UltraWire 2018

Workshop on Commercialisation of Ultra-Conductive Composites

www.ultrawire.eu

Agenda,

Speakers and Participating organisations

Date: *12th & 13th July 2018*

Meeting Venue: The Møller Centre
Churchill College,
Storey's Way, Cambridge
CB3 0DE
www.mollercentre.co.uk

Dinner Venue: The Saltmarsh Rooms
Kings College
King's Parade,
Cambridge
CB2 1ST
www.kings.cam.ac.uk

Organiser*: Cambridge Nanomaterials Technology Ltd*
14 Orchard Way, Lower Cambourne
Cambridge, CB23 5BN, UK
www.cnt-ltd.co.uk

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UltraWire Workshop 2018 - Meeting Venue

The **UltraWire Workshop 2018** - *Workshop on Commercialisation of Ultra-Conductive Composites* - will be taking place at the Study Centre at:

The Møller Centre
Churchill College,
Storey's Way, Cambridge
CB3 0DE
www.mollercentre.co.uk

The dinner will be taking place on **Thursday 12th July** at **7pm** at the:

The Saltmarsh Rooms
Kings College
King's Parade,
Cambridge
CB2 1ST
www.kings.cam.ac.uk

There is not parking available at **Kings College**, however parking at Queen's Road is free after 5pm. The closer Car Parks are at the ***Gran Arcade*** (Corn Exchange St, Cambridge CB2 3QF) and ***Park Street Car Park*** (13 Park St, Cambridge CB5 8AS).

Access to the college will be only through the main gate at Kings Parade.

Note *If you have any problem on the day and need to contact any of the organisers, you could call Dr Bojan Boskovic on his mobile phone +447780874335 or Ms Mónica Spreadbury at: +447563592671*

UltraWire Workshop 2018 - Agenda

UltraWire Workshop 2018

Workshop on Commercialisation of Ultra-Conductive Composites

Day 1

Date: 12th July 2018

Venue: SC3 Room (SC8 exhibition) - Study Centre, The Møller Centre

14:00 *Registration UltraWire Workshop 2018*

14:15 Welcome & Introduction

Dr Bojan Boskovic, CEO, Cambridge Nanomaterials Technology Ltd
(*UltraWire Project Exploitation and Dissemination Manager*)

- **Welcome and Introduction to the UltraWire Workshop 2018**
- **Overview of the UltraWire project (www.ultrawire.eu) and post-project activities**

14:30 **Dr Bruno DUFOUR,** Project Manager and Scientific Advisor, Hutchinson, France

Title "(Nano)-Carbon for Energy Storage Systems".

With 27,000 employees in 20 countries, Hutchinson Worldwide (a wholly owned subsidiary of Total) partners with the world's major transportation groups while dealing with multiple major issues involving vehicle safety, reliability, and comfort. The corporate Hutchinson Research Center aims at developing innovative solutions by using new chemistry of tailored polymers and (nano)-carbon materials, electrochemical, and mechatronics devices. This multiple capability allows addressing new fields of competence including high-density electric energy storage or energy harvesting devices. Hutchinson developments of energy storage systems, including supercapacitors and Li-ion battery electrodes using proprietary synthesis and processes will be presented. In these applications, the use of (nano)-carbon materials is critical to the devices performances. For instance, supercapacitors with very high energy densities require the use of nano-porous carbons with tailored porosities to fit with high voltage electrolytes.

15:00 **Paul Ladislaus,** Advanced Materials Process Technology Team Leader, Thomas Swan, UK

Title: "Graphene and carbon nanotubes production and application development at Thomas Swan"

An established, family owned specialty chemicals manufacturer based in North East England, Thomas Swan has a proven track record of developing innovative processes and products. In 2011, a chance encounter under the wings of Concorde at Duxford Air Museum, Cambridge, between our MD Harry Swan and Trinity College Dublin Professor Johnny Coleman set in motion a series of events that would lead, six years later, to the development of a world class 20t/year graphene manufacturing plant. Thomas Swan's experience with single-wall carbon nanotubes made us aware of the need to take control of graphene application development to ensure rapid market adoption. Thanks to innovations like our continuous high shear manufacturing process, we believe that graphene process is scalable. However, before it can be considered a commodity, however, it will also need to deliver real value in downstream applications. Paul will talk about the company's "graphene-journey" and how we have gone about developing our graphene product range.

15:30 *Coffee break*

16:00 **Giovanni A. della Rossa,** Innovation & IP Manager, Luigi Bandera SpA

Title: Grapholymer - Extrusion of 2DMaterials and foaming in polymers

A worldwide leader in Plastics Extrusion Machinery, Bandera has recently developed a laboratory EA-Extrusion Academy® with the goal of liaising between research and industrial production of the many products obtainable via the extrusion process, also associated to lamination, coating, converting and printing technologies. Bandera, industrial sponsor of CGC Cambridge Graphene Centre, and partner with IIT Istituto Italiano Tecnologia for 2Dmaterials in extrusion, is an associate member of Graphene Flagship the Future Emerging Technology program by the European Commission.
Grapholymer is the extrusion process to integrate graphene and 2D materials in many extrudable polymers. The House of Extrusion® 5,000 sq.m facility of production lines allows he scale up of prototype results to industrial output of +3,000 kg/h.

16:30 **Dr. Siva Böhm -** Chief Technology Officer at Talga Technologies Ltd, UK.

