning petroleum supply chain and logistics under uncertainty	Elganidi H. Elsaghier
14.20	Cantor 9130	Talk 11	Development of CdS/CdTe solar cell using In_xSe_y buffer layer	Mohammad L. Madugu
14.40	Cantor 9130	Talk 12	Repair and maintenance of our built infrastructure	Dr Fin O'Flaherty
15.00	Cantor 9130	Talk 13	Microscopic analysis of in-service aluminium-lithium airframe alloys	Aaron Cusack
15.20	Cantor 9130	Talk 14	Development of an integrated quality management framework for manufacturing organisations	Mohamed Khamkham
15.40	Cantor 9130	Talk 15	Impacts of global financial crisis on stock market volatility of the Nigerian banks	Maruf A. Raheem
16.00-18.00	Break until Professorial Lecture			
18.00	Cantor Atrium	Refreshments prior to the Professorial Lecture		
18.30	Cantor 9130	Inaugural Professorial Lecture (places must be booked for this event)	Robots and human robot interaction	Prof Jacques Penders
19.30	Cantor Atrium	Wine and nibbles		
20.15		Close		

DAY TWO - Wednesday 20th May				
Time	Location	Event	Title	Speaker
Session 4 - Chair Jacques Penders				
9.40	Cantor 9130	Talk 1	Integrated business modelling for innovation and profitable growth in born- global firms	Nonso Ochianwata
10.00	Cantor 9130	Talk 2	Developments in thermography for respiration rate monitoring	Dr Reza Saatchi
10.20	Cantor 9130	Talk 3	Multi robotic approach toward cooperative execution of agricultural task	Alireza Janani
10.40	Cantor 9130	Talk 4	A constructivist approach to understanding adaptations required to develop logistical infrastructure to support increased digital commerce	Tim Parker
11.00	Cantor Atrium	Refreshments		
Session 5 - Chair Dr Aseel Hassan				
11.20	Cantor 9130	Talk 5	Pyrolysis kinetics of poly(methyl methacrylate) and its effects on the ignition delay time	Dr Sam Dakka
11.40	Cantor 9130	Talk 6	Synthesis and properties characterization of Ba_2CoTeO_6 double perovskite	Anees Abdul Aziz
12.00	Cantor 9130	Talk 7	SIMS applications in coating systems and surface characterisation	Dr Piotr Dobrosz
12.20	Cantor 9130	Talk 8	Development of Quartz Crystal Microbalance (QCM) based sensors for detection of toxic chemicals in gaseous and liquid environments	Amani Saghayer Hamid
12.40	Cantor 9130	Talk 9	Life after a PhD - a career in precision surface management - working with the world's best in engineering & technology	Dr Sean Trengove
13.00	Cantor Atrium	Lunch and poster viewing session		
Session 6 - Chair Prof Doug Cleaver				
14.00	Cantor 9130	Talk 10	Sheffield festival of science and engineering	Prof Jack Yarwood
14.20	Cantor 9130	Talk 11	Stochastic calculus and derivatives pricing in the Nigerian stock market	Thomas Chinwe Urama
14.40	Cantor 9130	Talk 12	Incorporation of sulphate ions in glasses with implications for radioactive waste immobilization	Shuchi Vaishnav
15.00	Cantor 9130	Talk 13	Designing & simulation of fractal supply chain management- an optimization approach	Adewale A. Ogunsanwo
15.20	Cantor 9130	Talk 14	Optimising the performance of P3HT:PCBM organic solar cells	Burak Yahya Kadem
15.40	Cantor 9130	Talk 15	The advanced wellbeing research centre	Prof Steve Haake
16.00	Cantor 9130	Close of event and prizes		Prof Roger Eccleston



PROF CHRIS BREEN

Head of Polymers, Nanocomposites and Modelling Research Centre

Soft solids and modelling research – the medical perspective.

Repairing damaged discs, keeping infections under control and understanding the flow of fluids through different parts of the body are all in a day's work for some researchers in MERI. This talk will highlight results from projects involving hydrogels, controlled release wound dressings and modelling complex fluid flow.



SYED ASIM ALI SHAH

Supervisor: S Hasan

Structural Materials and Integrity Research Centre

Numerical simulation and modeling of Al/SiC

Metal Matrix Composites (MMCs) are becoming strong candidates as structural materials for many high temperature and aerospace applications. Various attempts have been made to predict the interfacial strengthening behaviour at metal-ceramic interface. A method of analysis proposed to model 2D/3D matrix - reinforcement interface using commercial finite element analysis software (ANSYS) using a unit cell approach. Numerical simulation of hard particulate reinforced Al alloy is simulated with a reinforcement of Silicon Carbide (SiC) using ANSYS. This research will help to identify the key parameters controlling the fracture at

matrix-reinforcement interface and the method proposed will help the design engineers to incorporate advanced MMC's in real life applications.



Mini Profile

Chris was awarded a PhD in 1980 and joined Sheffield Hallam University in 1987. He moved to The Materials Research Institute in 1992 and became Professor of Materials Chemistry in 2002. He is currently Head of the Research Centre for Polymers, Nanocomposites and Modelling. His research interests currently focus on polymers, nanocomposites and any material that includes clay.



Mini Profile

Currently a 2nd year PhD student in MERI at SHU. His research is focused on interfacial fracture strength of Aluminium Silicon Carbide metal matrix composites, using ANSYS finite element package.



DR BO LIANG

Senior Lecturer

Electronic Engineering

Adaptive noise cancelling and time-frequency techniques for rail and wheel surface defect detection

Adaptive noise cancelling (ANC) is a technique which can remove additive noises from the contaminated signals. Time-frequency analysis is another useful tool for condition monitoring and fault diagnosis purpose as time-frequency analysis can keep both time and frequency information simultaneously. This paper presents an ANC and time-frequency application for railway wheel flat and rail surface defect detection. The experimental results show that this approach can significantly reduce unwanted interferences and extract the weak signals from strong background noises. The combination of ANC and time-frequency analysis may provide

us one of useful tools for condition monitoring and fault diagnosis of railway vehicles.



SHAKEEL AHMED

Supervisor: D Asquith

Centre for Automation and Robotics Research

Gripping and handling technology for flexible materials

This research focuses upon an industrial process of assembling a high volume commercial product. The product consists of a polymeric tubular structure (a balloon) and an LED light unit. The light unit is attached through the mouth of a balloon to the other side of the inside of the balloon. The design and development of the gripper will be simulated using a commercially available finite element analysis (FEA) package (Simulia Abaqus v6.13) to verify the design. FEA modelling and simulation requires accurate measurement of latex balloon thin film properties. Therefore bulge test will be performed to characterize the latex thin film.



Mini Profile

Bo received his BEng and MPhil degrees in engine design and manufacturing in 1982 and 1985 in China. From 1985 to 1995, he became a lecturer, a senior lecturer and then an associate professor at one of the prestigious universities in China. In 1996 he was awarded a Sino-British Friendship Scholarship to study for a PhD in ship electrical propulsion systems at the University of Manchester and was awarded a PhD degree in 2000. Before joining Sheffield Hallam University in 2013, he was a research fellow at Cranfield University and a senior research fellow at Huddersfield University from 2001 to 2013.



Mini Profile

I am an Industrial and Manufacturing engineer. I have been involved with industrial machine design using CAD and worked in automotive sector of Pakistan for many years. My last job was teaching in an engineering university in Karachi.



DR NICK FARMILO

Research & Business Development Manager and Head of Structural Materials and Integrity Research Centre

From the very big to the very small

The Consultancy and Structural Integrity Research Centre cover a vast range of materials and applications. From buildings and bridges to nano-scale particulate contamination of surfaces, our experts provide high quality research and consultancy. The talk will endeavour to communicate several examples of new and cross-disciplinary activity.



