IOP BUSINESS AWARDS 2018

IOP Institute of Physics

The Institute of Physics is the professional and learned society for physics in the UK and Ireland, inspiring people to develop their knowledge, understanding and enjoyment of physics.

We work with a range of partners to support and develop the teaching of physics in schools. We encourage innovation, growth and productivity in business, including addressing significant skills shortagesand we provide evidence-based advice and support to governments in the UK and Ireland.

Our members come from across the physics community, whether in industry, academia, the classroom, technician roles or in training programmes as an apprentice or a student.

However our reach goes well beyond our membership to all who have an interest in physics and the contribution it makes to our culture, our society and the economy.

We are a world-leading science publisher and we are proud to be a trusted and valued voice for the physics community.

Introduction

Professor Dame Julia Higgins
DBE FRS FREng CPhys
Hon.FInstP
President, Institute of Physics

Welcome to the annual Institute of Physics Business Innovation and Business Start-up Awards. These awards recognise and reward companies that have built success on creative applications of physics and turned them into radical new technology. The plethora of industries represented here is testament to the eternal relevance of physics as a subject across a diverse range of applications.

Championing innovation is, now more than ever, a vital part of the Government's industrial strategy. This strategy outlines an ambitious vision to see the UK transform into the 'world's most innovative economy by 2030'. Significant boosts to R&D funding and the identification of 4 Industrial Strategy Grand Challenges reflect a focus and drive to tackle a shifting technological landscape and make the UK the best place to start and grow a business.

Our IOP produced economy report shows that physics-based businesses add £177bn in gross value, which represents a 16% share of the entire business economy. Additionally there are more than two million people employed in these businesses. These figures demonstrate that the effects of physics-based technology are not just being scrawled across University blackboards, but playing out in a real time contribution to UK businesses and the UK economy.

Within the midst of this, I am delighted that IOP business awards are recognising and celebrating this year's winners. These awards bolster the UK's reputation as the home of world leading institutions and pioneering businesses. Underpinning all of this, is physics as the major protagonist in driving business innovation and growth and creating genuine social and economic change. Positive change that can only progress with continued investment and continuing spotlight on the potential of physics to produce cutting edge technologies.

“It is a huge honour for our surgical guidance platform to be recognised for its innovative impact on oncology by the prestigious IOP.”

Dr Eric Mayes, CEO, Endomag

“This highly prestigious award will help raise awareness to current and potential customers worldwide about what our innovations can achieve.”

Mike Anderson, CEO, Innovative Physics

“We are delighted to win an IOP startup award. This is great validation as we apply ground-breaking nanotechnology to healthcare.”

Bob Pollard, CEO, Causway Sensors

“ONI is delighted to receive this award in recognition of its efforts to make super-resolution microscopy available to everyone.”

Bo Jing, founder and CEO, ONI

“This prestigious IOP award shows to our customers and our people we have the knowledge to inspire and innovate.”

Peter Adlington, managing director Plastipack Ltd

Business Award Winners 2018

Business Innovation Award

Awarded to small, medium and large companies that have excelled in innovation and delivered significant economic and /or societal impact through the application of physics.

Winners

- EndoMag
- Innovative Physics
- Leonardo
- Plastipack
- Pepsico
- Sonobex

Business Start-up Award

Awarded to businesses that have been incorporated for less than five years with a great business idea founded on a physics invention, with a great growth potential and or the potential of significant societal impact.

Winners

- Causway Sensors
- Creavo Medical Technologies
- Lynkeos
- ONI
- Stream Bio
- York Instruments

“Sonobex are extremely honoured to receive the prestigious IOP Business Innovation Award. It is a great recognition of the team’s hard work and dedication.”

Dr Daniel Elford, Chief Technology Officer, Sonobex

“This award brings great exposure for Stream’s novel CPN™ technology and the fantastic opportunity to learn from the best minds in physics innovation.”

Andy Chaloner, CEO, Stream Bio

“PepsiCo is honoured to be recognised by IOP for the advanced application of soft matter physics to create breakthroughs in extruded snack innovation.”

Dr Mehmood Khan, Vice Chairman and CSO, PepsiCo

“Winning the IOP Business Innovation Award recognises the investment by Leonardo into state of the art physics based products.”

Audrey Black, Vice President of Advanced Targeting, Leonardo MW

“The IOP award represents a great honour for York Instruments, and is testament to dedication of our talented physics team.”

Gordon Baltzer, CEO, York Instruments

ENDOMAG

For the development of a Sentimag surgical guidance system.

Endomag has developed an innovative technology to help surgeons locate cancerous tumours, currently focused on breast cancer surgery. The company is using magnetic field technologies as a method for detecting early-stage and often impalpable cancers. With the company's detection probe instrument, Sentimag, an ultra-sensitive magnetometer that can detect minute quantities of magnetic material, coupled with Endomag's 'locating' or 'tracing' products, Magseed or Magtrace, surgeons can be guided with unprecedented accuracy.