Title: Tuning graphene for applications with enhanced conductivity

17:00 **Closing remarks**

*By **Dr Bojan Boskovic**, CEO, Cambridge Nanomaterials Technology Ltd*

19:00 ***Dinner at Kings College***

Note It is planned that all presentations would be followed by Q&A discussion. The organisers reserve the right to change the programme, speakers or venue should circumstances require. *For any further enquires please do not hesitate to contact directly Dr Bojan Boskovic on Bojan.Boskovic@CNT-Ltd.co.uk or on his mobile phone +447780874335.*

UltraWire Workshop 2018

Workshop on Commercialisation of Ultra-Conductive Composites

Day 2

Date: 13th July 2018

Venue: SC3 Room (SC8 exhibition) - Study Centre, The Møller Centre

09:00 *Arrival and registration*

09:30 Welcome

Dr Bojan Boskovic, UltraWire Exploitation and Dissemination Manager, CEO, Cambridge Nanomaterials Technology Ltd

09:45 **Prof. Krzysztof Koziol,** UltraWire Project Coordinator**,** Professor of Composites Engineering, Head of Enhanced Composites and Structures Centre, University of Cranfield, UK

10:30 *Coffee break*

11:00 **Dr Agnieszka Lekawa-Raus,** Research Fellow in the Department of Mechatronics, Warsaw University of Technology, Poland

Title: Electrical machines wound with carbon nanotube wires

The electrical machines which include electrical transformers, generators and motors, constitute a vast part of electrical engineering infrastructure which enables generation, transport, transformation and finally utilization of electrical energy in both domestic and industrial applications. It has been already over hundred years since the principle of their operation has been proposed and since then many designs have been created and applied. However, the machines' development has reached its limits. Currently, the only way of improving their performance is by the use of new materials.
Carbon nanotube (CNT) wires appear here as a very attractive alternative to copper and aluminium windings currently used in these machines. Although the electrical conductivity of CNT windings may not seem sufficient at the current stage, it has to be remembered that this is not only conductivity which defines the performance and usability of the machine for the specific purpose. The other issues may include chemical resistance, weight, or high frequency performance which define the reliability, life-span or cost of the machines. Therefore, while observing a gradual progress in the area of electrical conductivity it is worth to consider other aspects of winding of machines with CNT wires. The following presentation will review the current progress in this area.

11:30 **Malcolm Burwell,** Chief Executive of UltraConductive Copper Company. UC3, USA

Title: Lessons from procuring VC funding for the development of ultraconductive copper

"Yes, UCC is a potentially world-changing technology, but why isn't it making sales today?" A not untypical quote from a target investor during the funding roadshow for UltraConductive Copper Company Inc. (UC3). During the 16 months it took to find and close Series A funding it was abundantly clear that investor's primary concern was not with the technology, but with the probability that their investment would make a return in the next <few> years. We were ultimately successful in gaining our investment, but the journey was eye-opening as to the state of venture investing in advanced materials today. Malcolm Burwell is a co-founder at UC3 and led the investment process. While some of his anecdotes are entertaining, the lessons he learned will be invaluable to those wondering how best to gain mainstream investment in these new Ultrawire technologies.

12:00 **Dr Raul Fangueiro**, Professor and Senior Researcher, University of Minho, Portugal

Title: "Nano-carbon based composite materials"

This presentation will give an overview of the technical and scientific achievements obtained by Fibrenamics/UMinho on the use of carbon nanotubes and graphene in combination with polymeric and cimenticious matrices. The strain sensing and the reinforcing capabilities of these nanomaterials when used in composites are presented and discussed. Techniques to homogeneously disperse CNT`s and graphene within these matrices are explained and their ability to obtain composite materials with homogeneous properties area presented. Moreover, the electrical conductivity of graphene reinforced polymeric composites, in the form of sheets and filaments, is explored and the ability to be used as 3D printed elements discussed.

12:30 **Dr Stefanos Koutsoumpis,** Application Physicist, National Technical University of Athens, Greece

Title: Carbon-based smart materials and intelligent structures: New challenges, perspectives and tools

Tailor made composite materials gain the interest of aerospace, defense and automobile industries due to uniqueness and extensive improved properties. Carbon fibers (CFs), carbon nanotubes (CNTs), graphene (G) and graphene oxide (GO) are under intense investigation, due to their unique mechanical, thermal and electrical properties but also their future potential for tailored enhancement of composites. Composites reinforced with G and/or CNTs exhibit a great potential for a series of applications in smart materials and intelligent structures, including among others, chemical sensor platforms, actuators, energy storage devices, self-healing systems, smart fabrics, water treatment, construction technologies and other emerging technologies. The increasingly high demand in production of new carbon based smart materials leads to the necessity of developing of large scale production methods. Among the several methods of CNTs production, CVD (fluidized-Bed, spray pyrolysis, etc.) can be considered as the appropriate upscaling technique. In addition, GO can be produced following two different synthesizing routes, based either on wet chemistry technique (modified Hummers methods) or on electrochemical processes, like electrochemical exfoliation of graphite, both easily adjusted from lab to large scale, leading to higher production yield. The high aspect ratio and electrical conductivity of CNTs make them an excellent health monitoring tool when embedded in composites. CNTs have been used as reinforcement in concrete for energy infrastructures, providing self-sensing for assessment of composite's durability. Back to smart materials and intelligent structures, their integration into existing and new technology could enhance the market position of existing products and introduce new. In close relationship to design, Internet of Things (IoT) and smart assessment, key to this is the development is the up-scaling, cost-effectiveness and production of carbon based smart materials.

13:00 Networking Lunch Buffet and Exhibition *(SC8 room)*

14:00 **Dr Alvin Orbaek White,** Senior Lecturer and Sêr Cymru II Fellow, Energy Safety Research Institute (ESRI), Swansea University, UK

14:30 **Christine Boyle MBE,** CEO Senergy, UK

Title: "Senergy Solar Thermal Nanocomposite Panels from Concept to Commercialisation"

Solar Thermal is a renewable energy that is 70% efficient which far exceeds Solar PV which is only 18% efficient. It also produces the lowest carbon emissions and is easily generated on site and it has the potential to become a reliable source of energy for heating and cooling space in the future. However to date solar thermal energy collection systems made from glass copper and aluminium have been expensive and the initial investment has been cost prohibitive.There have also been challenges around the architecture and appearance of the systems.
The Senergy business and product idea was conceived by Christine Boyle MBE, with almost 20 years running her commercial roofing company Christine recognised the potential for building integrated solar.
Unlike current thermal panels that are made of glass, copper and aluminium Senergy panels are 100% polymer plastic, this makes them 50% less expensive to both manufacture and install than current metallic panels on the market. The Senergy panels benefit from the advantages of the polymer materials and incorporate carbon nanotube materials that enhance the thermal performance and mechanical strength. The panels are also embedded with low cost sensor and information technologies. This digital integration provides an IOT/IQT platform ensuring the energy supply is more efficient and the building owner has greater control. These advantages address the challenges that have hindered the roll out of this form of renewable energy.
Bringing together expert roofing and polymer manufacturing companies alongside leading academics in the nanocomposite field, Senergy plan to leverage the innovative and commercial

opportunities they have identified. What are the opportunities and barriers for large scale cost effective production?

