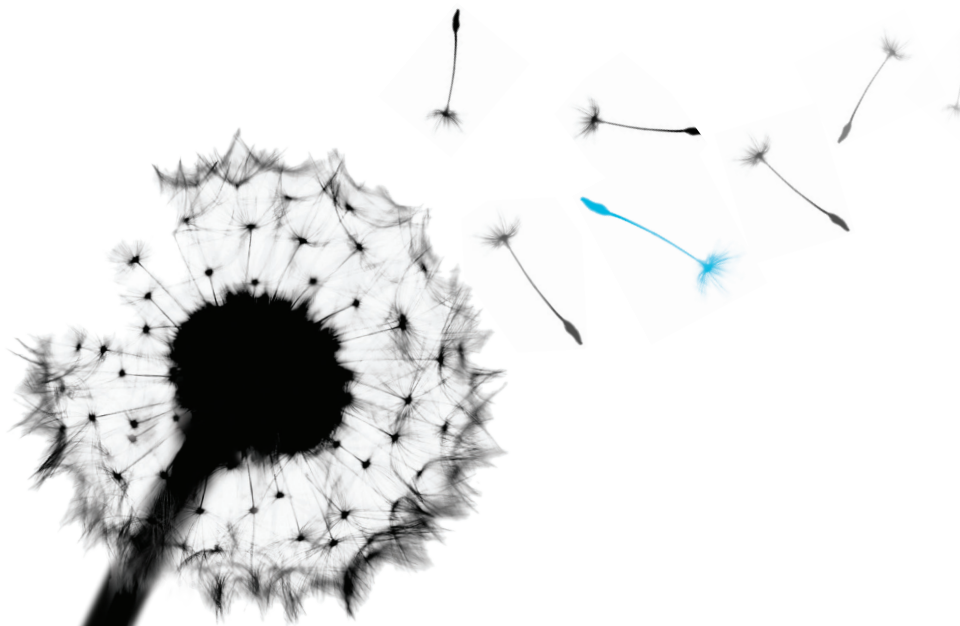


think

Business with Birmingham
issue three



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think energy

Breakthroughs in fuel cell technology

Original thinking at the University of Birmingham often leads to great things. One recent example is the design of a lighter and more cost-effective fuel cell, with potential benefit for hybrid fuel cell vehicles.

A 'fuel cell' is a type of battery which uses hydrogen and air to produce electrical power – with heat and pure water the only by-products. Currently, low-temperature fuel cells use components and materials which are heavy, expensive (eg, Platinum) and prone to degradation.

Dr Bruno G. Pollet, inventor of the new tubular fuel cell, said: *'The weight, volume and cost of the novel fuel cell stack are reduced significantly, which allows for better performance. In addition there are potential cost savings of around 20% on sealing and bipolar plate materials that are no longer required.'*

This is just one of the technologies available from Alta Innovations, the University of Birmingham's trading and commercialisation company.





'The weight, volume and cost of the novel fuel cell stack are reduced significantly, which allows for better performance.'

Dr Bruno G. Pollet, Inventor of the new tubular fuel cell, University of Birmingham

Technology and IP

Learn more
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'The knowledge, expertise and tools gained during this applied research project with the University of Birmingham will facilitate these digesters being pushed closer to their operational limits to maximise biogas production and to continue to grow the renewable energy side of the business.'

Paul Griffin, Sludge Process Advisor, Severn Trent Water

An energy boost for Severn Trent

Knowledge Transfer Networks (KTNs) were set up by the Technology Strategy Board (TSB) to bring together diverse organisations and to provide activities and initiatives that promote the exchange of knowledge and the stimulation of innovation in these communities. Through the KTN an EPSRC CASE Studentship was awarded to University of Birmingham researcher Dr Cynthia Carliell-Marquet, supported by Severn Trent Water to develop a diagnostic tool to boost their biogas production.