Magseed is a magnetisable seed, smaller than a grain of rice, that is inserted into the centre of a tumour to act as a beacon for surgical removal. Magseed is the only localisation device that has received FDA clearance for long-term and soft tissue implantation.

Magtrace is a magnetic fluid containing tiny iron oxide particles designed to mimic the route that spreading cancer cells are most likely to follow and is the only commercialised nanoparticle approved as a medical device.

Endomag's system has been used successfully in over 30,000 procedures across 300 hospitals in 30 countries and is the subject of 12 clinical publications.

The company

Endomag is pioneering the use of magnetism for minimally invasive surgical guidance, helping surgeons locate early-stage tumours, predominantly in breast cancer surgery. The company's technology has been used in over 30,000 procedures across 300 hospitals in 30 countries.

endomag

Business Innovation Award winners

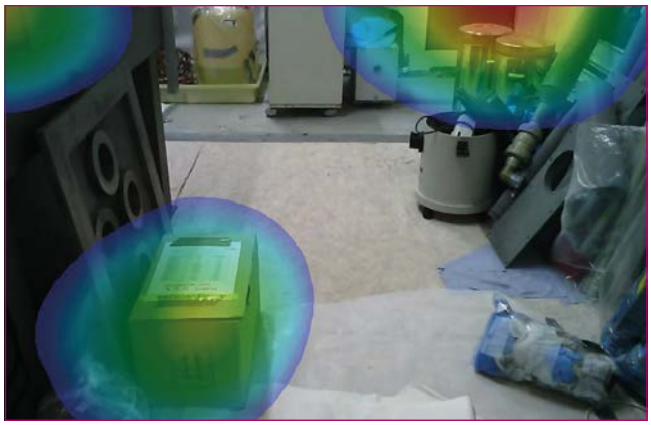
INNOVATIVE PHYSICS

Hot Spot Locators, radiation imaging systems which identify the type and location of radiation, whilst reducing exposure and saving lives in the process.

Radiological incidents (Chernobyl/Fukushima) have caused an increasing fear factor to many people globally. Radiation is invisible, with no touch, smell or taste and therefore cannot be detected easily. Decontaminating an area containing nuclear waste is complicated due to the intangible nature of radiation; dangerous contaminants are difficult to detect quickly. Traditionally, radiation workers survey small areas meticulously (every square centimeter) with hand-held meters. Not only is this cumbersome but it takes hours to inspect. Using a radiation imaging system such as the Hot Spot Locator (HSL) rapidly reduces the time and process.

Originally developed to aid in the clean-up effort around Fukushima Daiichi, the HSL is an imaging device allowing users to visualise radiation contamination. Signals from an array of high-energy-radiation sensor are coupled with a set of geometrically opposed shadows. IPL's specially designed deconvolution algorithms utilize the information eliminating background radiation, revealing both the source of radioactivity and the isotope.

The HSL provides an image/video of a large area; with the user observing where radiation hot spots are located, along with the type of radiation being emitted. The HSL speeds up decontamination work, reducing the exposure of radiation workers and saving lives in the process.



The company

Innovative Physics (IPL) are a research and development company, specialising in radiation detection equipment, AI software and medical imaging. IPL evolve current technologies from its patent portfolio, to provide novel solutions to radiological obstacles to benefit its customers and society.

innovative physics

LEONARDO MW

For the development of an Advanced Directed Infrared Countermeasure System: Miysis DIRCM

For over 40 years portable infrared guided Surface-to-Air Missiles (SAMs) have been spread throughout the world. This has driven the need for an effective countermeasure to protect helicopters, aircraft and particularly their crew and passengers. Used by both the military and terrorists, SAMs have been used in every conflict area around the world.

Traditional countermeasures for IR SAMs involve the use of flares, but only limited numbers can be carried on the aircraft, and which have become less effective as missile technology has evolved. The use of flares over towns also leads to fire risks. The need to provide effective and inexhaustible protection has driven the requirements for Directed Infrared Countermeasure (DIRCM) Systems.

Miysis is an advanced DIRCM System. Developed over the last decade, it is sold throughout the world to protect aircraft from SAMs. Designed and built in the UK, it encompasses advanced technology, exploiting more than thirty years of domain knowledge and expertise in infrared countermeasures.