OLAJIDE I. OLUSOLA

Supervisor: I M Dharmadasa
Thin Films Research Centre

Development of mono- and multi-junction device structures using electroplated II-VI binary compound semiconductors

Electronic devices such as Schottky diodes, p-n homo- and hetero-junction diodes and solar cells have been fabricated using n-CdSe, p-ZnTe/n-ZnTe, p-ZnTe/n-CdS and n-CdS/n-CdTe/p-CdTe semiconductor materials respectively. Electrodeposition growth technique has been employed for developing these semiconductor materials. The fabrication of graded bandgap solar cells with the structure glass/FTO/n-CdS/n-CdTe/p-CdTe/Au show better result than solar cells fabricated from glass/FTO/n-CdS/n-CdTe/Au. Optimisation of thickness of p-CdTe used as a back contact to n-CdTe was carried out to enhance the solar cell efficiency. It was observed

that solar cells with p-CdTe layer of higher thickness show poor performance as compared to one with thickness of few nanometres.



Mini Profile

Nick has managed the consultancy operation of MERI since 2000, and the Structural Integrity Research Centre since 2012, accounting for a total £1.3M of income. Several staff and two impact case studies were submitted to the recent REF. Nick has also led Business Development activities in MERI since 2000, and he has managed EU Framework and ERDF activities within the Institute. The Materials Analysis and Research Services CIC won three awards for collaboration - the highest of any CIC, and in 2008 he was shortlisted by Yorkshire Forward in a personal capacity for the Innovation Champion Award. Nick has experience of working at the interface between business and industry whilst working for Galvatech, as an intermediary at NASURF and from the University base in his current roles.



Mini Profile

My name is Olajide I. Olusola, a Nigerian by Nationality. My background is in Physics and Electronics. My main area of research interest is in the fabrication of electronic devices using low-cost semiconductor materials. SHU is a good place to be and the research programme is really interesting, and useful for my future career. I am hoping to use this training to contribute towards the development of Nigeria using solar energy applications.



DR SAEID HADIDIMOUD

Senior Lecturer
Mechanical Engineering

Consideration of elastic follow-up effect (strain accumulation / stress relaxation processes) in structural integrity assessment

The term elastic follow-up refers to strain accumulation/stress relaxation within structures due to localised nonlinear events such as plasticity, creep, or propagation of defects. Currently, standard structural integrity assessment procedures do not take this into account in great detail and use a qualitative approach. EFU is noted in assessment procedures if it is significantly high and ignored if it is low. This talk will introduce the concept of EFU through several applied examples and will further outline its quantification in structures experiencing such "nonlinear" events. Accurate estimation of elastic follow-up factor, "Z",

would allow improvement in structural integrity assessment procedures.



MONTADHER AL-MOUSSAWI

Supervisor: A Smith
Structural Materials and Integrity Research Centre

Friction stir welding of steel

Friction stir welding (FSW) is a unique new technique invented in the UK and used to join two pieces of metal by mechanical means without fusion or filler materials. Friction stir welding (FSW) is well proven on low melting point metals such as aluminium. However, there is a real challenge in higher melting point materials such as steel alloys. In this project, an attempt has been made to model FSW of a specialist grade of steel (DH36 and EH46 steel grades) used in the ship building industry. In addition to modelling, experimental tests have been carried out in order to validate modelling. SEM analysis showed the formation of a fine

microstructure of Bainite, acicular ferrite and ferrite/cementite aggregate in the welded zone as compared to the ferrite/pearlite morphology in the base metal. The project aims is to enhance welding quality and reduce FSW tool wear.



Mini Profile

Following completion of his PhD on "finite element modelling of local damage and material rupture" in 2000, Saeid worked as a research associate for the universities of Bristol and Oxford on "structural integrity assessment" related research projects jointly with TWI and British Energy. He is specifically interested in understanding and integrating the influence of residual stresses, localised plasticity, and progressive damage in fracture prediction tools, using experimental and computational fracture mechanics. His research has so far produced more than 70 articles including 20 journal publications. He has also taught several modules on mechanics of materials, fracture mechanics and finite element method for several years.



Mini Profile

Born in Baghdad/Iraq, graduated from Babylon University in Material Engineering, currently a PhD student at Sheffield Hallam University.



CHIMEZIE P. NNANWA

Supervisor: P Ezepue
Centre for Automation and Robotics Research

Functional analysis in investment theory: applications to the Nigerian stock market

This research work aims to develop new portfolio theory and investment system models that will fit the stylized facts of the Nigerian financial market better than the current models, and apply the models to investment prospects in Nigeria stock market (NSM). The rationale for the research is the relative lack of systematic studies of mathematical underpinnings of portfolio theory and related investment systems in the NSM, compared to the developed markets.



ELGANIDI H. ELSAGHIER

Supervisor: S Saad
Centre for Automation and Robotics Research

Optimisation and planning petroleum supply chain and logistics under uncertainty

The main aim of my research is the development of an operational model to assist practitioners in planning and optimising the petroleum industry supply chain and logistics, under different types of uncertainty and to sustain measures of performance. So far, a comprehensive literature to establish the current knowledge and practices has been carried out to look at the different supply chain functions involved in the petroleum industry and the uncertainties to decide on the research project's scope. The petroleum supply chain for studying in my research has been designed and the optimising and planning of the petroleum supply chain proposed, a

mathematical model has been developed. The computational methods will be used for sensitive analysis of mathematical model proposed.

Mini Profile

I am working on my PhD in Financial Mathematics under MERI. I have a wonderful Director of Studies (Supervisor), who is always there to help, guide and assist me in any way. MERI as an Institution provides all the research materials I need and makes them available at my disposal. With least force and maximum pressure, they monitor the progress of my work to make sure that I deliver the work within the limits of the time. I enjoy my stay here in Sheffield, meeting different people from different ethnicity and culture.

Mini Profile

Born in Misurata-Libya in 1966.
BSc in Material Science Engineering, MSc in Industrial Engineering.
Working as Assistant Lecture & Member of Teaching Staff at Faculty of Engineering - Misurata University - Libya



MOHAMMAD L. MADUGU

Supervisor: I M Dharmadasa
Thin Films Research Centre

Development of CdS/CdTe solar cell using In_xSe_y buffer layer

Electroplating technique was used to deposit semiconductor materials for application in thin film solar cells. All the required materials were electroplated from aqueous and acidic solutions. Multilayer graded bandgap thin film solar cells are known to have potential for harnessing most of the solar spectrum for highest solar to electricity conversion efficiency. The incorporation of a buffer layer such as indium selenide in the n- $In_xSe_y/n-CdS/n-CdTe/Au$ solar cell has shown interesting solar cell parameters. The effects of different chlorides treatment on the device parameters will be presented. Another two semiconductor materials used in

this device are CdS and CdTe which serve as window and absorber materials respectively. The current devices show efficiencies in the range 5-12%, and the work is continuing to increase efficiencies to highest possible values.



DR FIN O'FLAHERTY

Principal Consultant
Structural Materials and Integrity Research Centre

Repair and maintenance of our built infrastructure

We sometimes take the built infrastructure around us for granted, whether it is the buildings we live and work in or the roads and bridges we travel on, these man-made structures require continuous maintenance to ensure they operate reliably and safely. It is important that we manage these structures not only for our own use but also for future generations. The talk will present some of the research conducted over the years by the author into the performance of built infrastructure. In particular, the talk will focus on the management and repair of concrete bridges on our rail and road networks and energy efficiency of buildings.

Mini Profile

My name is Mohammad L. Madugu. I am from Nigeria with a background in Physics. My research interest is in the PV technology especially in the area of low-cost CdS/CdTe based thin film solar cells. This further gives me an opportunity to research well using physics concepts into this device, to improve the solar to electricity conversion efficiency. The challenges are interesting, and this is an excellent research programme to learn and develops my research carrier useful for the development of my native country by using solar energy application

Mini Profile

Fin is a researcher and consultant in the Centre for Infrastructure Management within MERI which provides a professional service to the construction and infrastructure sector. He has a background in civil engineering and is a Chartered Engineer. His main expertise is in the area of repair and maintenance of built infrastructure, development and evaluation of construction materials, testing and assessment of novel insulation materials for energy conservation and efficacy of renewable energy technologies.