Severn Trent Water leads the water sector when it comes to generation from renewables as a proportion of its energy use. It generates 20% of its electricity in this way, a colossal 183 Gigawatt hours each year. Its current renewable electricity generation comes mainly from biogas created from a sewage sludge anaerobic digestion (AD) process. One way of maximising biogas from AD is to make sure the methane-producing microorganisms have the optimum balance of trace elements to maintain an excellent rate of methane production.

The research project with the University of Birmingham has focused on developing a diagnostic tool which will determine whether sludge digesters will benefit from trace element supplementation to boost biogas production. Through this applied research and development Severn Trent is taking a leading

role in the industry in increasing energy efficiency through biogas production. Depending on the final outcomes of the work, mechanisms will be investigated to potentially roll out the impact to the wider UK and international water industry.

Paul Griffin, Sludge Process Advisor at Severn Trent Water said: 'We are increasingly investigating new avenues of biogas generation from existing sludge digesters, such as co-digestion of industrial and food-based wastes. The knowledge, expertise and tools gained during this applied research project with the University of Birmingham will facilitate these digesters being pushed closer to their operational limits to maximise biogas production and to continue to grow the renewable energy side of the business'.



Knowledge Transfer Networks

Learn more
<https://ktn.innovateuk.org/>
 Contact: d.i.boardman@bham.ac.uk

think business

Your call is important...

A Knowledge Transfer Partnership (KTP) between the University of Birmingham and BT is helping the company to advance the monitoring capabilities of its communication procedures with a view to transforming its service delivery systems.

BT is one of the world's leading providers of communications solutions serving customers in Europe, America and Asia Pacific. Its principal activities include networked IT services, local, national and international telecommunications services, and higher-value broadband products and services. BT serves over 18 million business and residential customers, and provides network services to other licensed operators.

Under Dr Behzad Bordbar, Lecturer in the School of Computer Science at the University of Birmingham, the partnership seeks to design and implement a distributed system for performance and compliance monitoring in BT's service oriented computer structures.

Professor Ben Azvine, Head of Security Research at BT said *'The KTP with the University of Birmingham will help us to deal with faults and problems in near real-time and identify root causes to problems so that we can avoid recurrences in the future. This will enhance our competitiveness in the market and consolidate our role as an innovative leader in the industry.'*

This Partnership received financial support from the KTP programme. KTP aims to help businesses to improve their competitiveness and productivity through the better use of knowledge, technology and skills that reside within the UK knowledge base. KTP is funded by the Technology Strategy Board along with the other government funding organisations.

Knowledge Transfer Partnerships

Learn more

www.birmingham.ac.uk

Contact: ktp@contacts.bham.ac.uk

Enterprising Birmingham

Competition winners announced



Recognising the value of creating a thriving entrepreneurial culture to support its academic staff to develop their innovative ideas and catch the eye of potential investors, the University of Birmingham recently ran a business plan competition aimed at staff with research based ideas.

The competition culminated with shortlisted contestants presenting their commercially viable ideas, in the form of a business plan, to a panel of experts at a prestigious showcase event. The candidates had previously attended an in-house training course constructed by Research and Commercial Services and in partnership with PricewaterhouseCoopers, designed to give them the skills necessary to formulate their business plan.

Winning projects were led by Dr Wai-Ling Bickerton ([see page 6](#)) and Dr Rustam Stolkin

who were each awarded £15k to help further develop their research into a commercial product or service. Four runner-ups were awarded a prize of £1,000, presented by Pro-Vice-Chancellor Professor Edward Peck.

The event final was opened by Sir Dominic Cadbury, Chancellor of the University, who said: *'This event demonstrates the University of Birmingham's commitment, enthusiasm and support for taking research projects and ideas, which have practical opportunities, into the market. He continued, 'new products and companies are the lifeblood of our economy and there couldn't be a better time to do this.'*

Enterprising Birmingham

Learn more

www.birmingham.ac.uk

Contact: c.mansell@bham.ac.uk



L-R: Dr James Wilkie (Director of Research and Commercial Services at the University of Birmingham and CEO of Alta Innovations Ltd) pictured with winners Dr Wai-Ling Bickerton and Dr Rustam Stolkin and Professor Edward Peck (Pro-Vice-Chancellor and Head of College of Social Sciences)

think environment



Supporting a safe and sustainable environment...