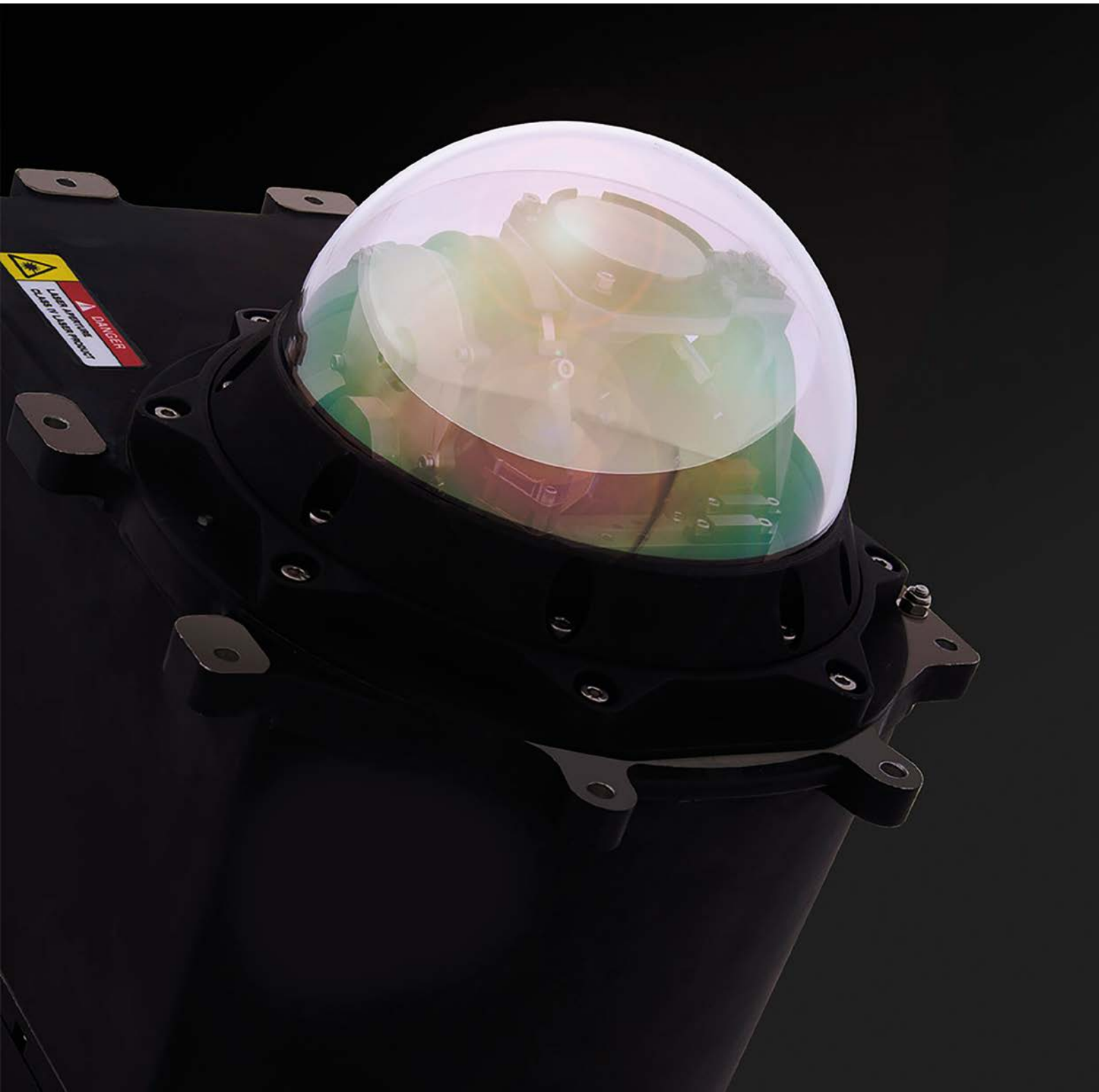
The smallest and lightest DIRCM available today, Miysis is fully qualified and in production. The performance of Miysis has been shown to have a 100% success rate during UK Government and NATO tests against a range of real SAM threats.

The company

Leonardo is a global high-tech company and one of the key players in Aerospace, Defence and Security. Leonardo is the largest inward investor in the UK defence sector and one of the biggest suppliers of defence equipment to the UK MoD.

The company works with Governments, Armed Forces, institutions and citizens to design and realise a wide range of products, systems, services and integrated solutions to meet their customers defence, protection and security needs.

LEONARDO


DANGER

PLASTIPACK

For the development of an innovative new swimming pool cover that saves energy and reduces chemical consumption.

Showing the wide range of companies that can benefit from simple, yet eloquent physics, the new EnergyGuard™ ST is an advanced swimming pool cover material allowing for the best energy gain while inhibiting algae growth. Swimming pool covers are commodity products with the potential to increase water temperature, to drastically limit evaporation, and to decrease non-ecofriendly chemical and filtration use.

The new EnergyGuard™ ST is designed to block photons necessary for photosynthesis, reducing algae, while enhancing solar powered temperature increase. This has been possible through the conception of a long pass infrared filter absorbing all the energy in the visible and transferring directly all the heat contained in the infrared solar radiation. This new product represents a disruptive innovation enabling the company to strategically position themselves as world leading in a highly competitive market awash with low cost manufacturers.

Furthermore, the combined energy and chemicals savings represents an important environmental achievement. Critically, customers value this innovation as sales have virtually doubled within only 2 years of its incorporation.

The company

Plastipack Ltd is an independent specialist manufacturer of cover materials for swimming pools and water storage solutions. We pride ourselves on our superior manufacturing and quality. And consistently invest in research and development, creating and refining scientifically tested materials.