15:00 *Coffee break*

15:30 **Dr David Gerada,** Senior Fellow in Electrical Machines, University of Nottingham, UK

Title: "Power Density Roadmaps and Technology Limits for Electrical Machines for Propulsion Applications"

16:00 **Discussion, future of the ultraconductive composites based nanomaterials**

*Facilitated by **Dr Bojan Boskovic**, CEO, Cambridge Nanomaterials Technology Ltd*

- *Short presentation on survey results about opportunities and barriers for nanomaterials commercialisation by two University of Cambridge master students, supervised by **Dr Bojan Boskovic**, CNT Ltd and **Dr Caterina Ducati**, University of Cambridge:*
  - ***Xianjie Dai** – MPhil in Micro- and Nanotechnology Enterprise, University of Cambridge*
  - ***Yuanhang Liu,** MPhil in Micro- and Nanotechnology Enterprise, University of Cambridge*
- *UltraWire Technology Development Opportunities and Barriers*

17:00 *Closing remarks*

Note It is planned that all presentations would be followed by Q&A discussion. The organisers reserve the right to change the programme, speakers or venue should circumstances require. . *For any further enquires please do not hesitate to contact directly the NCEM Programme Director, Dr Bojan Boskovic on Bojan.Boskovic@cfbi.com or on his mobile phone +447780874335.*

UltraWire 2018 Workshop - Speakers

Professor Krzysztof Koziol, *(Speaker)*
Head of Enhanced Composites and Structures Centre, Cranfield University
School of Aerospace, Transport and Manufacturing, Building
UK

Prof. Krzysztof Koziol is the Head of the Electric Carbon Nanomaterials Group. His current research is in the area of synthesis and applications of substrate-bound and gas-phase-grown carbon nanotubes, with a particular focus on chirality control of carbon nanotubes. In addition, he is exploring two methods of making carbon nanotube fibres; the first is based on direct and continuous spinning from carbon nanotube aerogel, where up to 70 meters per minute of fibres can be achieved. These fibres show exceptional mechanical properties - a combination of strength, stiffness and toughness - but also very high electrical and thermal conductivity. The second method is based on spinning Carbon Nanotube fibres from liquid dispersion of well-defined structures of carbon nanotubes. During his previous research projects, he developed various methods for the synthesis, purification, chemical modification and fabrication of highly aligned nanotubes and polymer composites. In addition he discovered a new synthesis route which solves the problem of the chirality control challenges of carbon nanotubes. Using this process he has been able to synthesise armchair or zigzag type nanotubes. His other current research interests include: post treatment and applications of pure carbon nanotube and carbon nanotube polymer composites as well as design and testing of various devices based on carbon nanotube wire technology.

Dr Bruno DUFOUR *(Speaker)*
Hutchinson,
CRI, rue Gustave Nourry 45120
Chalette sur Loing
France

Dr Bruno Dufour, PhD in polymer chemistry from the University of Grenoble in 2002, is a project manager and scientific advisor at Hutchinson in Montargis, France since 2010. He has 13 years of experience in industrial R&D, in developing new materials for energy storage, composites, coatings, ophthalmic and thermal insulation. He co-authored around 70 publications including 30 independent patent applications.

Paul Ladislaus *(Speaker)*
Thomas Swan
UK

Paul Ladislaus MA (Cantab) MEng (Hons) CEng MIChemE VR. Paul Ladislaus is a Chartered Chemical Engineer with extensive experience in Chemical Process Operations and Process Technology Development. He is the Process Technology Team Leader for the Advanced Materials Division at Thomas Swan, focusing on the scale-up of new processes and products and optimisation of existing process technologies. Paul holds a Master's Degree in Chemical Engineering from the University of Cambridge and is a Member of the Institute of Chemical Engineers. Paul is actively working on a very successful collaborative programme for the transfer, development and scale up of techniques and test methods for the production of graphene and other exciting novel advanced engineering materials.

Dr Siva Böhm *(Speaker)*
Chief Technology Officer at Talga Technologies Ltd, UK
Future Business Centre
King Hedges Road
Cambridge CB42HY- UK

Dr. Siva Böhm received his first degree in Berlin in Chemical Engineering and an M.Sc. in Applied Chemistry at Hahn Meitner Institute (MPI) in Berlin. Since 2016, Dr. Böhm works as Chief Technology Officer at Talga Technologies Ltd, Cambridge UK & Talga Advanced Materials GmbH, Germany, where he is focussing Swedish Ore to very Few layer Graphene and developing value-added products using industrial high volume Graphene, Graphite and Graphite Ore.
Dr. Siva Böhm is a Member of Royal Society of Chemistry with a charted chemist status and Fellow of Technical of Surface Coatings & Oil and Colour Chemist Association. In addition, he is reviewer for several peer-reviewed journals and a member of the editorial board at Flatchem. Recently, Siva has been awarded the Royal Society Industrial Fellowship.

Dr Alvin Orbaek White, *(Speaker)*
Senior Lecturer and Sêr Cymru II Fellow
Energy Safety Research Institute (ESRI)
Swansea University Bay Campus
UK

Dr. Alvin Orbaek White is a Senior Lecturer and Sêr Cymru II Fellow and at the Energy Safety Research Institute (ESRI). His vision is to advance global energy sustainability through the development of more efficient and equitable methods of transporting electricity.
Throughout his academic career, Dr. Orbaek White has worked to develop innovative methods to synthesize and characterize carbon nanomaterials. He completed his PhD on the catalytic growth of single walled carbon nanotubes, he has managed several projects related to the application, separation, characterization, wet-chemistry and synthesis of single walled CNTs, and multi walled CNTs. At the Massachusetts Institute of Technology, he developed a novel technique resulting in an approximate one hundred-fold increase in length of CNTs, called ultra-long CNTs.
Education and mentorship is also a priority. For instance, Dr. Orbaek White developed a teaching laboratory module for undergraduate chemistry students on plasmonic silver nanoparticles. He also raised funds through a program called Project SEED providing students from low-income households with a summer stipend and the opportunity to conduct chemistry research at Rice University.
Dr. Orbaek White was recently awarded UK Digital Economy Crucible, during which he plans to investigate the changing energy industry landscape due to the use of ultra-conductive electricity cables, better understand network distributions and the mathematical logic underpinning smart grid methodology.

