

INTELLECTUAL PROPERTY OPPORTUNITIES

MIDLANDS INNOVATION COMMERCIALISATION OF RESEARCH ACCELERATOR (MICRA)

A single gateway to research with commercial potential from the eight universities of Midlands Innovation



Intellectual Property Opportunities



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Institution	Title	Problem it addresses	Solution	Further information source	Contact
Medtech, Biomarkers & Diagnostics					
Keele University	Polymer Electrospinning Apparatus	A key challenge in tissue engineering is the manufacture of nano-scale scaffolds that mimic the real tissue architecture.	Enables selection and control of surface chemistry properties of nanofibers as they are being formed	N/A	a.farrington@keele.ac.uk , 01782 733843
Keele University	PCL nanofiber coated glass coverslips	Stem cell growth and induced differentiation are challenging factors in stem cell research	Removes the need for additional biologically derived products or stimuli when culturing and differentiating stem cells	N/A	a.farrington@keele.ac.uk , 01782 733843
Keele University	Blood loss pictogram (Co-owner: Bayer)	Previous methods of measuring/tracking the level of menstrual blood loss during clinical trials have been too subjective or too laborious.	Provides a standardised, objective and reliable method for self-reporting by trial subjects.	N/A	a.farrington@keele.ac.uk , 01782 733843
Keele University	Virtual Patients	Training a clinical workforce at scale and pace is challenging.	Enables widespread use via online simulation with avatars providing feedback and assessment	N/A	a.farrington@keele.ac.uk , 01782 733843
Loughborough University	Performs	The assessment skills of radiologists in reviewing X-rays of Breast and other cancers requires frequent review and feedback.	Performs is an established methodology to test and provide feedback to radiologists based on cases screened by a panel of experts.	https://performs.international/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk , Tel: +44(0) 1509 223858
University of Birmingham	Prognostic Urinary Protein Biomarkers for Bladder Cancer	There is an urgent need for prognostic biomarkers to guide clinical decision making in urothelial bladder cancer (UBC)	Three urinary prognostic biomarkers for UBC identified	https://app.in-part.com/articles/3235	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Birmingham	Synthetic Sensing of Glycoproteins for Prostate Cancer Diagnostic Test	Early and accurate detection of prostate cancer is critical to improve patient survival. The Prostate Specific Antigen (PSA) test looks for a protein called PSA that appears in 50 different forms that have the same protein but with different sugars attached. Not all forms of PSA are an indication of cancer so the standard PSA test generates a high level of false positives and false negatives.	We have created synthetic receptors at nano-cavities on surfaces that are complementary in size, shape and functional group orientation to the target glycoprotein. The sensor chip integrates seamlessly with existing SPR technology already available in many medical and biological laboratory scenarios.	https://app.in-part.com/articles/1696	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Birmingham	Screening Method and Reagents for Transfection and Delivery of Biomolecules	Overcoming the cell membrane barrier and deliver active pharmaceutical ingredients to the target cell	Novel polymeric scaffold and screening methods which penetrate the cell membrane more efficiently	https://app.in-part.com/articles/402	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Leicester	Cadatheter and the Near Virtual Autopsy			https://app.in-part.com/articles/388 , https://le.ac.uk/enterprise/development/technology-transfer/medical-devices	red-commercial@leicester.ac.uk , +44 (0)116 223 1347

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University of Leicester	Innovative Device Providing Relief from Tinnitus			https://app.in-part.com/articles/386 https://le.ac.uk/enterprise/development/technology-transfer/medical-devices	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	MegaPlex PCR - Massively Multiplexed PCR			https://app.in-part.com/articles/83	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	Increasing the Performance of Hybridisation-Based Target Enrichment For NGS			https://app.in-part.com/articles/535	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	LifeMap®: Assessing the Risk of Sudden Cardiac Death			https://app.in-part.com/articles/415 https://le.ac.uk/enterprise/development/technology-transfer/medical-devices	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	Universal tissue sampling device			https://le.ac.uk/enterprise/development/technology-transfer/medical-devices	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	Percutaneous pericardial left ventricular assist device			PCT/GB2016/050925	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	Automatic Measurement and Characterisation of Urine Flow in Patients			PCT/GB2017/050436	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	Therapeutic target and circulating biomarker for aortic dissection and intramural hematoma			PCT/GB2016/050413	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	Evidence Collection Kit for Sexual Assault			PCT/GB2017/053459	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Nottingham	Fully synthetic growth substrate for stem cell culture	For large scale, reproducible and high quality human pluripotent stem cell (hPSC) production, translation from laboratory scale culture to production on an industrial scale is a key challenge. A shift away from ill-defined biological substrates towards fully defined and xeno-free substrates to support the expansion of hPSC populations is required to assure quality.	The technology exists as a fully synthetic polymer substrate that is capable of supporting both the expansion and differentiation of hPSCs. The substrate is fully defined chemically and prepared by a reproducible protocol allaying any fear of batch to batch variation and loss of valuable downstream product. The material is xeno-free and biologic free and would seamlessly fit within an existing quality system.		gillian.shuttleworth@nottingham.ac.uk