PLASTIPACK LIMITED


Braby
PLASTIPACK LTD

Business Innovation Award winners

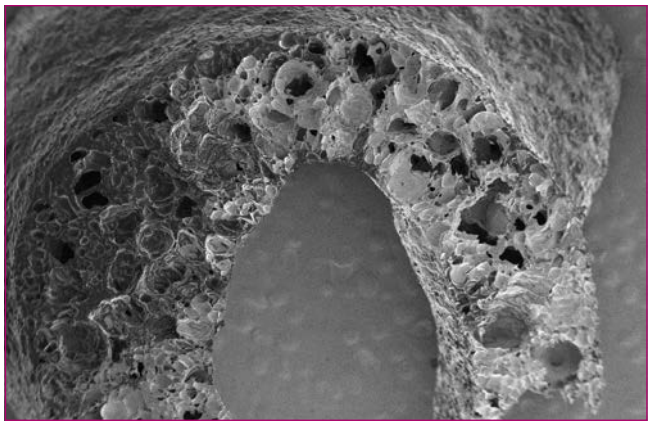
PEPSICO

For the development of breakthrough snack products through application of soft matter physics.

A soft matter physics approach was applied to the development of new snack products for consumers in emerging markets (including India, Thailand, Indonesia) unlocking significant cost reductions (sales price of £0.05 per bag) and a reduced reliance on raw materials imported from Europe.

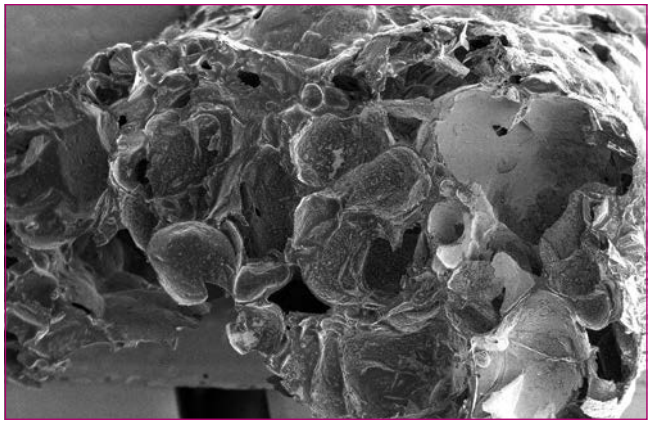
Lay's is one of the world's largest food brands and is aspirational to consumers everywhere seeking an assurance of safety, quality and great taste. Based on physics principles, this breakthrough provided a new route to delivering Lay's-branded quality snacks to consumers in emerging market at an accessible price point. Sales two years after launch are at 120% of the volume plan, and are 100% incremental to Lay's potato chips, an outstanding commercial success for the innovation approach developed by the Lays Shapes team.

To meet the needs of consumers on product design (Lay's branding) and cost, the team demonstrated that potato-character products need not rely on high potato formulations, requiring a new framework to address the challenge by understanding the process in a new way. In collaboration with Prof van der Sman (Wageningen University), the team applied soft matter physics tools such as Complex Disperse System methodology with fundamental characterisation methods such as microscopy, to define and understand ingredient and product functionality from a microstructural perspective.



The company

PepsiCo is one of the world's leading food and beverage companies with more than $63 billion in net revenue in 2017 and a global portfolio of diverse and beloved brands. PepsiCo is focused on delivering sustainable long-term growth while leaving a positive imprint on society and the environment (Performance with Purpose).



PEPSICO

Business Innovation Award winners

SONOBEX

For the development of Low Frequency Industrial Noise Control by Acoustic.

Noise is an ever increasingly important global public health problem. High noise levels generated by industrial machinery have a significant impact on human health. Therefore increasing pressure is being placed on stakeholders in the industrial sector to deliver improvements in noise mitigation technologies. One particular example that we are focussed on solving is the low frequency “hum” emitted by power transformers, gas/steam turbines and compressors.

Acoustic Metamaterials hold great potential for blocking noise propagation in certain frequency ranges by tuning the material’s design and making use of internal periodic structures and localised tuned resonators to create bands in which limited wave propagation occurs. By tuning the periodic structures and resonant dampers to the specific frequency ranges of troublesome noise sources; optimised noise abatement can be obtained. This enables greater levels of noise reduction than are achieved through the use of more common abatement processes such as those based upon mass law or porous absorbers.

Sonobex have developed the first commercially available acoustic metamaterial-based technologies that are revolutionising industrial noise control and enabling unrivalled low frequency noise reduction. The use of the innovative physics based research has enabled the development of a disruptive technology that will replace conventional, ineffective solutions into a well- established global marketplace with significant environment and societal benefits.

The technology helps reduce environmental impact and addresses increasingly strict noise control regulations and noise pollution awareness.

The company

Sonobex are a specialised research and development company pioneering the development of next generation acoustic technologies through the application of acoustic metamaterials.