Giovanni A. della Rossa *(Speaker)*
Innovation & IP Manager
Luigi Bandera SpA
Italy

Giovanni della Rossa studied Gamma-Ray Bursts at Milan University Physics, R&D Management Master at Bocconi University Milan. Holds several patents in Quantum Entangled Lithography with JPL - NASA and in plastic PV panels extrusion. Serial entrepreneurial ventures, now holds the position of Innovation & IP Manager at Costruzioni Meccaniche Luigi Bandera spa where he supervises innovation and academia and research liaisons in the field of nano composites in/on plastics via the extrusion process and future plastic applications.

Dr Raul Fangueiro *(Speaker)*
Professor and Senior Researcher
University of Minho
Portugal

Prof. Raul Fangueiro is currently professor and senior researcher in the School of Engineering at the University of Minho, Portugal. He is the Head of the Fibrous Materials Research Group of the same university with expertise in advanced materials (nano, smart, composites) and structures (3D, auxetic, multiscale) with 40 researchers. He is the mentor and the coordinator of the FIBRENAMICS International Platform (www.fibrenamics.com) including 300 partners developing promotion, dissemination, technology transfer and research activities on fiber-based advanced materials. He has more than 145 published papers in international reputed scientific journals, 400 conference publications, 36 books and 14 patents. He is the scientific coordinator of several national and international research projects on advanced fibrous and composite materials, manly for building, architectural and health-care applications. He supervised various PhD and Pos-Doc scientific works and is the Chair of ICNF and AUXDEFENSE conferences and member of the editorial board of several leading international scientific journals on composite and fibrous materials.

Dr Agnieszka Lekawa-Raus *(Speaker)*
Research Fellow at Warsaw
University of Technology,
Poland

Dr Agnieszka Lekawa-Raus is a Research Fellow at Warsaw University of Technology, Poland. As a holder of a 3-year grant for young Leaders of Polish Science funded by National Centre for Research and Development, she is currently running her first research group whose main focus is on the development of nanocarbon based electrical conductors, machines and electronics. She has been gaining her research experience while working and studying for PhD degree in Materials Science at University of Cambridge UK, pursuing an Electrical Engineering degree at Lublin University of Technology, Poland as well as visiting Kanazawa University, Japan and Los Alamos National Laboratories, USA. Her main interest is in the novel conductive materials, nanocarbons, electrical machines and functional composites.

Malcolm Burwell *(Speaker)*
CEO
UltraConductive Copper Company Inc.
USA

Malcolm Burwell is Chief Executive of UltraConductive Copper Company. UC3 was started in early 2017 to develop the manufacturing process for ultraconductive copper. Prior to UC3, Malcolm ran the ultraconductive copper development program at the International Copper Association. For the last 20 years, he has worked at the interface between business and new-to-the-world technologies. Prior to that, he led hands-on developments of new products, technologies and processes. Malcolm has founded three previous technology companies and has worked for over 30 technology organizations worldwide. He is based in Boston Massachusetts.

Dr. Stefanos Koutsoumpis *(Speaker)*
Application Physicist
National Technical University of Athens
Greece

Dr. Stefanos Koutsoumpis (male) is an Applied Physicist with a PhD on Polymer Physics and an MsC on Material Science. He has 11 publications on international scientific journals and 20 participations to regional and international conferences. He has been involved in the implementation of 5 European and National funded research programs. His research focuses on the molecular dynamics of polymers and the dynamics at the polymer/filler interphases of polymer nanocomposites. His scientific interests focus on Additive Manufacturing, Smart Materials and Recycling strategies for plastic and composite

materials. He is an experimental physicist and is well familiar with various characterization techniques for polymers and polymer nanocomposites, including thermal, dielectric, electric behaviour, mechanical properties, structure.

Dr. David Gerada *(Speaker)*
Senior Fellow in Electrical Machines
University of Nottingham
UK

David Gerada received the Ph.D. degree in high-speed electrical machines from the University of Nottingham, Nottingham, UK in 2012. From 2007-2016 he was with the R&D Department at Cummins Inc. At Cummins he pioneered the design and development of high speed electrical machines, transforming a challenging technology into a reliable one suitable for the transportation market, while establishing industry-wide used metrics for such machinery. In 2016 he joined the University of Nottingham as a Senior Fellow in Electrical Machines, responsible for developing state of the art electrical machines for future transportation which push existing technology boundaries, while propelling the new technologies to higher technology readiness levels (TRL). Dr. Gerada is a Chartered Engineer in the U.K. and a member of the Institution of Engineering and Technology.

Christine Boyle MBE *(Speaker)*
Senergy Innovations
5th Floor Lombard House
10-20 Lombard Street
Belfast BT1 1RD
UK

Bssc (Hons) Queens University Belfast. CEO, responsible for driving innovation strategy. Brought together a team of global leading engineers from both Queens University and Ulster University alongside experienced polymer manufacturing companies based in Northern Ireland who currently export polymer products to 70 countries worldwide. Raised over 600K whilst retaining 100% equity and sole ownership of the company.

Xianjie Dai *(Speaker)*
MPhil in Micro-nanotechnology Enterprise
University of Cambridge
UK

Xianjie Dai is a master student at the University of Cambridge studying Micro- and Nanotechnology Enterprise. She is currently working on a project that aims to investigate the government innovation strategy under the supervision of Dr Bojan Boskovic. She holds a BA in Materials Science and Engineering from the University of Manchester. Her main interest is nanotechnology, nanomaterials and functional composites.

Yuanhang Liu *(Speaker)*
MPhil in Micro-nanotechnology Enterprise
University of Cambridge
UK

Yuanhang Liu is an MPhil student in the Department of Materials Science and Metallurgy at the University of Cambridge. His current research interest is the technology growth strategy in graphene industry, and his work is supervised by Dr. Bojan Boskovic from Cambridge Nanomaterials Ltd. and Dr. Caterina Ducati from the University of Cambridge. Prior to Cambridge, he completed his BSc degree at the University of Liverpool with 1st class in chemistry.