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Institution	Title	Problem it addresses	Solution	Further information source	Contact
University of Nottingham	GET: Novel intracellular delivery system				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Negative / counter selection marker for use in Clostridia				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Bacterial 'orthogonal' expression system				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Rapid reliable and highly sensitive test for TB				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Novel polymers which resist bacterial attachment				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Antimicrobial biomaterials for medical devices	The consequence of bacterial attachment to the surfaces of medical devices is the potential to initiate the establishment of highly resistant surface associated biofilms. Biofilms then present as sources of bacterial infection and reservoirs of plasmids that carry antibiotic resistant genes.	A novel class of materials (unique acrylate and methacrylate polymers) resistant to bacterial attachment discovered using a high throughput materials discovery platform with up to 81%, 99%, 99% reduction in bacterial coverage of P. aeruginosa (gram-), S. aureus (gram+) and uropathogenic E. coli (gram-) respectively, compared to market leading anti-bacterial silver hydrogel as well as clinically isolated strains.		gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Diagnostic device for Acute Kidney Injury				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	RegeneWAX: rapid prototyping of vascularised tissues				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Resorbable composite and coupling technology				caroline.sykes@nottingham.ac.uk
University of Nottingham	ECLIPS - Auditory Processing Questionnaire	The ECLIPS questionnaire can be used to assess children where there are concerns about their auditory, linguistic or social development. Support decisions about: Whether a child should be referred and which professionals should be considered for further help What further assessments or clinical support is needed	A novel questionnaire to assess children with listening difficulties. It is a home-based assessment questionnaire of children's listening and cognitive abilities. The results of the questionnaire can be used by educational psychologists, paediatricians, GPs, Audiologists, and speech and language therapists to develop a profile of a child's cognitive and listening skills, and to quantify levels of particular difficulties.		caroline.sykes@nottingham.ac.uk