Formed in 2012 as a spin out from the Department of Physics at Loughborough University, the Company subsequently joined the Merford Group in Jan 2017. Sonobex are now delivering robust noise control solutions into the power generation sector using our NoiseTrap® Technology.

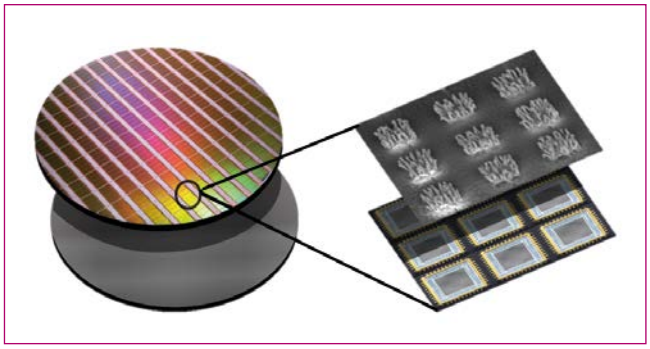
sonobex
a MERFORD company

CAUSWAY SENSORS

For the development of a nanotechnology based point of care solution for the detection of pathogens.

Causeway sensors are experts at manufacturing on the nanoscale – on the scale of atoms and molecules. At the nanoscale, materials and their interaction with light behave quite differently. We have developed a chip with a billion gold nanorods which act as interacting optical antenna. The resonant frequency of these nanostructures is highly sensitive to changes in mass at their surface making them ideal for biological sensing applications. We have built an accompanying device which sensitively reads biological detection events at the chip surface.

Rapid detection of clinically relevant biomarkers and pathogens from biological samples is central to the diagnosis of disease. Current hospital practice involves taking blood samples from the patient and sending these samples to a central laboratory for processing. The turnaround time from sample to diagnosis can range from several hours to days. Causeway Sensors are creating a disruptive technology that will offer a paradigm shift in health care diagnostics. Our rapid point-of-care platform will address diagnostic bottlenecks, giving clinicians accurate data in minutes, enabling quick prescription of the correct treatment. Our technology will have its greatest impact in infectious diseases like sepsis, where survival rates drop by 8% every hour it is untreated.



The company

Causeway Sensors use cutting edge nanotechnology to enable pathogen detection for a range of infectious diseases within the healthcare sector. We are developing a robust, portable, multiplexed and sensitive diagnostic platform suitable for use at the point of care.

Causeway™ Sensors

Business Start-up Award winners

CREAVO MEDICAL TECHNOLOGIES

For the development of innovative diagnostics technology for acute medicine.

A MagnetoCardioGram (MCG) is an image of the magnetic field of the heart. For the last 50 years it has been known that this image can provide an accurate and rapid assessment of cardiac function, however, the signal from the heart is tiny and it is hidden inside background fields that are millions of times larger.

Historically, complex cryogenic equipment was used, which does not present a cost effective solution for emergency medicine. We developed an entirely new type of room temperature induction magnetometer that enabled us to use quantum correlations between the sensors to identify and remove background noise.

Removing this noise reveals the underlying cardiac signal and enables our device to function. This allowed us to create a very compact device which is small, lightweight and can be moved in and around a busy emergency department. This has the potential to fundamentally change chest pain triage and allow a clinician to rapidly discharge patients who do not have cardiac related chest pain.

The cost saving resulting from rapid triage means that the hospital sees a rapid return on investment and will make substantial cost savings over the lifetime of the device.

The company

Creavo is a UK-based, privately held, medical device company set up to commercialise the innovative MCG technology developed by Professor Ben Varcoe for elective and emergency clinical settings.

CREAVO
MEDICAL TECHNOLOGIES

LYNKEOS

For the development of Muon imaging systems for the 3D-characterisation of shielded containers and structures.

Lynkeos Technology Ltd. is the first company in Europe to commercialise cosmic muon tomography. Muons are elementary particles, similar to electrons but heavier, that are produced in particle showers in the atmosphere by high-energy cosmic rays. There are about 100 muons per second per square metre at sea level and the typical muon energy is about 10,000 times the typical energy of an X-ray. This means that muons are highly penetrating, ubiquitous, natural and cost-free.

The Lynkeos Muon Imaging System uses cosmic-ray muons to provide a 3D image of the test object inside the system. Detectors above and below the object track the path travelled by the muons and sophisticated software algorithms analyse the collected data. This is similar to an X-ray CAT scan, except that the top detector replaces the X-ray source and that no artificial radiation is used.

The result is an image of the contents of shielded containers, e.g. for nuclear waste, that cannot be imaged by conventional X-ray or gamma-based imaging techniques. It does not only allow for a visualisation in 3D, but it also allows to distinguish between different materials.

The company

Lynkeos Technology provides unique 3D imaging solutions and material identification using naturally occurring cosmic-ray muons. Key applications include the imaging of the contents of shielded nuclear waste containers as well as large-scale infrastructure.