Dr Bojan Boskovic *(Organiser and Speaker)*
NCEM Programme Director, CfBI
CEO, Cambridge Nanomaterials Technology Ltd
Cambridge, UK

Dr Bojan Boskovic is a NCEM Programme Director at the CfBI and a founder and a CEO of the Cambridge Nanomaterials Technology Ltd (www.CNT-Ltd.co.uk) a consultancy company specialised in carbon nanomaterials. He has more than ten years of hands-on experience with carbon nanomaterials and composites from industry and academia in the UK and Europe. Previously, he worked as a R&D Manager at Nanocyl, one of leading carbon nanotube manufacturing companies in Europe. He also worked on carbon nanotube synthesis and applications as a Principal Engineer-Carbon Scientist at Meggitt Aircraft Braking Systems, as a Research Associate at the University of Cambridge, and as a Senior Specialist at The Morgan Crucible PLC. During his PhD studies at the University of Surrey he invented a low temperature carbon nanofibre synthesis method using PECVD. This research was granted a patent, published in Nature Materials and utilised by CNT synthesis equipment manufacturer Surrey Nano Systems. He and his team at the Cambridge Nanomaterials Technology Ltd helped a number of companies to understand the patents and market landscape and develop R&D strategy regarding carbon nanomaterials. He is also working as an advisor for the European Commission (EC) on Engineering and Upscaling Clustering regarding setup of the European Pilot Production Network (EPPN) and European Materials Characterisation Cluster (EMCC). He has experience in management of Exploitation, Dissemination and Business Planning related activities in European collaborative R&D FP7 and Horizon 2020 projects (ElectroGraph, UltraWire and NanoLeap).

UltraWire 2018 Workshop - Speaker & Delegate Organisations

AIRBUS Defence and Space
AIRBUS Group

Web: www.airbus-group.com

Airbus Group is a European industrial flagship which unites the capabilities of three market leaders: Airbus, Airbus Defence and Space and Airbus Helicopters. EADS has been rebranded as Airbus Group from January 2014. Airbus Military, Astrium and Cassidian are in formation to merge as Airbus Defence and Space. This broad range of products turns the new Division into a top-10 world player in defence and space. **Astrium** is Europe's No. 1 space company and is ranked third worldwide. Part of the international EADS Group and now Airbus Group, they are the only European space company that covers the entire space business, from civil and defence systems to services and applications. Their design, manufacturing and test facilities are among the most advanced in the world. They have unrivalled expertise in the techniques and key technologies required for developing and delivering major space systems. The 18,000-plus employees of Astrium are all driven by the same ambition: to make space technology work for everybody. Their skills, energy and entrepreneurial spirit have contributed to the success of many of the most important projects in space, including Ariane, the International Space Station, ATV, Herschel, Spot & Pléiades constellation, Mars Express and Skynet 5.

Prysmian Group

Web: http://www.prysmiangroup.com/

Prysmian Group is world leader in the energy and telecom cables and systems industry. With nearly 140 years of experience, sales of over €7.5 billion in 2016, 21,000 employees across 50 countries and 82 plants, the Group is strongly positioned in high-tech markets and offers the widest possible range of products, services, technologies and know-how. It operates in the businesses of underground and submarine cables and systems for power transmission and distribution, of special cables for applications in many different industries and of medium and low voltage cables for the construction and infrastructure sectors. For the telecommunications industry, the Group manufactures cables and accessories for voice, video and data transmission, offering a comprehensive range of optical fibres, optical and copper cables and connectivity systems. Prysmian is a public company, listed on the Italian Stock Exchange in the FTSE MIB index.

Nissan

Web: http://www.nissan-global.com

http://www.nissan-global.com/EN/NRC/

Nissan Motor Company Ltd, usually shortened to Nissan, is a Japanese multinational automobile manufacturer headquartered in Nishi-ku, Yokohama. The company sells its cars under the Nissan, Infiniti, and Datsun brands with in-house performance tuning products labelled Nismo. Nissan is a global full-line vehicle manufacturer that sells more than 60 models under the Nissan, Infiniti and Datsun brands. In fiscal year 2015, the company sold more than 5.4 million vehicles globally, generating revenue of 12.2 trillion yen. Nissan engineers, manufactures and markets the world's best-selling all-electric vehicle in history, the Nissan LEAF. Nissan's global headquarters in Yokohama, Japan manages operations in six regions: ASEAN & Oceania; Africa, Middle East & India; China; Europe; Latin America and North America. Nissan has been partnered with French manufacturer Renault since 1999 and Mitsubishi Motors since 2016 under the Renault-Nissan Alliance.

Johnson Matthey

Web: http://matthey.com/

Johnson Matthey (LSE: JMAT) is a British multinational speciality chemicals and sustainable technologies company headquartered in the United Kingdom.
It has five global divisions, each of one focussed on the development of high value added, high technology products and services. With 200-year commitment to innovation keeps them at the forefront of technological breakthroughs that make the world a better place.
Enabled by their science, manufacturers across many industries, including automotive, petrochemicals and pharmaceuticals, apply their innovations to improve the function, performance and safety of their products at a lower environmental cost.

Swansea University
Energy Safety Research Institute (ESRI)

Swansea University Bay Campus
Fabian Way,
Swansea, SA1 8EP,
Wales,
UK
Web: http://www.esri-swansea.org/en/

The Energy Safety Research Institute building at Swansea University's Bay Campus forms part of the College of Engineering. The Energy Safety Research Institute concentrates the College of Engineering's strength in the energy sector. The Energy Safety Research Institute is supported by industry sponsors. It focuses on the safety issues surrounding the development and expansion of existing energy processes, as well as the safe deployment and integration of new 'green' energy technologies. The design and construction of a new 3,800m2 building enables the University to develop the quality and scale of its research efforts in the areas of energy and safety. The vision of the Energy Research Safety Institute (ESRI) and Swansea University is "building the bridge to a sustainable, affordable and secure energy future."