AARON CUSACK

Supervisor: A Smith
Structural Materials and Integrity Research Centre

Microscopic analysis of in-service aluminium-lithium airframe alloys

Aluminium-lithium alloys exhibit mechanical behaviours which are different from conventional aluminium alloys. A characterisation programme has shown that an aluminium-lithium alloy material that has been in service on UK military aircraft (for almost 20 years) still meets the requirement of the original design specification. Further to this, Transmission Electron Microscopy is being undertaken to determine the microstructural effects on aluminium-lithium alloy 8090 when it is subjected to various pre-determined conditions. This work is one of a number of key elements that work towards maintaining the airworthiness and continued safe operation of modern military aircraft.



MOHAMED KHAMKHAM

Supervisor: S Saad
Centre for Automation and Robotics Research

Development of an integrated quality management framework for manufacturing organisations

Manufacturing organisations nowadays are facing many challenges with respect to improving the level of quality and achieving competitive advantage compared with competitors. This is due to the increasing variety of quality management methods in the last couple of years, hence the integration of quality management methods becomes a means for handling this and can lead to drive out the weaknesses from the quality system. Therefore, the presentation will show, how the strategy of the research intends to develop an integrated quality management framework, which consists of two models namely; Lean and six sigma integrated model,

for improving the manufacturing processes and TQM and Six-sigma integrated model, for unifying the management system and achieve business excellence in manufacturing organisation



Mini Profile

Aaron gained his degree in Forensic Engineering from Sheffield Hallam University in 2008. He currently works for the UK Ministry of Defence as a Higher Scientific Officer at 1710 Naval Air Squadron. His work primarily focuses on metallic material failure analysis and providing scientific support to front line military units. He is a part of a specialist deployable team that supports the Military Air Accident Investigation Branch and is the Squadron's Forensic Weapons and Munitions Officer.



Mini Profile

I am a PhD student in MERI at SHU. As a Quality Engineering Researcher, I believe that quality management is the driving force for achieving the required goals effectively in any system, so I am enjoying the challenges faced to complete the tasks and objectives of my PhD



MARUF A. RAHEEM

Supervisor: P Ezepue
Centre for Automation and Robotics Research

Impacts of global financial crisis on stock market volatility of the Nigerian banks

Recently, the 2007-2008 global financial crises have drastically shaped the financial systems of both developed and developing economies, leading to various financial market reforms and regulations across the globe. This research therefore investigates effects of these crises and the financial reforms introduced in the Nigerian financial market by the Central Bank of Nigeria (CBN) on the volatility of stock prices of some selected banks in the Nigerian Stock Market (NSM) using Generalized Autoregressive Conditional Heteroscedastic (GARCH) models. Daily stock prices of each of the selected banks from 2004-2014 covering periods of the indicated scenarios are considered.



PROF JACQUES PENDERS

Head of Centre for Automation and Robotics Research

Robots and human robot interaction

The word 'robot' originated from science fiction and denoted a human-like machine that could do all a human could do but without emotions and a conscience. As academics, we have high regard for intellect and intellectual activities; usually this refers to human capacities such as computing and verbal and symbolic reasoning. Mankind has built machines (computers) that can compete with humans and in specific areas even beat humans. What about robots provided with such intellectual capabilities? However clever the computer in the robot, robots are machines that have to act in the real world. The real world is uncontrollable and unpredictable and this is a bit of a problem in robotics. Biological organisms

together can create and produce fascinating results: for instance, ant colonies build impressive nests and maintain effective organisational structures, even though individual ants have relatively little brains. Inspired by this, swarms of simple robots are applied to improve our understanding of group behaviour. The potential of the swarm can also be used to overcome challenges as in Search and Rescue; however the latter requires that the robots can interact sensibly with humans. This lecture will examine what has been achieved in the areas of swarm robotics and related human robot interaction, and also look at the current challenges in these areas.



Mini Profile

I am a Nigerian, had my first and second degrees from the University of Ilorin, Ilorin Nigeria. Travelling and making friends have become part of me.



Mini Profile

Professor Jacques Penders is currently head of the Centre for Automation and Robotics Research at Sheffield Hallam and deputy director of Sheffield Robotics, which incorporates research in robotics across Sheffield Hallam and the University of Sheffield. Jacques started research in robotics in 1987. His current research interest is in Natural Agents and Robotics, in two particular fields: exploring the basic fabric of group behaviour by modelling groups of natural organisms/implementing groups of artificial agents (including swarm robotics) and understanding the Communicational Landscape for tactile/haptic Human-Robot interaction.



NONSO OCHINANWATA

Supervisor: P Ezepue
Centre for Automation and Robotics Research

Integrated business modelling for innovation and profitable growth in born-global firms

Despite the success of born global firms (BGFs) such as Google and Apple, in other parts of the world, there have not been enough integrative studies on the nature of integrated business modelling which underpins the development and profitable growth of such BGFs. This is even more important for developing countries such as Nigeria and Sub-Saharan Africa, given that there are very few visible home-grown BGFs in these places. This research aims to develop an Integrated Born Global Business Model (IBGBM), which could facilitate the creation of BGFs in different contexts



DR REZA SAATCHI

Reader
Centre for Automation and Robotics Research

Developments in thermography for respiration rate monitoring

Respiration rate (RR) is the average number of times air is inhaled and exhaled per minute. It is a critical measure of health and so it needs to be measured accurately. Currently there is no accurate way to measure RR. In this study we are developing a thermal imaging based method to measure RR. The fluctuations in facial skin surface temperature caused by respiration are accurately detected for this purpose. The challenge has been to deal with head movements during data recording. We have developed several tracking algorithms suitable for thermal videos. The presentation outlines some of the results obtained.

Mini Profile

His research interests are in the areas of entrepreneurship, business modelling, born global firms and international new ventures. Using primarily qualitative methods as well as mixed methods, he is particularly interested in how entrepreneurs start-up and develop their businesses and also how firms establish partnerships internationally.

Mini Profile

Reza is a Reader with a focus on research in medical electronics engineering. He has published around 120 papers and supervised 25 PhD students to completion. He has collaborations with industry and medical institutions for his work and has been awarded a number of prizes and research grants.



ALIREZA JANANI

Supervisor: J Penders
Centre for Automation and Robotics Research

Multi robotic approach toward cooperative execution of agricultural task

By growth of population, demand for food has increased, yet current agricultural approaches are human dependent and are not as efficient as they should be. Also studies reveal that the population of farmers is decreasing for variety of reasons. In addition, single robotic approaches are more efficient but they still require constant human monitoring.

A team of robot, on the other hand, has the potential to execute the given task cooperatively even without human monitoring. In order to achieve a cooperative behaviour, individuals in the team are required to interact with each other. Current research is investigating the possibility of

the execution of series of agricultural tasks using a team of cooperative robot.



TIM PARKER

Supervisor: D Clegg
Consultancy & Business Development

A constructivist approach to understanding adaptations required to develop logistical infrastructure to support increased digital commerce.

On-line retail is changing the high street but also logistical infrastructure required to deliver manufactured goods. Depending on sector, logistics typically contributes 5-40% of an item price. Goods must be stored, distributed and delivered efficiently to remain competitive, but, requirements to deliver quicker and more reliably to consumers, stretches the capacity and capability of existing logistics networks. My research examines the significant factors considered for constructing and re-developing logistical infrastructure to meet this challenge. Whilst at preliminary stages, I am proposing to adopt a constructivist approach to conduct a mixed methodological study of existing, and possible, future logistical infrastructure models.

Mini Profile

Born in Tehran and graduated from Sheffield Hallam University (BEng and MSc). Passionate about designing new electronic system, software and games in different platforms.

Mini Profile

Born in Sheffield and having worked in both military and civil logistics, latterly for FMCG and healthcare companies, I am now a Senior Lecturer in Logistics and Supply Chain Management at Sheffield Hallam University.

**DR SAM DAKKA**

Lecturer
Aerospace Engineering

Pyrolysis kinetics of poly(methyl methacrylate) and its effects on the ignition delay time.

An experimental technique in normal gravity conditions was developed to capture the piloted ignition mixing time related to microgravity combustion. This technique is based on the investigation of degradation of a large particle size material, 0.5 mm diameter PMMA by Thermogravimetry, Mass Spectrometry, and Differential Thermal Analysis (DTA). The experimental results were incorporated in a numerical model previously developed for determining the piloted ignition delay time of a solid combustible impulsively exposed to an incident heat flux and prescribed forced flow. From these findings, we confirmed that piloted

ignition mixing time is of the same order to the pyrolysis time.