LYNKEOS TECHNOLOGY LTD


LYNKEOS
TECHNOLOGY LTD
lynkeos.co.uk
MUON
IMAGING
SYSTEM

Business Start-up Award winners

ONI

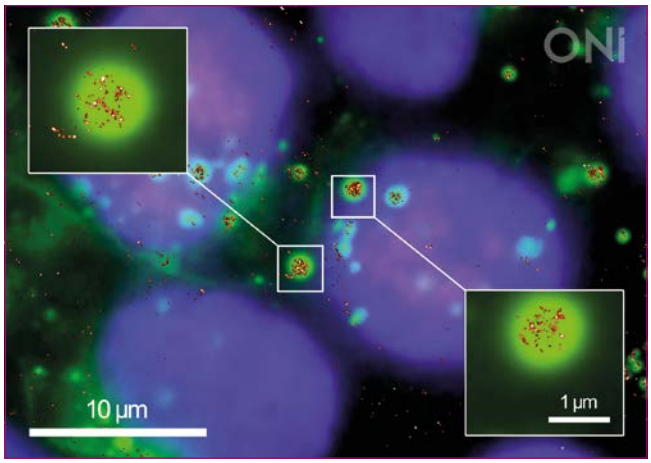
For the development of the world's first desktop-sized super-resolution microscope.

ONI is passionate about democratising super-resolution microscopy and bringing it to the bench of every researcher. To achieve this, we have designed our flagship product, the Nanoimager, which miniaturises Nobel Prize winning technology in the world's first desktop-sized super-resolution microscope. The Nanoimager breaks the limits of microscopy by allowing scientists and doctors to visualise cellular features that were previously invisible.

The ability to optically resolve structures down to ten nanometers has tremendous implications for the early diagnosis of disease, and for the development of effective and personalised therapy. To accelerate this progress, ONI is developing the tools that enable the automation of the entire microscopy workflow, from automatic sample preparation to AI-driven analysis tools. ONI also offers its microscopy platform as a subscription, where users, much like a phone contract, get access to hardware, software, and analysis services.

ONI's vision is to create a compact, easy-to-use product that could one day be used anywhere, from the research bench to your doctor's office.

In just over two years, ONI has grown to a global team of more than 70 people with over 25 nationalities represented, working together to empower researchers across the world with the ultimate microscopy technology.



The company

ONI makes the world's first desktop-sized super-resolution microscope. Its flagship product, the Nanoimager, has miniaturized Nobel Prize winning technology to provide researchers with the tools to unveil nanometric structures that were previously invisible.

ONI

STREAM BIO

For the development of nontoxic, fluorescent, magnetic nanoparticles for bioimaging, therapeutics, diagnostics and environmental detection.

CPNs™ are derived from imaging polymers (semiconductors) found in OLED TV screens – it is these polymers that are at the core of our nanoparticle. Current bioimaging technologies suffer from problems such as toxicity, poor brightness and fading after a couple of hours.

CPNs™ are significantly brighter than the current technologies available and haven't shown any signs of fading after 12 months. The surface of the particle is designed to enable antibodies and other targeting agents to be fixed to it, which then allows the CPN™ to be directed at a specific target cell or protein. Stream has developed 4 colours (wavelengths) to target the life sciences R&D molecular probe market, specifically in cell labelling, imaging, tracking, disease diagnostics and drug development.

A further 4 wavelengths are in the pipeline to allow scientists a greater choice to track multiple targets. The increased brightness enables a far greater sensitivity for detection and within the polymer core, and magnetic iron oxide particles provide a cell purification capability not currently available. Looking beyond the R&D market for CPN™ molecular probes, research is being carried out to potentially use CPNs™ for improved medical diagnostics, fluorescence and MRI guided surgery of tumours, and infrared imaging of tumours.

The company

Stream Bio develops and manufactures innovative bioimaging molecular probes. Our superior Conjugated Polymer Nanoparticles (CPNs™), expertise and partnerships with industry and academia, enables us to create CPN™ solutions for many R&D applications, which address longstanding problems within the life science industry.

Business Start-up Award winners

YORK INSTRUMENTS

For the development of next-generation MEG brain scanners for use in research and healthcare.

York Instruments is a technology company currently working on the next generation of magnetoencephalography (MEG) scanners. Our wider product range is centred around the use of magnetism for clinical diagnostics and scientific research. Magnetoencephalography is becoming established as a major neuroimaging technique.

Unlike fMRI, it allows direct temporal measurement of neuronal activity and provides improved localisation accuracy and broadband detection range as compared to EEG. Our MEGSCAN product is ground-breaking in that we offer a vastly improved signal-to-noise ratio through our use of hybrid quantum interference devices (HyQUID) sensors. We use zero liquid helium to achieve cryogenic cooling; and we incorporate low noise, modular electronics to control our system.

Researchers and clinicians working in the fields of epilepsy, traumatic brain injury and chronic brain pathologies welcome the introduction of this high-quality research and diagnostic tool, that takes advantage of core technology advances via a more usable interface, and that is cheaper to run than any comparable system on the market.