A new facility will open at the University of Birmingham this Spring that will enable businesses to gain invaluable and reliable data on the impact their products have on the environment.

At the Facility for Environmental Nanoscience Analysis and Characterisation (FENAC)* manufactured nanoparticles, used in nanotechnology and nano-enabled products, can be analysed under realistic conditions. In particular, the analyses will be performed

in complex media relevant to environmental, ecotoxicological and toxicological conditions

Jamie Lead, Professor of Environmental Nanoscience at the University of Birmingham and Director of FENAC said: *'The facility will help businesses to gain a much better understanding of the biological and environmental impacts of the manufactured nanoparticles they are using, information that will be essential in meeting the requirements of EU regulation such as REACH.'*

'The facility will help to provide a much better understanding of the biological and environmental impacts of manufactured nanoparticles.'

Jamie Lead, Professor of Environmental Nanoscience at the University of Birmingham and Director of FENAC

FENAC facility

Learn more

www.gees.bham.ac.uk/research/fenac/index.shtml

Contact: j.r.lead@bham.ac.uk

* FENAC is currently funded by the Natural Environment Research Council.

Waste not, want not

One of the biggest threats to our environment is the storage and disposal of hazardous wastes and there are very stringent laws in place to govern this. It is vital, therefore, that waste is analysed correctly to determine whether it can be classified as hazardous or inert. This is also important as the financial consequences of disposing of hazardous waste can be a substantial burden on companies.

West Midlands based Chamberlin and Hill are part of Chamberlin plc, a leading foundry and engineering group founded over 100 years ago. The Group provide specialised castings and safety/security products to a wide variety of industries across the World.

Articles are produced in Chamberlin and Hill's foundry by pouring molten iron into moulds to make what is known as iron castings which are used for a variety of engineering purposes. A bi-product of the processes used is a particular type of waste referred to as 'slag'. The Company needed to know

whether the slag produced from their furnaces was hazardous so that they could not only make the necessary provision for its storage and disposal but also potentially save up to £130,000 per annum on disposal costs.

Utilising expertise and cutting edge equipment at the University of Birmingham investigations were carried out on the chemical composition of the slag. Samples were provided for X-Ray Diffraction (XRD) analysis to provide structural information relevant to the chemical nature of the slag. The research was able to conclude that the slag consisted of a stable inert material which also occurs naturally in igneous rocks.

The facilities and equipment used for the research have been funded by the Science City Research Alliance (SCRA) Advanced Materials project. The Advanced Materials project is part of a larger investment by Advantage West Midlands and ERDF in the research infrastructure of the West Midlands region, which unites the Universities of Birmingham and Warwick in a strategic

research partnership – SCRA – formed under the Birmingham Science City initiative.

Adrian Lacey, Foundry Group Health, Safety and Environment Manager at Chamberlain and Hill said *'Working with Professor Colin Greaves and researchers at the University of Birmingham, as part of SCRA, has resulted in a real financial benefit to our business. Their expertise has been invaluable in confirming the chemical composition of our waste material'*

In addition to this project Chamberlin and Hill have also placed a University of Birmingham chemical engineering student at their company for twelve months, who is currently involved in process controls and analysis and the development of scrap databases.

Birmingham Science City

Learn more

www.birminghamsciencecity.co.uk/research-alliance

Contact: r.simpson@bham.ac.uk



think health

Our vaccine technology is rising star in the fight against cancer and wasting diseases

To maximise the real-life benefits of its research the University provides a launch-pad for exciting and innovative spin-out businesses. One such venture, Hybrid BioSystems Ltd (Hybrid) has recently merged with Myotec Therapeutics Ltd (Myotec) to form a new biotechnology company. The company develops novel treatments for cancer and wasting diseases.