**ANEES ABDUL AZIZ**

Supervisor: A Feteira
Structural Materials and Integrity Research Centre

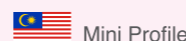
Synthesis and properties characterization of Ba_2CoTeO_6 double perovskite

The polycrystalline Ba_2CoTeO_6 double perovskite has been prepared using the solid state reaction route. Purity and crystal structure were examined by X-ray diffraction. Ba_2CoTeO_6 adopts an hexagonal perovskite structure with internal symmetry described by the P-3m1 space group, with $a = 5.7979 \text{ \AA}$ and $C = 14.2598 \text{ \AA}$. Scanning electron microscopy revealed a microstructure consisting of anisotropic grains with lengths up to $12 \mu\text{m}$. Finally, both electrical and thermal properties were measured. Ba_2CoTeO_6 ceramics show a thermal conductivity of 1.06 W/mK , a promising value for high temperature thermoelectrics.



Mini Profile

Sam earned his PhD in Aerospace Engineering from the University of Maryland, College Park USA; his research was focused on combustion of solid fuel materials. Following his PhD he pursued research on microgravity droplet combustion at NASA Glenn Research centre and a post-doctoral fellowship at the University of California Davis. Sam gained extensive experience in the industry at Honeywell Aerospace and GE-Aviation. Sam holds an intermediate certificate on keel boat sailing gained whilst sailing in Oahu, Hawaii. He also enjoys golfing and other recreational activities.



Mini Profile

Her research interests are predominately in the field of energy harvesting.

**DR PIOTR DOBROSZ**

Researcher
Consultancy & Business Development

SIMS applications in coating systems and surface characterisation

Secondary ion mass spectrometry (SIMS) is a technique used in materials science and surface science to analyse the composition of solid surfaces and thin films. SIMS uses charged primary ions focused at a sample to sputter off atoms and molecules characteristic of the outermost atomic layers of the material. The primary ion dose can be carefully controlled so that the damage to the surface is negligible and the technique is essentially considered as non-destructive. Larger numbers of ions per unit area can also be used to sputter into the bulk of the sample (so called dynamic SIMS). This mode of operation allows chemical depth profiles to be obtained.

**AMANI SAGHOYER HAMID**

Supervisor: A Holloway
Structural Materials and Integrity Research Centre

Development of Quartz Crystal Microbalance (QCM) based sensors for detection of toxic chemicals in gaseous and liquid environments

In this research we aim to investigate the use of advanced QCM measurement techniques to extract information on sensing film parameters when exposed to target analytes (toxic chemicals) in both gas and liquid phases. Additionally characterisation of the film properties has been investigated by parameters obtained from QCM measurements in conjunction with suitable data analysis and modelling techniques. Validation of the film properties has been established (thickness and structure) using complementary existing methods such as AFM, SEM and Ellipsometry

Current work continues in developing a model for the sensing membrane which can be used to predict the response on ad/absorption of selected toxic chemicals and subsequently develop/identify a suitable range of membranes for sensing applications.



Mini Profile

Piotr graduated with a PhD in Advanced Materials from Newcastle University in 2006 and is currently working as a Researcher in the consultancy team in MERI. Prior to this, he was employed as a Research Associate at Manchester Metropolitan University and at Newcastle University where he carried out materials characterisation. During his 7 years of employment, Piotr has gained experience in various analytical techniques. His skills set range includes techniques that are used to characterise material physical/chemical properties such as SEM, EDX, WDX, AFM, Raman Spectroscopy, XRD, XPS, SIMS, STEM as well as techniques required to assess materials mechanical properties including hardness, tensile tests, toughness, wear tests and nanoindentation.



Mini Profile

Graduate and awarded MSc degree from Al Fatah (Tripoli) University. Lecturer and a permanent staff member Physics Department in Tripoli Uni. Optimistic, a nice fun and friendly person who looking to achieve goals.



DR SEAN TREGOVE

Ex-Phd Student
Kennametal Extrude Hone Limited

Life after a PhD - A Career in precision surface management - working with the world's best in engineering & technology

Since completing my PhD at Sheffield Hallam in 1991 I have been privileged to spend almost 25 years working with global companies in diverse sectors of engineering. I have worked in applying precision surface technologies to enable improved product performance in applications including diesel fuel injection, F1 and Motorsport, automotive powertrain, off-road vehicle hydraulics, gas turbine, oil and gas pumps, artificial limbs, space and satellite, nuclear and many more. I have also had the pleasure of working throughout Europe, India and USA. I hope this short snapshot of my experiences may help you think about the opportunities open to

you in the road ahead as you embark into the exciting global economy.



PROF JACK YARWOOD

Emeritus Professor
Retired Director of the Materials Research Institute

Sheffield festival of science and engineering

The Festival aims to celebrate what is best about Science, Engineering, Mathematics and Technology (STEM) across South Yorkshire and beyond. The Festival builds upon many years of SU/SHU collaboration on the (National) Science and Engineering week, co-ordinated by the British Science Association. MERI has been represented at the Festival in the last two years through the enthusiastic involvement of Dr Hywel Jones, Prof Chris Sammon, Prof Doug Cleaver and by Dr Karen Vernon-Parry, who has led the successful "Explore Science and Engineering" at SHU. The Festival provides an excellent opportunity for both staff and students to engage

in 'outreach' activities. The outcomes are often unexpectedly rewarding.



Mini Profile

Managing Director of Kennametal Extrude Hone UK. Responsible for sales in UK, France, Spain, Scandinavia and India. Married with 2 children and enjoy running, road biking and keeping fit.



Mini Profile

Jack is a physical chemist and spectroscopist. He was the MRI Director between 1993 and 2006, and a schools' lecturer in Chemistry and Science weeks for 8 years between 2000 and 2007. In 2014 and 2015, he was instrumental in ensuring that MERI had a presence at the Sheffield Festival of Science and Engineering.



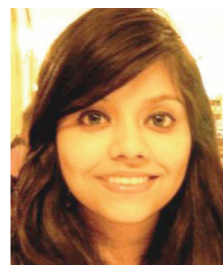
THOMAS CHINWE URAMA

Supervisor: P Ezepue
Centre for Automation and Robotics Research

Stochastic calculus and derivatives pricing in the Nigerian stock market

Financial policy makers in Nigeria are strongly interested in deepening the Nigerian Stock Market (NSM) by introducing derivative products into the market. Hence, the Central Bank of Nigeria recently released a grant to the Nigerian Association of Security Dealers for commencing derivatives trading in Nigeria, with a focus on selected over-the-counter products. Examples include forward, foreign exchange options and swaps, and cross-currency interest rate swaps. This research therefore investigates the links between NSM characteristics, stylized facts and derivative pricing models, using stochastic calculus tools. The results are expected to

provide insights into the suitability of some proposed derivative products for the NSM.



SHUCHI VAISHNAV

Supervisor: P Bingham
Structural Materials and Integrity Research Centre

Incorporation of sulphate ions in glasses with implications for radioactive waste immobilization

Vitrification is a potential treatment option for several types of HLW and ILW arising as residues after spent fuel processing and site decommissioning. The high content of anions such as sulphate (SO_4^{2-}) which is present in some of these wastes can limit the waste loading of the glass wasteform (thereby increasing wasteform volume) and can pose problems due to water soluble secondary phase formation. In our work we aim to better understand the mechanisms underlying the incorporation of sulphate ions in glass and to develop better wasteforms as a result. Here we present the

results of initial laboratory scale trial vitrification studies using simple binary and ternary silicate glass compositions with and without sulphate doping along with industrial surrogate borosilicate glasses.



Mini Profile

Chinwe Urama hails from OVOKO, Igboeze South Council Area in Enugu State - Nigeria and is currently a Lecturer at Institute of Management and Technology (IMT), Enugu, South East Nigeria.



Mini Profile

I have two Masters degrees in Nuclear Reactor Engineering and Nuclear Science & Technology from CEA- Paris, France and University of Delhi, India respectively. I have been enrolled as a PhD research scholar at MERI, SHU since November, 2013. Additionally, I serve as an Associate Lecturer within MERI.