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University of Nottingham	Biomarkers for Pseudomonas infection				caroline.sykes@nottingham.ac.uk
University of Nottingham	Vetebral Plate for deformity correction				caroline.sykes@nottingham.ac.uk
University of Nottingham	Clostridium Difficile Biomarkers	Clostridium difficile (CDI) is the leading worldwide infective cause of hospital-acquired and antibiotic-associated diarrhoea, imposing a considerable financial burden on health service providers. Management of this infection is complicated due to antimicrobial resistance, recurring infections, and strikingly the inability to reliably differentiate between acute infection and asymptomatic or symptomatic carrier states.	Utilising a number of biomarkers, two prediction tools have been validated. Firstly, the severity of CDI can be predicted and categorised as either Mild or Severe. In addition, a 30-day mortality prediction tool using a number of CDI related toxins and proteins has been developed.		caroline.sykes@nottingham.ac.uk
University of Nottingham	Lynch Syndrome Diagnostic	Currently only at risk people are tested for the presence of Lynch Syndrome but NICE guidance is imminent which will recommend that ALL patients with colorectal cancer undergo testing for Lynch Syndrome. Currently the testing for MSI and BRAF mutations involves multiple steps and specialist instrumentation.	A PCR based genetic testing method that does not require capillary electrophoresis equipment to complete. This test requires real-time PCR machines with HRM capability. These are common and would be present in most Molecular Diagnostic labs. In contrast, the capillary electrophoresis machines and sequencing machines are not required.		caroline.sykes@nottingham.ac.uk
University of Nottingham	Polymer matrix for Temozolomide drug delivery to the brain	The median survival of patients with Glioblastoma Multiforme (GBM) stands at less than 18 months despite surgery, chemotherapy and radiotherapy. Currently, upon initial diagnosis of GBM, standard treatment consists of maximal surgical resection, radiotherapy and concomitant adjuvant chemotherapy of oral Temozolomide (TMZ).	The technology comprises of a mouldable biodegradable polymer matrix of poly(lactico-co-glycolic acid) (PLGA)/poly(ethylene glycol) (PEG) microparticles capable of sustained multiple drug release. This technology delivers TMZ, protected as the prodrug, directly to the residual disease too infiltrative to be removed surgically. The technology is capable of releasing other agents in a sustained manner, alongside TMZ.		caroline.sykes@nottingham.ac.uk
University of Nottingham	Hyperpolarised gas cleaning for MRI	Clinical use of hyperpolarised gases for lung imaging in MRI requires separation of hyperpolarised gases from carrier gases. Existing separation techniques can reduce hard won polarisation of the inhalable gases.	A new single step chemical process uses a catalysis approach to remove carrier gases without a significant impact on hyperpolarisation. The system has been demonstrated for both Xenon and Krypton.		george.rice@nottingham.ac.uk
University of Nottingham	Erasable flow-through biosensors	Surface Enhanced Raman Spectrometry (SERS) is a technique that exploits the enhanced Raman signal generated by the surface absorbance of molecules to nanostructured surfaces as a mechanism to create highly sensitive sensors. Whilst SERS compatible surfaces do exist and are being commercialised the level of sensitivity, reproducibility and robustness restrict their potential for integration into, for example, hand-held mobile sensing tools or their use in embedded environments. Examples include diagnostic tools for biomedicine, quality-control and reporter/sensor platforms for industry.	Nottingham, in collaboration with the University of Rochester (US) and their spin-out SimPore have developed an exquisitely sensitive, reusable and potentially flow-through SERS platform has a significantly wide applicability across applications as potentially broad as diagnostic devices in the acute setting, patient-operated monitoring products for chronic diseases (cystic fibrosis, diabetes, cancer, myocardial infarction), roadside substance abuse tests, tools for drug discovery, and industrial bio- and nanoparticulate-sensing and quality control platforms.		george.rice@nottingham.ac.uk
University of Warwick	Diagnosis of Autism Spectrum Disorder (ASD) in children	Diagnosis of ASD currently depends on clinical observation of behaviour, which is an expensive obstacle to early diagnosis and treatment.	Clinical test based on urinary and plasma biomarkers would offer fast, robust and more cost effective method of diagnosing ASD in children.	https://app.in-part.com/articles/3406	MICRA@warwick.ac.uk