Argonne National Laboratory

9700 S. Cass Avenue
Lemont, IL 60439
United States
Web: www.anl.gov

Argonne National Laboratory, one of the U.S. Department of Energy's national laboratories for science and engineering research, employs 3,400 employees, including 1,400 scientists and engineers, three-quarters of whom hold doctoral degrees. Argonne's annual operating budget of around $760 million supports upwards of 200 research projects. Since 1990, Argonne has worked with more than 600 companies and numerous federal agencies and other organizations.
Argonne's mission is to apply a unique mix of world-class science, engineering and user facilities to deliver innovative research and technologies. They create new knowledge that addresses the most important scientific and societal needs of our nation. They also actively seek opportunities to work with industry to transfer our technologies to the marketplace through licensing, joint research and many other collaborative relationships.
Argonne is managed by UChicago Argonne, LLC, for the U.S. Department of Energy's Office of Science. They are located on 1,500 acres (6.9 sq. km) in southwest DuPage County, Illinois 25 miles (40 km) southwest of Chicago. The site is completely encircled by the beautiful Waterfall Glen Forest Preserve.

Cranfield University

Web: https://www.cranfield.ac.uk/manufacturing

Cranfield University has a distinctive approach to manufacturing research. We combine expertise in design, technology and management along with research into materials sciences together, all with a focus on manufacturing. We teach more than 300 postgraduate students in areas ranging from manufacturing technology to systems and management. Research students work in fields as diverse as ultra-precision engineering to the novel application of Virtual Reality technologies to support maintenance and through-life engineering services. We work in Technology Readiness Levels (TRL) 1-6. Cranfield offers a part-time executive manufacturing Master's programme to develop industry professionals who can lead business change and innovation. From 2016 we will also run a Manufacturing Leadership Programme for SMEs and a Manufacturing Directors Programme. We work with more than 1500 businesses and governments around the world. Through our industry connections guest lecturers, often senior managers in leading companies, provide insight into current industry challenges. Many industry contacts actively recruit our graduates.

Haydale Composite Solutions Ltd

Web: www.haydale.com

HAYDALE Composite Solutions (formerly EPL Composite Solutions Ltd) are a globally-focussed research and development organisation specialising in graphene, polymer composite materials, processing and product development for a broad range of clients.

Our mission, as a premier R&D partner, is to maximise our client's investment through targeted development from design and prototype to testing and certification. Building upon our 23 years of experience in introducing new composite processes, products and materials into established markets such as energy, infrastructure and transport sectors, HAYDALE Composite Solutions are recognised as being a world leading innovative solution provider and a science, product and technology partner to clients small and large.
With strong links to leading academic and professional partners and through our specialist knowledge in the application of graphene in polymers and composites, we can further enhance material performance bringing about a major competitive advantage.

University College London

Web: http://www.ucl.ac.uk/

UCL was founded in 1826 to open up higher education in England to those who had been excluded from it – becoming the first university in England to admit women students on equal terms with men in 1878. The Faculty of Mathematical and Physical Sciences encompasses the logical, experimental and mathematical study of our Universe. The Faculty is an internationally renowned centre for both theoretical and applied research and a centre of educational excellence. Front-line research feeds directly into our teaching programmes, and our students benefit from access to first-class laboratory facilities.

MBDA

Web: http://www.mbda-systems.com/

MBDA is the only European group capable of designing and producing missiles and missile systems to meet the whole range of current and future needs of the three armed forces. MBDA is a multi-national group with 10,000 employees working together across France, Germany, Italy, Spain and the United

Kingdom. Offices also set up in USA. It is jointly held by 3 prestigious shareholders: AIRBUS (37.5%), BAE Systems (37.5%) and Leonardo (25%).

Hutchinson

Hutchinson,
CRI, rue Gustave Nourry 45120
Chalette sur Loing
France
www.hutchinson.com

Hutchinson designs and manufactures smart solutions for a world on the move and contributes to future mobility on land, in the air and at sea.
40000 employees; automotive and aeronautics; Materials and structures, sealing systems, fluid management systems, vibration control systems.

UltraConductive Copper Company

6 Albermarle Ave,
Lexington Massachusetts 02420
USA
Web: https://ultraccc.com/

UltraConductive Copper Company Inc. (UC3) is a venture focused on the manufacturing scale-up of a new room-temperature conductive material: ultraconductive copper (UCC). UC3 works with the electric vehicle components industry, who are attracted by the potential for lighter and more efficient UCC wires to increase electric vehicle range. UC3 was spun-out from the International Copper Association in 2017 and institutionally-funded in June 2018. Company management is always open to discussing commercial possibilities with new potential partners and investors.

National Technical University of Athens

Zografou Campus
9, Iroon Polytechniou str
15780 Zografou
Athens, Greece
https://www.ntua.gr/en/

The **National Technical University of Athens**, sometimes known as Athens Polytechnic, is among the oldest higher education institutions of Greece and the most prestigious among engineering schools. It is named Metsovio in honor of its benefactors Nikolaos Stournaris, Eleni Tositsa, Michail Tositsas and Georgios Averoff, whose origin is from the town of Metsovo in Epirus.
It was founded in 1837 as a part-time vocational school named Royal School of Arts which, as its role in the technical development of the fledgling state grew, developed into Greece's sole institution providing engineering degrees up until the 1950s, when polytechnics were established outside Athens.

University of Nottingham

Power Electronics, Machines and Control Group
Department of Electrical and Electronic Engineering

https://www.nottingham.ac.uk/research/groups/power-electronics-machines-and-control-group/

The Power Electronics, Machines and Control Group (PEMC) at the **University of Nottingham** spans all key power electronics disciplines from power device and component technology to complete power conversion systems. Key recent strategic developments have been based around expansion of staff critical mass, engagement with industry and development of facilities.

Leidos

10260 Campus Point Drive
MS C2E, San Diego, California
92121 USA
Web: www.leidos.com

We make the world safer, healthier, and more efficient through information technology, engineering, and science."
Leidos vision is to "Become the global leader in the integration and application of information technology, engineering, and science to solve our customers' most demanding challenges.
We will deliver innovative solutions through the efforts of our diverse and talented people who are dedicated to our customers' success. We will empower our teams, contribute to our communities, and operate sustainably."