The company

York Instruments specialises in magnetic measurements and their healthcare applications. In our first product, MEGSCAN, we are improving the sensitivity and precision with which we can monitor biologically-generated magnetic fields, allowing earlier and improved diagnoses of a variety of clinical conditions.that were previously invisible.

YORK INSTRUMENTS

PAST WINNERS

“It gave the ZephIR team a big boost to win an IOP Innovation Award in 2013, recognising our pioneering work in the development of lidar for the wind industry. We continue even now to enjoy the benefit to our reputation with customers.”

Michael Harris, chief scientist, ZephIR, 2013 winner

“The IOP Business Innovation Award is the most credible award that Coherent Scotland has won, it is the one we are most proud of.”

Chris Dorman, vice president, Coherent Scotland, 2013 winner

“This award represents a fantastic stamp of recognition from the Institute on the record-breaking achievements of the OSS team.”

Mike Lawton, chief executive, Oxford Space Systems, 2017 winner

“We’re honoured by this recognition of our technical advancement as we strive to be a global driver of change and innovation in our industry.”

Tom Scarangello, chairman and CEO, Thornton Tomasetti Inc., 2017 winner

“After years of research, recognition by the IOP of the science in developing cryogen-free, superconducting MRI scanners is greatly appreciated.”

David Taylor, CEO, MR Solutions, 2017 winner

“We’re extremely proud and delighted to receive the IOP Business Innovation Award, which recognises our advances in electrical systems integration.”

Paul Stein, CTO, Rolls-Royce, 2017 winner

“ “It is a great honour to receive this award, which is in recognition of the outstanding team at ICEoxford, who continue to produce world-class innovative products for the global cryogenic markets.”

Chris Busby, managing director, ICEoxford, 2017 winner

“This award is a great recognition of our ambition to innovate and collaborate with the wider physics network and to bring the discoveries out of the lab and into the real world.”

Graeme Malcolm OBE, CEO and founder, M Squared, 2017 winner

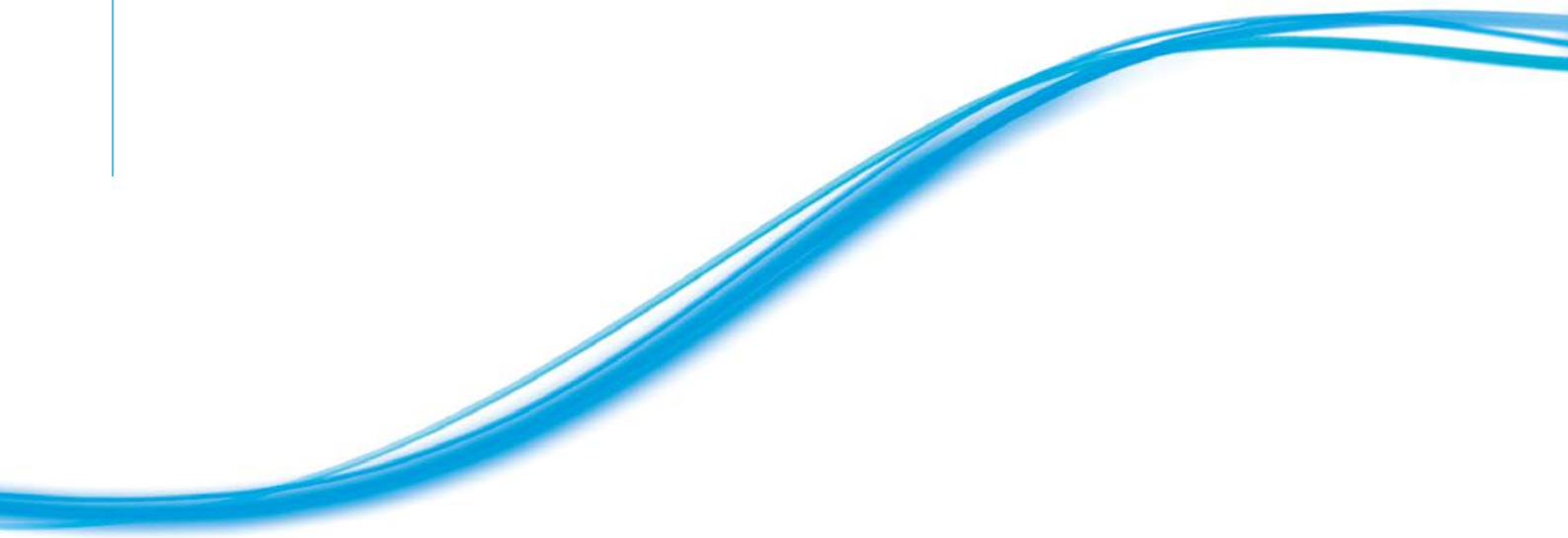
“We’re delighted to receive this prestigious award and for the recognition by IOP of ANT’s highly innovative medical technology”