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University of Warwick	Novel system for cryopreservation	Antifreeze proteins, are very challenging to obtain synthetically and so must be extracted in a process which is both expensive and time consuming; In addition these antifreeze proteins are thought to be toxic to human cells. Therefore there is a need to develop synthetic cryoprotecting agents that are easy to produce and non-toxic to human cells and tissues.	Researchers at the University of Warwick have developed a novel cryopreservation technique using an easily available, biocompatible chemical which is already approved for human consumption (GRAS designated) and is routinely used in the pharmaceutical industry. The agent acts to prevent the natural recrystallisation of small ice crystals into larger ones, a major cause of cell death. The use of this cryoprotecting agent allows a considerable reduction in the time between thawing the material and having transplant-ready cells whilst avoiding the use of toxic organic solvents, thus increasing the safety of the cryopreservation process.	https://app.in-part.com/articles/1259	MICRA@warwick.ac.uk
University of Warwick	New Test to Accurately Determine the Onset of Labour	The current test for foetal fibronectin is detectable in vaginal secretions at the end of pregnancy; a negative result can be used to determine if a patient is not in labour. A positive result means a patient is at a higher risk of giving birth early, but it cannot be used as an indicator that a patient is in labour, so it does not help the clinician decide how to manage a patient's care.	The Warwick team has identified a biomarker that can provide both a positive and negative indicator of the onset of labour. The biomarker is a direct indicator of the biochemical changes associated with the onset of labour. The test is based on a simple antibody test using cells from a cervical swab.	https://app.in-part.com/articles/648	MICRA@warwick.ac.uk
University of Warwick	IVF Pre-Implantation Screening Method	Pregnancy rates following IVF treatment are relatively low and unpredictable even when the embryos appear to be 'top quality'. Currently, embryos may be screened by morphological analysis or pre-implantation genetic screening (PGS), both of which have their limitations. PGS involves genetic analysis of one or more cells removed from embryos. It ideally requires at least two top quality blastocysts for analysis and is thus inapplicable to many patients. It is expensive and invasive, technically challenging and the results may not be representative of the embryo as a whole	The Warwick team has identified protein biomarkers that are released by the embryo during culture indicating the health of the embryo, relative to other test or control embryos. Embryos are cultured in individual drops of culture medium and the Warwick team have devised a simple test that can be performed on embryo-conditioned medium once the medium is finished with for culture purposes.	https://app.in-part.com/articles/647	MICRA@warwick.ac.uk
Therapeutics					
Aston University	Therapeutic methods - ICAM-3 antibodies for the treatment of inflammation	Inflammation can both cause and exacerbate multiple disease states ranging from lymphoma to cardiovascular disease. There are limited effective treatments for these diseases.	The invention relates generally to methods and materials for modulating the recruitment of macrophages or monocytes to sites at which they may contribute to disease initiation or progression. Aston has a mouse monoclonal antibody made to a human I-CAM 3 epitope which could be humanised and used as a treatment for inflammatory diseases such as lymphoma and atherosclerosis.		Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160
Aston University	Transglutaminase Inhibitors - Antibody Treatments for Fibrotic Diseases	Although scarring (fibrosis) is a normal process the body uses to help limit damage caused by injury, when scarring occurs in organs it leads to reduced function and eventually a disease state. There are limited treatments for fibrosis and almost all directly act on the effects of fibrosis rather than the fibrosis itself. No effective treatments are available for fibrosis	Transglutaminase heparin-binding site peptides and antibodies have been developed as a potential therapy for the treatment of fibrosis.		Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160
Aston University	Transglutaminase Inhibitors - Novel Small Molecule Treatments for Fibrotic Diseases	Although scarring (fibrosis) is a normal process the body uses to help limit damage caused by injury, when scarring occurs in organs it leads to reduced function and eventually a disease state. There are limited treatments for fibrosis and almost all directly act on the effects of fibrosis rather than the fibrosis itself. No effective treatments are available for fibrosis	Small molecule peptidomimetic inhibitors compounds for use in the treatment of fibrosis, scarring and proliferative disorders have been developed. The patent has been granted in the US and Japan and is proceeding to grant in China and the EU.	Patent Publication No. WO 2014/057266	Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160
Aston University	Therapeutic bioglass material for use in treating bone cancer	Osteosarcoma is the eighth most common childhood cancer with one of the lowest survival rates. There is a huge unmet clinical need for treatments that give patients further options and improved clinical outcomes.	New biomaterials for bone cancer (osteosarcoma) applications. The materials help promote bone regeneration whilst simultaneously releasing anticancer agents to tackle residual cancer and prevent secondary cancers. It is likely the treatment would also have further indications.		Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160
University of Birmingham	Nanoparticles for Cancer Imaging and Treatment	Effects of Radiotherapy and chemotherapy agents are attenuated by DNA repair machinery, increasing the probability of tumour cells to survive and proliferate	Novel nanoparticles introduce chemo- or radio-sensitising compounds into the cancer cell acting as DNA repair inhibitor and nuclear localisation signal element	https://app.in-part.com/articles/2052	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	Targeting the DNA Damage Response pathway for the treatment of neurodegenerative diseases	New therapies are needed to treat patients affected by dementia	A novel link between DDR signalling and neuropathology, leading to the identification of novel targets for Alzheimer's disease treatment	https://app.in-part.com/articles/3248	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	New Therapy for Bone Regeneration	There is considerable clinical unmet need for new methods of treatment to augment bone regeneration safely in patients that require spinal fusion after experiencing LDDD, to avoid serious side effects like ectopic bone growth, paralysis and cancer.	Bone regeneration is promoted when extracellular vesicles are applied in combination with phosphate to the site of need, which outperforms the current gold standard of care with the growth hormone, BMP-2, with improved bone quality, quantity & density.	https://app.in-part.com/articles/2196	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090