University of Minho
Fibrenamics Project

Web: https://www.uminho.pt/EN
https://www.web.fibrenamics.com/en/

The University of Minho (Universidade do Minho) is a public university in Portugal, with four campuses. The School of Engineering focus its activities on the traditional areas of Engineering, as well as on emerging and unique areas with a strong research component. It also focuses, at a national level, on the excellence of its teaching, internationalization and social interaction projects. This is a School for the Community and the relevance of its work is evident through numerous partnerships with the economic fabric of national and international business.
Fibrenamics is an international platform that belongs to **University of Minho** that is working across sectors – with an emphasis on architecture, construction, sport, medicine, protection, transport and home textiles – covering all the extraordinary world of fibers.

Queen Mary University of London

School of Engineering and Materials Science
Web: https://www.sems.qmul.ac.uk/

The School of Engineering and Materials Science (SEMS) provides outstanding degree programmes coupled with internationally leading research which is reflected in all our undergraduate programmes. Our taught postgraduate programmes are similarly first class and provide students with a fantastic opportunity to engage with cutting-edge research in: Aerospace Engineering and Fluid Mechanics, Bioengineering, Chemical Engineering and Renewable Energy, Materials Engineering and Mechanical Engineering, Robotics and Design. The skills developed by our students and our extensive industrial connections provide graduates with excellent employability in stimulating and well-paid careers.
Queen Mary University of London is a Russell Group university. We are ranked 9th in the UK for research and provide an attractive campus environment within the heart of London.

Infineon Technologies AG

Wernerwerkstrasse2
Regensburg 93049
Germany
Web: https://www.infineon.com/

Infineon Technologies AG is a world leader in semiconductor solutions that make life easier, safer and greener. Microelectronics from Infineon is the key to a better future. In the 2017 fiscal year (ending 30 September), the Company reported sales of around €7.1 billion with about 37,500 employees worldwide. Infineon is listed on the Frankfurt Stock Exchange (ticker symbol: IFX) and in the USA on the over-the-counter market OTCQX International Premier (ticker symbol: IFNNY). entity.

Center for Research in Biological Chemistry and Molecular Materials –CIQUS

C/Genaro de la Fuente s/n
1578 Santiago de Compostela
15782 Spain
Web: https://www.usc.es/ciqus/en

The **CiQUS** (University of Santiago de Compostela, Spain) addresses challenges in Biological and Medicinal Chemistry, New functional Materials and Synthetic Technologies for Sustainable Development, supported by Structural, Theoretical and Computational Chemistry as transversal areas. CiQUS hosts 20 research groups, including 5 ERC projects, and over 200 people:
- 2016-2017: 90-100 papers/yr, average Impact Factor IF=7,10 JCR. 82%Q1, 45%D1.
- 2014-2017: 4,70 M €/yr from competitive R&D funds (27% international, 18% private),
- 2014-2017: 16 patents, 2 licenses, 3 spin-offs.

Invro Limited

University Gate East, Park Row
Bristol BS1 5UB, UK

Web: www.invro.com

Invro Ltd is a micro-enterprise run by Dr Duncan Grant that was founded to promote the use of power electronics in broadcast receivers and it broadened its interest into other areas of power electronics. It is working with Oxford Technology Venture Capital Trust to expand the business, first in the service sector by supporting other power-electronics-based businesses and then by moving into the manufacturing sector where appropriate opportunities arise. The company has established a strong and growing network of relationships within the power electronics industry.

Catalan Institute of Nanoscience and Nanotechnology –ICN2

Web: http://icn2.cat/en/

The **Institut Català de Nanociència i Nanotecnologia**, with its official English translation Catalan Institute of Nanoscience and Nanotechnology and acronym ICN2, is a non-profit international research institute located close to Barcelona, Spain. Its research lines focus on the newly-discovered physical and chemical properties that arise from the behaviour of matter at the nanoscale.

The trustees of the ICN2 are the Government of Catalonia, the Spanish National Research Council and the Autonomous University of Barcelona. The institute promotes collaboration among scientists from diverse backgrounds to develop basic and applied research, while always seeking out new ways to engage with local and global industry. The ICN2 also trains researchers in nanotechnology, develops numerous activities to facilitate the uptake of nanotechnology by industry, and promotes networking among scientists, engineers, technicians, business people, society, and policy makers.
The ICN2 was accredited by the Spanish Ministry of Economy, Industry and Competitiveness as a Severo Ochoa Centre of Excellence in 2014, the highest level of recognition of scientific excellence and leadership that can be bestowed on a research centre in Spain.

Thomas Swan

Thomas Swan
Chemical manufacturing since 1926

Web: https://thomas-swan.co.uk/

Founded in 1926 in Consett, in the North East of England, **Thomas Swan** today produces over 100 performance and speciality chemicals and offers an experienced and flexible manufacturing service.
Our values have helped us become an international company, offering a world-class product and service capability.
Thomas Swan & Co. Ltd. is an independent chemical manufacturing company with a global network of distributors. With offices and warehousing in the UK, USA and China, we service the domestic and international markets and export to over 80 countries worldwide.

International Copper Association, Ltd.

Cu Copper Alliance™

260 Madison Avenue,16th Floor
New York, NY 10016-2401
USA
Web: www.copperalliance.org

The International Copper Association is the industry association for the world-wide copper production industry. They are a New York not-for-profit corporation with 37 member companies, 15 offices worldwide and with a retained staff of 220 people. 28 of our members are global copper production companies; together they are responsible for more than 50% of refined copper production worldwide. The remaining members are some of the world's largest global copper fabrication companies. Our mission is to grow and defend markets for copper, based on its superior technical performance and its contribution to a higher quality of life.

Warsaw University of Technology

Universitas Varsoviensis
Warsaw University

https://www.pw.edu.pl/engpw

Warsaw University of Technology builds upon the traditions of Polish technical universities that used to function in Warsaw. the Polytechnic Institute founded in 1826 thanks to the efforts of Stanisław Staszic and the School of Hipolit Wawelberg and Stanisław Rotwand established in 1895. Warsaw University of Technology started on its own in 1915 thanks to the efforts of the Association for Scientific Courses and the Citizens' Committee of the City of Warsaw. Working uninterruptedly, the University has been producing generations of graduates and has had an increasing number of scientific and technical achievements. It is not only the oldest, but also the best technical university in Poland; in the ranking of Polish universities, it has taken the first place in its category for nine years. At Warsaw University of Technology, over 180 student research groups, organisations and associations are active, and the educational offer includes more than 30 fields of study (also with English as a medium of instruction).