Ian Quirk, CEO, Active Needle Technology, 2017 winner

SEVEN YEARS OF BUSINESS INNOVATION AWARD WINNERS

Active Needle Technology
Airbus Defence and Space
Aqua Cooling Solutions
Aurox
Causway Sensors
Coherent Scotland
Creavo Medical Technologies
Displaydata
e2v
Elekta
EndoMag
Gas Sensing Solutions
Gooch & Housego
Hallmarq Veterinary Imaging
ICEoxford
Ikon Science
Innovative Physics
Jaguar Land Rover
Kromek
Leonardo MW
Lynkeos
M Squared
Magnox
MBDA UK
Metrasens
MR Solution
Naneum
Ossila
ONI
Oxford Space Solutions
Pepsico
Plastipack
pureLiFi
Rolls-Royce

Silixa
Simpleware
Sonobex
Stream Bio
Tesla Engineering
The Technology Partnership
Thornton Tomasetti Defence
Tracerco
Ultra Electronics
York Instruments
Zephir



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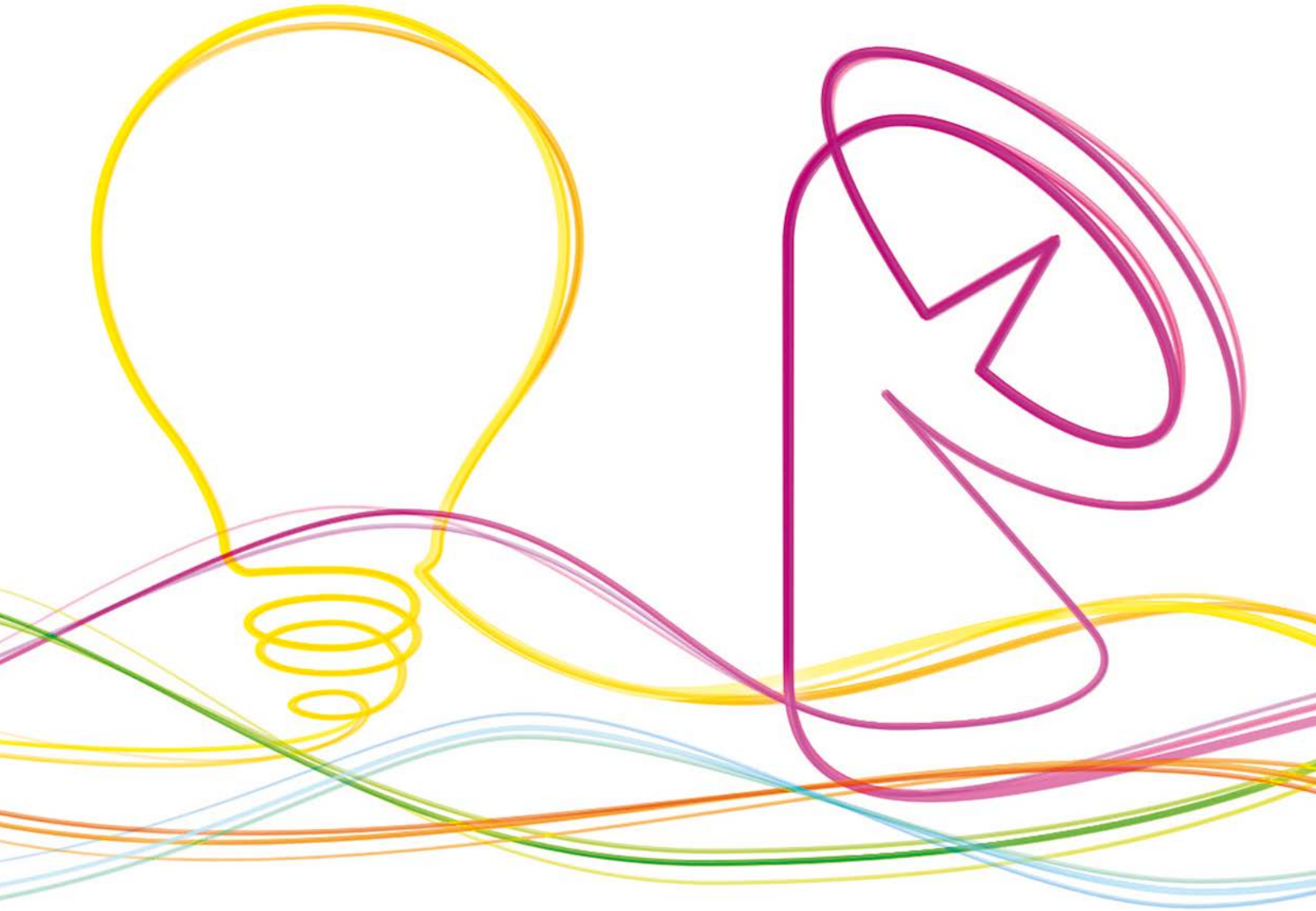

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