ADEWALE A. OGUNSANWO

Supervisor: S Saad
Centre for Automation and Robotics Research

Designing & simulation of fractal supply chain management- an optimization approach

Traditional supply chain management is encumbered and too debilitated to effectively solve problems inherent in present 21st Century Supply Chain Management. This research work conceptualise a novel and strategic value driven simulation and optimisation approach to design a fractal supply chain management capable of meeting and surmounting challenges inherent in the 21st Century SCM. The research demonstrated how simulation can effectively resolve the dynamic state, fluidities and transient effects in SCM compare to ordinary mathematical modelling. The designing of the constructs for the modelling of fractal supply

chain architecture design was done using Fuzzy Logic Analysis method. The final testing, simulation and optimisation experimentation exercise was achieved using SupplyChainGuru software.



BURAK YAHYA KADEM

Supervisor: A Hassan
Thin Films Research Centre

Optimising the performance of P3HT:PCBM organic solar cells

Renewable energy is one of the main issues that has been considered by world community as an alternative source to the common energy sources such as fossil fuel. Among several types solar cell organic solar cells have several advantages over known photovoltaic devices such as low cost, light weight, simple preparation methods, capability of deposition on flexible substrate as well as chemical tunability to engineer the polymer band gap. In this research, P3HT:PCBM organic solar cells will be prepared and modified by several routes including the used solvents, active layer thickness as well as modification of electron transport and hole

transport layers. These routes are shown to have significant effect on the photovoltaic performance of investigated active layers. Some early results of such modifications have revealed a PCE of 3.84%, FF of 50%, JSC of 12.6 mA.cm⁻² and Voc of 0.61V.

Mini Profile

Background experience in industrial quality management, advanced engineering, water and environmental sustainability. Adewale is currently focusing on modelling, simulation and optimisation of fractal supply chain management to promote sustainability to solve 21st Century Supply Chain problems.



PROF STEVE HAAKE

Director of Centre
Sports Engineering Research

The advanced wellbeing research centre

The Advanced Wellbeing Research Centre (AWRC) is the culmination of 25 years of interdisciplinary research in sports engineering. This presentation will describe the concept behind the AWRC and how engineers, social scientists, psychologists and clinicians may work together to make the products of the future that motivate more people to move more, more often.

Mini Profile

Steve is Director of the Centre for Sports Engineering Research at Sheffield Hallam University, which employs 36 full-time staff and students. Working previously as a physicist and then a mechanical engineer, he founded the International Sports Engineering Association, with its associated journal and conference (the last was held in Sheffield in 2014). He currently acts as the Director of Research for the National Centre for Sport and Exercise Medicine in Sheffield which advocates the use of physical activity as medicine and has the aspiration for Sheffield to be the most active city in the UK by 2020.

Mini Profile

Burak Kadem is a PhD student in the Thin Film research center, MERI. He has Masters Degree in Physics (thin films) since 2001 from Al-Mustansiriya University-Iraq. He is already a lecturer in Babylon University, College of Science, Physics department, advanced polymer lab. He is member of Iraqi computer society as well as Iraqi physics and mathematics society. Burak is member of the editorial board of Advances in physics theories and application journal since 2011. He is doing his PhD in Organic solar cells, mainly optimising the performance of P3HT:PCBM solar cell. He has several interests in the composites materials, polymers, thin films as well as solar cells. He has published a variety of papers in composites and thin films. He also has interests in computer science (formatting and installing), football, swimming and video games.

POSTERS- Cantor Atrium

Thank you to the following students who are presenting posters:



SHAHRIAR ABUBAKRI

Supervisor: P Mangat
Structural Materials and Integrity Research Centre

Effect of microwave curing on bond strength of repair material with the substrate



RIDITA ALI

Supervisor: R Saatchi
Centre for Automation and Robotics Research

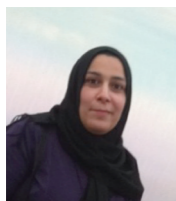
Vibration analysis as a novel screening tool for long bone fractures



BENJAMIN ALLSOPP

Supervisor: P Bingham
Consultancy

The effects of Bi₂O₃ doping on the optical properties and structure of soda lime silica glasses for photovoltaic applications



RABIA AWIDAN

Supervisor: P Ezepue
Centre for Automation and Robotics Research

Time series analysis and macroeconomic effects of oil price fluctuations in Nigeria.



RAMIN BAHADORI

Supervisor: S Saad
Centre for Automation and Robotics Research

Cycle stock optimisation in fractal supply network



Mini Profile

I graduated with MEng Mechanical Engineering degree from Sheffield Hallam University and at the moment I work for Materials and Engineering Research Institute as a research assistant. In addition, I am doing part time PhD in microwave curing of Concrete repair.



Mini Profile

My PhD, research is in Medical Electronics. Additionally, I am a Specialist Visiting Lecturer at Sheffield Hallam University. I am also working as a Research Assistant on a Food Engineering Project.



Mini Profile

The project consists of development of new glass compositions with enhanced optical, chemical and mechanical properties for the PV module industry. I graduated the University of Huddersfield with first class honors in an MChem degree in 2014. I have undertaken research in photochromic 2H-pyrans with Vivimed Labs Europe, and synthesis of lead phosphate crystals with Yorkshire Water.



Mini Profile

I am Rabia Awidan, lecturer in the Faculty of Education, University of Tripoli in Libya, I have a Masters in Statistics since 2007. I am single and like reading. I am doing a doctoral research in statistics.



Mini Profile

I am Ramin Bahadori, I have a masters in logistics and supply chain management. I am doing PhD MERI with an interest in research areas of fractal supply network and it's logistics capabilities



BARNALI BISWAS

Supervisor: P Hovsepian
Thin Films Research Centre

Characterization of growth defects in PVD coating



KALLUM BURGIN

Supervisor: T Spencer
Polymers, Nanocomposites and Modelling Research Centre

Evaluation of a new pressure boundary condition for lattice-Boltzmann simulations.



AARON CUSACK

Supervisor: A Smith
Structural Materials and Integrity Research Centre

Microscopic analysis of in-service aluminium-lithium airframe alloys - ensuring scientific support to front line commands



ALIREZA DASTAN

Supervisor: D Cleaver
Polymers, Nanocomposites and Modelling Research Centre

Molecular dynamics simulation of fibre formation



MUSSTAF A ELYOUNNSS

Supervisor: A Holloway
Centre for Automation and Robotics Research

Development of an intelligent robotic rein for haptic control and interaction with mobile machines



Mini Profile

I received my MSc (Physics) at the Indian Institute of Technology Guwahati. Currently I am working in the area of PVD coatings.



Mini Profile

I am a full time PhD student at Sheffield Hallam University, where I also got my BSc in Mathematics. My research interest is in fluid modelling, for which I am developing novel Lattice Boltzmann codes, providing insight and optimisation opportunity in the food industry.



Mini Profile

Aaron gained his degree in Forensic Engineering from Sheffield Hallam University in 2008. He currently works for the UK Ministry of Defence as a Higher Scientific Officer at 1710 Naval Air Squadron. His work primarily focuses on metallic material failure analysis and providing scientific support to front line military units. He is a part of a specialist deployable team that supports the Military Air Accident Investigation Branch and is the Squadron's Forensic Weapons and Munitions Officer.



Mini Profile

I hold a Master's degree in Mechanical Engineering from Iran. Before starting my studies in MERI, I worked as a research assistant and also part-time lecturer in some Universities in my home country. I'm really keen on everything related to computers and therefore my PhD project, which is totally computational, matches my interests.



Mini Profile

I am Musstafa Elyounnss, lecturer in the High Institute for Engineering Professions – Tripoli, I have an Msc in computer Engineering and Master in Engineering Science Eng. Project Management 2010. I am married and am interested in travelling. Now I am doing a PhD in robotics at SHU



ABDUSALAM SAAD ESSA

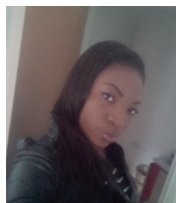
Supervisor: C Sammon
Polymers, Nanocomposites and Modelling Research Centre

The influence of composition on the mechanical properties of Laponite-pNIPAM hydrogels



Mini Profile

I am Abdusalam Saad Essa, lecturer at the higher institute of medical professions, Dental technology department. I have a master degree since July 2011. I am married, and I have a daughter. I love reading and music.