Talga Technologies Limited
Talga Technologies Limited
Unit 15 Cambridge Science Park,
Milton Road, CB4 0FQ, United Kingdom
Web: www.talgaresources.com

Talga Resources Ltd (ASX: TLG) is a technology minerals company enabling stronger, lighter and faster products for the coatings, battery, construction and carbon composites markets using graphene and graphite. Talga has significant advantages owing to its in-house graphene product development team, 100% owned unique high grade mineral deposits in Sweden and a pilot process facility in Germany. New products are being developed using Talga's graphene/graphite materials at Talga Technologies Limited UK to suit customers such as industrial conglomerate Tata, BASF subsidiary Chemetall, UK listed Haydale, Zinergy UK Ltd and German based Jena Batteries amongst others.

SENERGY

5th Floor Lombard House
10-20 Lombard Street
Belfast BT1 1RD
https://www.senergyinnovations.co.uk

With a background spanning almost 20 years in the commercial roofing industry, **Senergy** are a Belfast based enterprise that design and manufacture SMART Solar Thermal Panels. By combining our roofing expertise with that of global leading engineers, we have developed the Senergy solar thermal panels. Unlike current solar thermal panels that are made from glass, copper and aluminium, Senergy panels are manufactured using advanced nanocomposite plastics.
Being aware of the sun's potential to deliver limitless amounts of solar energy, Senergy was inspired to design an architecturally attractive solution that would reduce the upfront cost of a solar heating system making it affordable to harness the sun's renewable energy.

Costruzioni Meccaniche Luigi Bandera SpA

Corso Sempione, 120
21052 Busto Arsizio (VA) Italy
Phone: +39 0331 398111

Costruzioni Meccaniche Luigi Bandera SpA is a worldwide leader in designing and manufacturing complete extrusion lines for packaging and converting.
Born as a mechanical workshop during the 40's, Bandera is now a worldwide leading company in the extrusion industry.
Innovation at Bandera is pursued via The House of Extrusion ® and Extrusion Academy ®. From laboratory scale (0.1-4.0 kg/h) where it is possible to develop new compounds from polymers and nano-composites in conjunction with academia and industrial research to industrial productions (+3,000 kg/h) of commercial products.

The Nanoscience Centre
Cambridge University nanofabrication and characterisation facility

Web: https://www.nanoscience.cam.ac.uk/

The **Nanoscience Centre** is an 1800m^2 research facility completed in January 2003 and located at the north east corner of the University's West Cambridge Site. The Centre provides open access to over 300 researchers from a variety of University Departments to the nanofabrication and characterisation facilities housed in a combination of Clean Rooms and low noise laboratories. Office space is primarily home to the Department of Engineering's Nanoscience Group, technical and administrative staff and members of other research groups who require long term access to facilities.

SHWire

Schwering & Hasse Elektrodraht GmbH
Pyrmonter Str. 3-5
D-32676 Lügde
Web: http://www.sh-wire.de/en/

Since its foundation **SHWire** has developed into an acknowledged quality leader within its industry. The product range encompasses all enamelled copper and aluminium wires demanded by the winding wire industry on a global basis. In addition to the standard types required, SHWire develops and produces new types of enamelled wires, including the innovative low friction SHTherm® 210 GLIDE and the „shaped“ wire, which provides superior mechanical properties way above current industry standards.

University of Cambridge

Department of Materials Science & Metallurgy
University of Cambridge
27 Charles Babbage Road
Cambridge
CB3 0FS
UK
Web: www.msm.cam.ac.uk

The **Department of Materials Science & Metallurgy** has a large and vigorous research school, with about 100 research fellows, postdoctoral scientists and visiting scientists, and more than 140 research students studying for the PhD degree. The current research income of more than £4 million per year and a doubling time of about seven years. With an academic staff of over 30, including Research Fellows, the Department's research covers all major areas of the materials science, and this breadth is reflected in the scope of our four-year undergraduate course. Contact with industry plays an important part in the course through visits to industrial facilities, speakers from industry and vacation placements.

Safran Electrical & Power

https://www.safran-electrical-power.com/

At the heart of the design and production of aeronautical electrical systems, Safran Electrical & Power is an expert in the entire onboard electrical power chain, and the active representative of Safran in the area of the "more electric" aircraft.
Design, generation, distribution, conversion, wiring, load management, ventilation, systems integration, support and services: Safran Electrical & Power is an expert in the entire energy chain on board of an aircraft. The maturity of each of our products and our complete expertise in electrical systems, including wiring, make it a unique player in the market. This combination enables it to provide optimized, innovative and made-to-measure solutions for every client. Safran Electrical & Power currently has unique leverage when it comes to meeting the challenges of safety and increased mass on aircraft.

Safran Electrical & Power is also the European leader and one of the two world leaders in aeronautical electrical systems. It is a first class partner for several aircraft manufacturers.

Cambridge Nanomaterials Technology Ltd

14 Orchard Way
Lower Cambourne
Cambridge CB23 5BN
UK
Web: www.cnt-ltd.co.uk

CAMBRIDGE NANOMATERIALS TECHNOLOGY LTD

The Cambridge Nanomaterials Technology (CNT) Ltd is an innovation management and nanotechnology consulting company based in Cambridge, UK. The CNT Ltd helps companies, academic and government institutions to develop world-class innovative solutions for nanomaterials related R&D and IPR strategy, partnership, products, technologies, funding and markets. CNT Ltd is specialised in carbon nanomaterials R&D consulting and collaborative R&D project management, including exploitation and dissemination management, consortium and supply chain building. CNT has done a number of patent landscaping and market research analysis studies regarding production and use of various nanomaterials helping to link inventors and technology developers with end-users and investor. CNT is leading private Nano-Carbon Enhanced Materials (NCEM) consortium with members from leading industrial organisations and academic institutions.