The new company, PsiOxus Therapeutics Ltd (PsiOxus), led by Chief Executive Officer Dr John Beadle, will build on a pipeline of therapeutics including key vaccine technologies. One of their platform technologies, PolySTAR; a technology for polymer coating viral vaccines, was originally researched and developed at the University of Birmingham under Hybrid founders, Professor Len Seymour, now Chair of Gene Medicine at Oxford University, and Kerry Fisher, an internationally-recognised specialist

in molecular medicine who is an alumnus of the University of Birmingham.

In conjunction with the merger, PsiOxus completed a £3.6 million financing with the participation of all major investors of both predecessor companies, including Imperial Innovations, Invesco Perpetual, and the Mercia Fund – a £12.8 million venture capital fund focused on the West Midlands of which the University of Birmingham is a close partner. The new funds will be used to develop therapeutic treatments for cancer and wasting diseases, helping to advance two particularly promising treatments, Myotec's MT-102 and Hybrid's ColoAd1, through phase I and II clinical development.

Dr James Wilkie, Chief Executive of Alta Innovations, and Director of Research and Commercial Services at the University of Birmingham, said: *'The merger of the*

University of Birmingham's spin-out company, Hybrid Biosystems, with Myotec Therapeutics is a fantastic development. Together with the significant investment in PsiOxus Therapeutics, this provides an exceptional platform on which to further develop and accelerate the commercialisation of novel and important therapies that target cancer and wasting diseases'.

The major shareholders of PsiOxus include Imperial Innovations, Invesco Perpetual, the Mercia Fund, Cancer Research Technology and the University of Birmingham.

University of Birmingham spin-out companies

Learn more

www.alta.bham.ac.uk

Contact: info@alta.bham.ac.uk

Because cognition matters

Behavioural brain science experts at the University of Birmingham have devised a unique assessment tool, the Birmingham Cognitive Screen, BCoS™, which enables the efficient and comprehensive screening of cognitive function after a brain injury. It has already been used to inform the planning of care for over 800 stroke patients in the West Midlands.

A team led by Glyn Humphreys, Professor of Cognitive Psychology at the University of Birmingham and research fellow, Dr Wai-Ling Bickerton, are behind the research. The new tests can be administered to a much broader community of patients and far earlier than other tests. Dr Bickerton, one of the two winners of the University of Birmingham's *Enterprising Birmingham Competition* (see page 4) explained *'The tests have been designed*

to overcome difficulties often experienced by doctors, neuropsychologists and occupational therapists in assessing patients with speech and visio-spatial impairments'.

The academic team is currently working with Alta Innovations to establish a strategy for a new potential spin-out company, Cognition Matters™, through which it is hoped that the tests, training and further tools aimed at improving the diagnosis and management of cognitive function, can be effectively commercialised.

University of Birmingham Spin-out companies, technology and IP

Learn more

www.alta.bham.ac.uk

Contact: info@alta.bham.ac.uk



'The tests have been designed to overcome difficulties often experienced by doctors, neuropsychologists and occupational therapists in assessing patients with speech and visio-spatial impairments'.

Dr Bickerton, one of the two winners of the University of Birmingham's Enterprising Birmingham Competition

think advanced manufacturing

See a material difference

Researchers at the University of Birmingham have been working with global engineering group, Sandvik, to investigate the material behaviour of extrusion paste during processing.

Sandvik's operations are based on their unique expertise in materials technology and their extensive insight into customer processes. This combination has provided the Company with world-leading positions in three primary areas of materials technology; Tooling, Mining and Constructing and Materials Technology. They use extrusion paste in a selection of their products for drilling, cutting and machining tools covering a wide range of application areas in the aerospace, medical and construction sectors.

Working with Professor Jon Preece and Professor Colin Greaves from the School of Chemistry at the University of Birmingham and making use of state of the art equipment at the University Sandvik provided two samples of their extrusion paste, originating from the same production batch, to be assessed.

When tested the two samples showed different behaviours which meant that a thorough and

detailed analysis was needed to find out whether or not the samples were indeed identical. Results from the analysis confirmed variations in the chemical compositions of the two samples which helped to further establish the difference in the behaviour of the two materials during processing.