ENOHOR IGBEYI

Supervisor: L Alboul
Centre for Automation and Robotics Research

The journey to the uncanny valley; bridging the gap between humans and humanoid robots through age, culture and religion.



Mini Profile

My research background is based on the uncanny valley phenomenon which is in the field of humanoid robots and aesthetics, although having a background in computer science I have an amazing Director of studies who guides me at every stage needed. Hence I have no worry about working in MERI, my career goal is to achieve a breakthrough in this field that has never been touched before.



RONAK JANANI

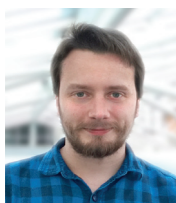
Supervisor: H Wang
Structural Materials and Integrity Research Centre

Graphene-based supercapacitor films



Mini Profile

I received my degree in electronics majoring nanotechnology from Multimedia University (Malaysia) in 2014. I am passionate about my research on supercapacitors. I believe they can make our lives a little bit easier in the near future.



ALEXANDER LUKASH

Supervisor: L Alboul
Centre for Automation and Robotics Research

Emergent behaviour in swarm robotics.



Mini Profile

Alex joined MERI as a PhD student in 2014, focusing on emergent behavioural patterns and self-organisation in robotic systems with a large number of agents. He is also a Teaching Assistant in programming courses at SHU.



CAJETAN IKECHUCKWU MBAMA

Supervisor: P Ezepue
Centre for Automation and Robotics Research

The effect of digital innovation, customer experience and financial performance on the financial industry.



Mini Profile

I am Cajetan Mbama, Technical lead / Consultant at Hewlett-Packard (HP) in Newcastle, UK. I have an MSc in I.T. and MPhil in Digital Communications from the University of Teesside, UK, and currently studying for PhD in Digital Services Innovation, Customer Experience and Financial Performance amongst UK Banks.



ABUBAKAR MOHAMMED

Supervisor: H Wang
Structural Materials and Integrity Research Centre

The influence of Inhibitor concentration on the corrosion protection of pipeline steel by sol-gel Coating



Mini Profile

Abubakar studied BEng (Mechanical Engineering) and MSc (Mechanical Engineering) at Federal University of Technology Minna, Nigeria and University College London respectively. He is currently working on "The Mechanism of Corrosion Protection of Oil and Gas Pipelines using Sol-Gel Technology".



KHALID RMAYDH MUHAMMED

Supervisor: P Bingham
Structural Materials and Integrity Research Centre

The electrical and physical properties of Pb-free piezoelectric ceramic materials



Mini Profile

I am Khalid Rmaydh Muhammed, I was nominated by the Higher Committee for Education Development in Iraq (HCED-Iraq) to study PhD materials engineering at MERI at Sheffield Hallam University. I think the best thing that happened to me was the birth of my child Younis and the study of PhD materials engineering at Sheffield Hallam University with Dr. Paul A. Bingham.



HARRIET NWAIZU

Supervisor: R Saatchi
Centre for Automation and Robotics Research

Inertial measurement unit techniques for analysing patterns of human movement and balance



Mini Profile

A PhD student in MERI - Sheffield Hallam University and my research interest is in developing a technique for human motion analysis using inertial measurement units (IMUs).



AYOTUNDE ADIGUN OJO

Supervisor: I M Dharmadasa
Thin Films Research Centre

Electrodeposition of fluorine doped cadmium telluride thin film from cadmium nitrate precursor for application in photovoltaic device fabrication.



Mini Profile

I am OJO Ayotunde, a lecturer in the department of Mechanical engineering, Ekiti State University, Nigeria. I like playing and watching football, internet surfing and playing video games. I am doing my Ph.D in Photovoltaic Semiconductor materials.



CRISTINA PASCUAL GONZALEZ

Supervisor: A Feteira
Structural Materials and Integrity Research Centre

Band gap engineering of KNbO₃-based ferroelectric ceramics



Mini Profile

My name is Cristina and I am studying towards a PhD in ferroelectrics for solar energy harvesting at Sheffield Hallam University. I was awarded a BSc in Physics from the Universidad Complutense de Madrid (Spain) and a MSc in Fuels and Renewable Energies for the Future from the Universidad Autonoma de Madrid (Spain). I love cooking and ice skating.



ASMAIEL RAMADAN

Supervisor: F Al-Naemi
Centre for Automation and Robotics Research

Magnetic fault current limiter



ALEX SCRIMSHIRE

Supervisor: P Bingham
Structural Materials and Integrity Research Centre

Advanced spectroscopy of catalyst and energy materials



OJEDOKUN OLALEKAN OLAYINKA

Supervisor: P Mangat
Structural Materials and Integrity Research Centre

Time dependant chloride diffusion in alkali activated cementitious materials

Mini Profile

I am Asmaiel Ramadan a PhD student in the Materials and Engineering Research Centre at Haram University. I have an MSc in Asset Management, Aberdeen, UK/2002 and MSc in Electrical Engineering from Tripoli, Libya/2010

Mini Profile

A graduate in Forensic Engineering from SHU, and a professional scuba diver, now working with advanced ceramics to help research the next generation of green energy and eco-fuels.

Mini Profile

I am a Full-Time PhD student in MERI at SHU. My research focus is on Durability Properties of Alkali Activated Cementitious Materials with much emphasis on the Corrosion of steel, Carbonation, and Chloride Profile in Alkali Activated Materials

VOTING FOR YOUR FAVOURITE POSTERS

1. What is a QR Code?

A QR Code (it stands for 'Quick Response') is a mobile phone readable barcode that can store website URLs.

There are 2 QR codes available. One for the PhD posters and one for the Undergraduate posters on display during the MERI Research Symposium – you can vote for as many posters as you like, but you may only vote once per poster.

2. How does it work?

You can scan the code using your Android or Smartphone, you will be directed to a voting page, where you can select and rate the individual posters according to set criteria.

3. Where can I get a scanner application?

Most phones will have a barcode scanner as an App, you will need to download the App to your phone. When the App is launched and placed over the code it will scan the code and direct you to the voting page.

4. The result?

The public vote will close at 2pm on Wednesday 20th May (day 2) and the result will determine the prize winners. Prize giving will be held at 4pm.

**TO VOTE FOR PHD
POSTERS SCAN HERE**



**TO VOTE FOR UG
POSTERS SCAN HERE**



PRIZES

Prizes in the form of vouchers will be awarded in the following categories:

- Best PhD student talk - 1st prize
- Best PhD student talk - 2nd prize
- Best PhD student poster - Judges vote
- Best PhD student poster - Public vote
- Best undergraduate poster

Prizes will be presented by Professor Roger Eccleston Pro Vice-Chancellor for the Faculty of Arts, Computing, Engineering and Sciences (ACES).



Mini Profile

Professor Roger Eccleston joined Sheffield Hallam in September 2012. Professor Eccleston worked previously at the University from 2004 - 2007 as director of the Materials and Engineering Research Institute (MERI). He returned to Sheffield Hallam from his most recent role as Dean of the School of Science and Technology at Nottingham Trent University. Prior to this, Professor Eccleston was Director of Technology at the Sciences and Technology Facilities Council (STFC) where he led the Technology Unit, providing engineering and technology services to major UK science projects and facilities, including the Large Hadron Collider. He is an alumnus of Sheffield Hallam, having studied applied science at Sheffield City Polytechnic. He also has a PhD in physics from the University of Warwick.

These prizes have been generously donated by our sponsor:

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Presentation Judges

Alan Smith, Lyuba Alboul, Richard Wiktorowicz, Paul Bingham, Kathy Doherty, Doug Cleaver, Wayne Cranton

Poster Judges

Frances Clegg, Hywel Jones, David Asquith, Torsten Schenkel, Antonio Feteira, Karen Vernon-Parry

Thanks to the members of the planning committee:

Alan Smith (Chair), Lyuba Alboul, David Asquith, Paul Bingham, Antonio Feteira, Gail Hallowell, Gillian Hill and Karen Vernon-Parry

FLAG KEY

United Kingdom	Netherlands	Ireland	The United States of America
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We supply industrial gases, performance materials, equipment and technology. We are the world's largest supplier of hydrogen and helium and have built leading global supply positions in growth markets such as semiconductor materials, refinery hydrogen, coal gasification, natural gas liquefaction and advanced coatings and adhesives.

Relationships are the rock on which we've built our company and, like MERI, we are understanding of the needs and interests of the people who depend on us. We build relationships that stand the test of time. Our enduring values are at the heart of our proud tradition of excellence.

Because of this shared vision and commitment we value the research and consultancy relationship that we are developing with Sheffield Hallam University and MERI.

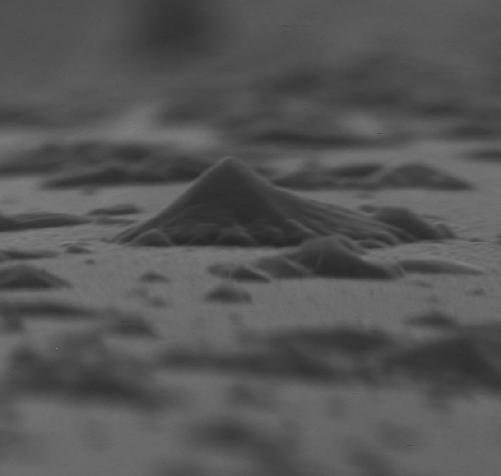
We also want to be the best company to work for. To achieve this we provide an atmosphere of inclusion and respect. We value everyone's opinion. We provide our people challenging, satisfying work and the opportunity to develop their talents and advance their careers. And above all, we make sure our people are as safe and sound when they return home as they are when they arrive for work. We want our people to feel valued and take pride in contributing to a great enterprise. We want them to know they work in an atmosphere of trust where they can say what they think and make a difference. We expect them to continue to learn and grow. We reward them for their commitment and contribution.

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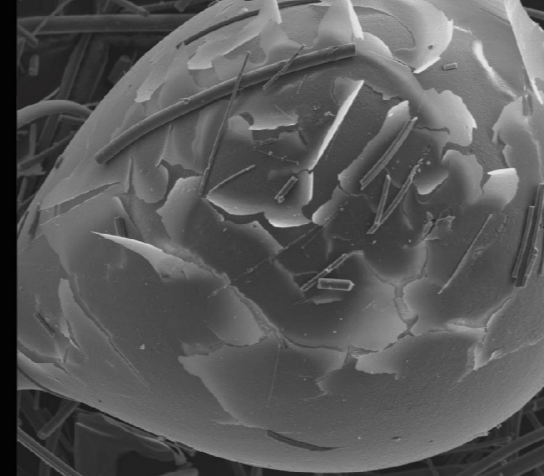
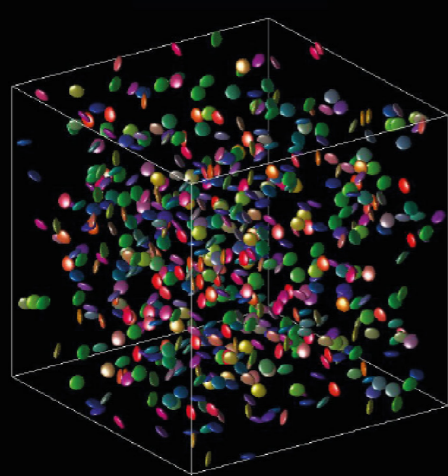
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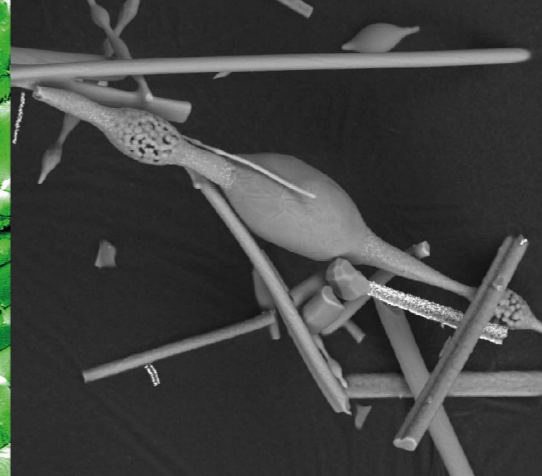
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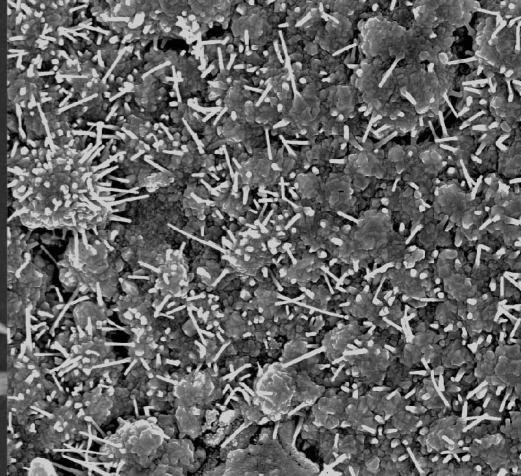
spot 4.0 WD 5.0 mm mag 803 x HV 10.00 kV det ETD Lens Mode Field-Free 100 μm



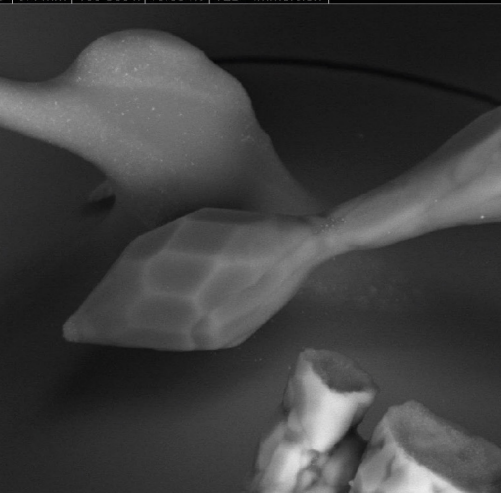
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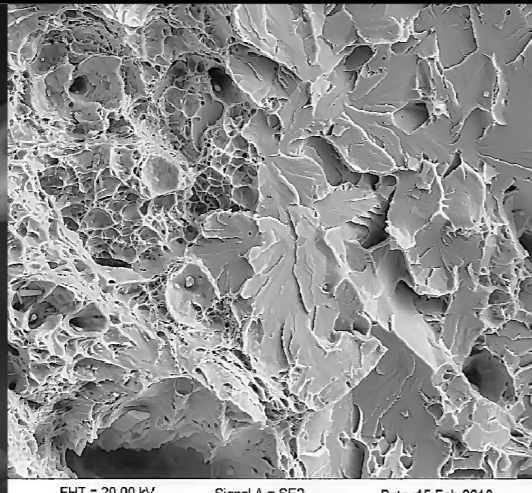
WD 5.3 mm HV 15.00 kV BSED 5.0 spot 1 700 x mag 50 μm