The facilities and equipment used for the research have been funded by the Science City Research Alliance (SCRA) Advanced Materials project. The Advanced Materials project is part of a larger investment by Advantage West Midlands and ERDF in the research infrastructure of the West Midlands region, which unites the Universities of Birmingham and Warwick in a strategic research partnership – SCRA – formed under the Birmingham Science City initiative.

Sandvik are now planning further work with the University of Birmingham researchers to examine alternative methods for the removal of the fugitive binder system(s) from the extrusion paste. Ihsan Al-Dawery PhD, Programme Coordinator at Sandvik said *'Working with researchers at the University of Birmingham as part of SCRA has enabled us to access external expertise and resources. The project has addressed our main objectives and we are looking forward to further joint collaborative work with SCRA in the future.'*

Birmingham Science City

Learn more

www.birminghamsciencecity.co.uk/research-alliance
Contact: r.simpson@bham.ac.uk

SCIENCE CITY RESEARCH ALLIANCE

UNIVERSITY OF BIRMINGHAM THE UNIVERSITY OF WARWICK

'The project has addressed our main objectives and we are looking forward to further joint collaborative work with the Science City Research Alliance in the future.'

Ihsan Al-Dawery PhD,
Programme Coordinator at Sandvik

Size! matters

A new compact laser technique for measuring very small distances is another example of the technologies available through Alta Innovations, the University of Birmingham's trading and commercialisation company.

Professor of Experimental Physics at the University of Birmingham, Clive Speake is behind the research that has led to the development of EUCLID – an **Easy to Use Compact Laser Interferometric Device** – capable of sensing at the pico metre level and over a range of many millimetres. It has been developed from an optical readout system intended for drag-free satellites such as the space-based gravitational wave observatory, LISA.

EUCLID has a unique combination of high sensitivity and immunity to target mirror misalignment and its compactness makes it ideal for a wide range of applications such as integrated circuit manufacture, length metrology, nanophysics (AFMs) seismometer readout and general applications in physics research such as gravitational wave observatories. The device can be supplied as a simple plug and play USB compatible unit, with no requirement for either a mechanical or electrical connection to the object being tracked.

Technology and IP

Learn more

www.alta.bham.ac.uk
Contact: info@alta.bham.ac.uk

IQ booster



You can boost your organisation's knowledge and resources by tapping into world-class expertise at the University of Birmingham. We're constantly making exciting breakthroughs – in medicine and engineering, energy and social science – and then making them available to the people who will benefit most.

Here is just a snapshot of some of the technologies currently available from Alta Innovations, the University of Birmingham's trading and commercialisation company.

Technology and IP

Learn more

www.alta.bham.ac.uk

Contact: info@alta.bham.ac.uk

Title	What is it?
Reconfigurable antennae for wireless communications	A reconfigurable antenna designed for current and future wireless communication systems. The antenna system is primarily geared for hand held mobile devices such as mobile telephones, laptops, PDA etc.
Rapid production of ceramic moulds for investment casting	A new rapid shell build method using super-absorbent polymers which reduces shell build time.
EUCLID Interferometer	A compact laser interferometric measuring device capable of sensing linear displacement at the pico metre level.
ILIAD Interferometer	A compact laser interferometric measuring device capable of sensing rotational displacement.
Recovery of rare earth magnets	A simple method of removing rare earth magnets from scrap assemblies to enable recycling of valuable raw materials.
Repair and maintenance of equipment containing rare earth magnets	Selective removal of damaged or faulty rare earth magnets from an assembly without damage to surrounding components.
Word dominoes	Learning game on PC, Android and iPhone platform for developing the use of phrasal verbs.
Platinum recovery from road dust	A method of recovering platinum group metals which originate from catalytic converters and are found in roadside dust.
Resin applicator	A new resin applicator for filament winding equipment which reduces environmental solvent emissions and clean up costs.
Field programmable gate array	C-to-HDL compiler code generation technology for high level synthesis of FPGA designs and algorithms.

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