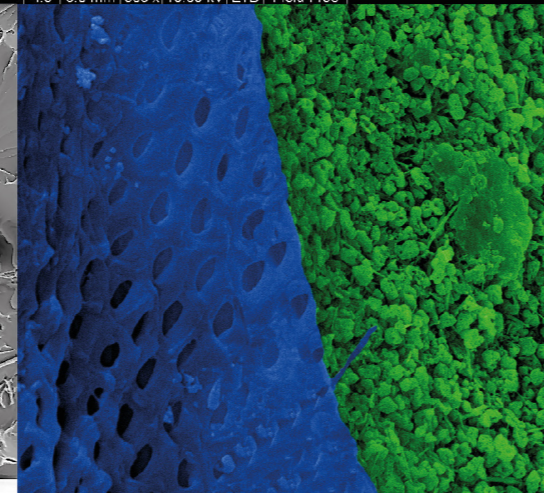
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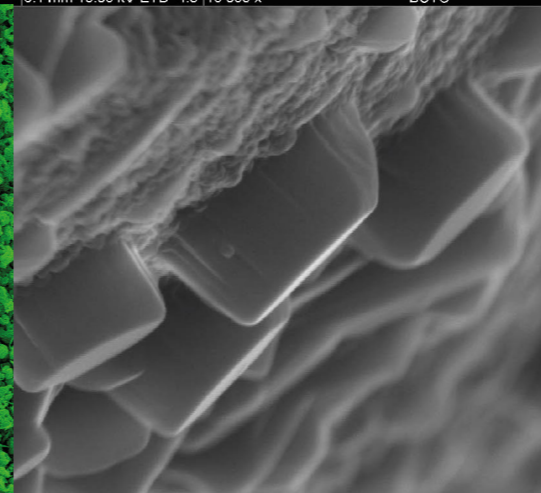
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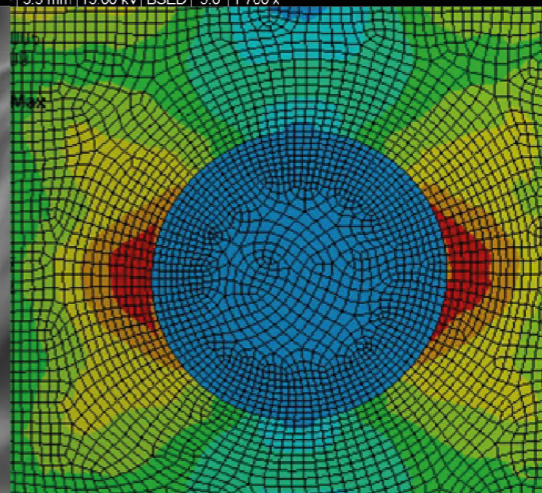
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WD = 6.5 mm Photo No. = 797 Time :16:45:40



WD 6.6 mm HV 15.00 kV det ETD spot 3.5 mag 4 000 x Lens Mode Field-Free 10 μm



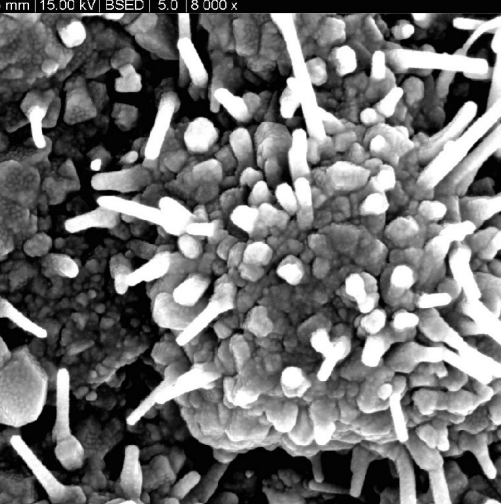
spot 4.0 WD 5.1 mm mag 200 000 x HV 18.00 kV det TLD Lens Mode Immersion 500 nm



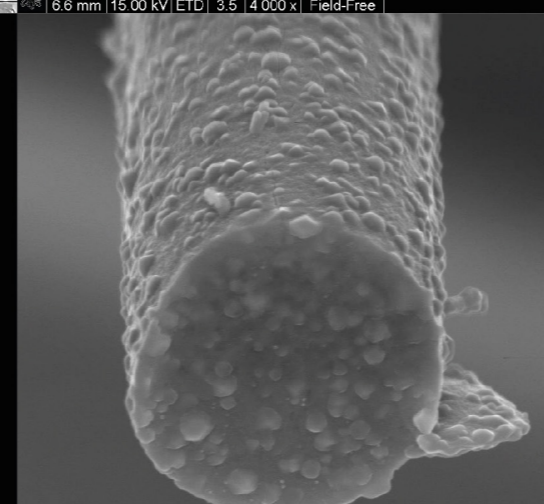
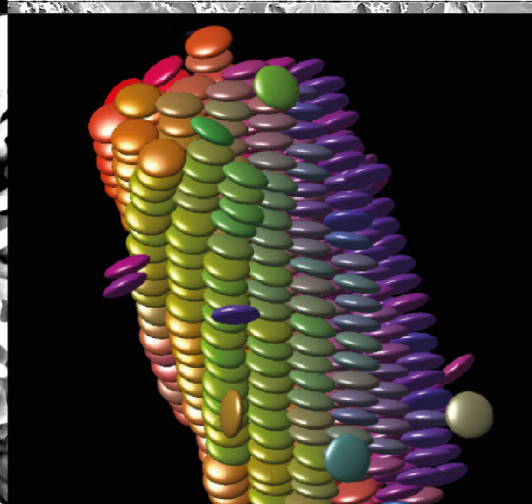
spot 4.0 mode A+B WD 4.8 mm mag 4 000 x HV 20.00 kV det BSED Lens Mode Field-Free 10 μm



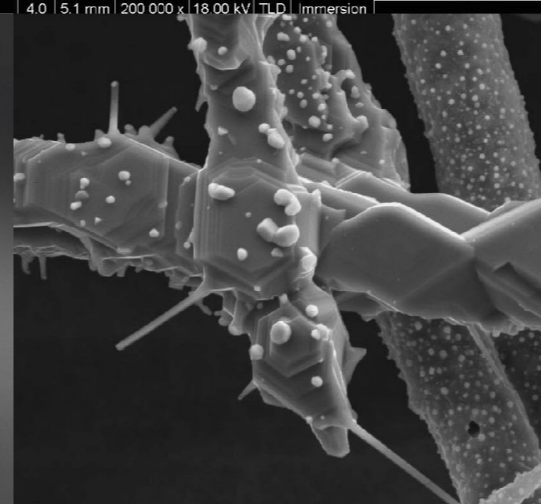
WD 6.0 mm HV 10.00 kV ETD 4.5 spot 10 004 x mag 10 μm BCTO



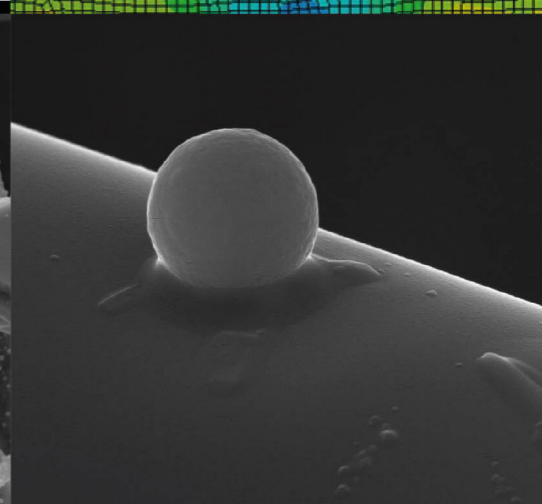
WD 5.4 mm HV 10.00 kV det TLD spot 4.0 mag 160 000 x Lens Mode Immersion 500 nm



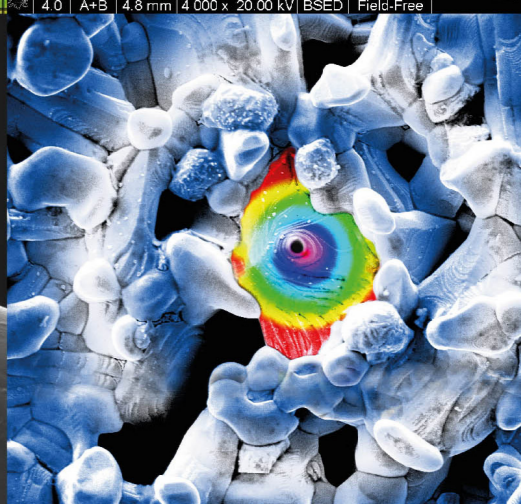
spot 4.0 WD 5.0 mm mag 30 000 x HV 10.00 kV det TLD Lens Mode Immersion 3 μm



spot 5.0 WD 5.3 mm mag 13 000 x HV 10.00 kV ETD 4.5 spot 10 000 x mag 5 μm



WD 4.8 mm HV 10.00 kV det TLD spot 4.0 mag 80 000 x 1 μm



WD 6.0 mm HV 10.00 kV ETD 4.5 spot 10 004 x mag 10 μm BCTO

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