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University of Birmingham	Defensomes as Antimicrobial Surface Treatments	Many infections, especially bone and prosthetic infections, involve the formation of a bacterial biofilm. Biofilms inhibit the penetration of antimicrobial agents and are therefore harder to clear than normal infections. Silver nanoparticles have been investigated as antimicrobial surface treatments but these have shown significant cell toxicity.	A novel antimicrobial surface treatment using synthetic immune system-inspired proteins called defensomes	https://app.in-part.com/articles/325	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Leicester	Fibrotix: Improving the Healing and Appearance of Scars			https://app.in-part.com/articles/82	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Nottingham	Novel antifungals/fungicides				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Next-generation temozolomide	The therapeutic benefit of TMZ depends on its ability to damage DNA and trigger the death of tumour cells. Although TMZ offers some hope to GBM (Glioblastoma Multiforme) patients, a best 5-year survival rate of 9.8% is achieved.	Synthesised three novel N3-propargyl, C8-substituted TMZ analogues which overcome MGMT/MMR resistance and possess in vitro anti-tumour activity superior to TMZ in GBM and colorectal carcinoma (CRC) cell lines.		gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	ACE: Synthetic operon construction in Clostridia				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Transposon vector for Clostridia				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Clostridium-directed enzyme-prodrug therapy (CDEPT)				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Natural translation inhibitor				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Vaccine antigens against Streptococcus uberis				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Novel antibiotics for C.difficile infection	The bacterium Clostridium difficile has become a major healthcare threat of global significance with approximately 50,000 cases per annum reported in the UK and 500,000 cases in the US. Mortality rates in the UK due to C. difficile infection are four times higher than infections due to MRSA.	Synthetic antibiotic peptide with novel MOA which shows high selectivity against C. difficile without causing damage to beneficial gut microflora. When orally administered, the novel peptide is near-completely retained in the gut (i.e. it is minimally absorbed).		gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	pH responsive cancer therapy				gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Oncology Therapeutic Antibodies				caroline.sykes@nottingham.ac.uk
University of Nottingham	Novel therapeutic for Myotonic Dystrophy				caroline.sykes@nottingham.ac.uk
University of Nottingham	Novel mannose receptor modulators	Dampening down the inflammatory response is needed in many disease states including atherosclerosis, chronic obstructive pulmonary disease (COPD), cancer and ischaemia reperfusion injury (IRI). However, the potential of MR as a therapeutic clinical target has yet to be clinically exploited.	A series of novel polymers which bind MR and prevent the recycling of the receptor back to the surface of the cells. By doing so they effectively act as MR blockers and could effectively inhibit a number of biological processes that are mediated by MR including the inflammatory response.		caroline.sykes@nottingham.ac.uk
University of Warwick	Novel targets and therapeutic needs for the treatment of Bovine and Human Respiratory Syncytial Viruses	HRSV is the single most important cause of severe respiratory illness in infants and young children. Palivizumab is the only treatment approved for high risk infants but its costs limits its use in many parts of the world.	Warwick scientists have identified a host protein which is conserved across species and which plays a fundamental role in translational processes required for the replication of RSV. Targeting of this protein provides an opportunity for the development of a suite of anti-viral therapeutics and eliminates the problem of development of drug resistance.	https://app.in-part.com/articles/1697	MICRA@warwick.ac.uk
Materials, Engineering & Manufacturing					
Cranfield University	Controllable Venturi with Injection	Slugging in multiphase flows in oil production	Novel venturi valve system to control flow conditions to mitigate slugging	NA	rob.l.evans@cranfield.ac.uk
Cranfield University	Carbon Fibre Moulding	Increasing strength of carbon fibre composite objects	Method of aligning fibres in carbon fibre moulding	NA	rob.l.evans@cranfield.ac.uk
Cranfield University	Pseudo Spiral Tubes	Slugging in multiphase flows in oil production	Novel configuration of pipe design	NA	rob.l.evans@cranfield.ac.uk
Cranfield University	Multiphase Surface Jet Pump	Pumping of multiphase flows (gas-liquid mixtures)	Novel jet pump design	NA	rob.l.evans@cranfield.ac.uk
Cranfield University	CO Catalyst	Carbon monoxide produced by burning of charcoal	Method of converting carbon monoxide to CO2	NA	rob.l.evans@cranfield.ac.uk

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Loughborough University	Double Beam Shear	The accuracy and reliability of testing the interlaminar shear (ILS) mechanical properties of composite materials has to date been limited.	This new test has the potential to measure the interlaminar shear mechanical properties of composite materials with far greater accuracy and reliability than ever before	http://www.lboro.ac.uk/enterprise/double-beam-shear/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk, Tel: +44(0) 1509 223858
Loughborough University	Novel Ammonia production system for emission reduction (ACCT)	Current Nox reduction systems do not operate at lower exhaust temperatures, reducing their efficiency	Our innovative technology extends the operating temperature range of AdBlue SCR systems	http://www.lboro.ac.uk/enterprise/acct/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk, Tel: +44(0) 1509 223858
Loughborough University	High Speed Sintering	Many additive manufacturing technologies such as 3D printing are limited in the speed at which they can produce components.	HSS is a method of producing components at speeds 10-100x faster than previous techniques from various materials which has already been proven on the market by established companies. Additional non-exclusive licensees are sought.	https://www.highspeedsinteringtechnology.com/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk, Tel: +44(0) 1509 223858
Loughborough University	Aqueous Nanosuspensions	Current techniques to form nanoparticles in suspension and then form ceramic materials suffer from a limit to the packing of nanoparticles due to their surface properties.	A suite of techniques have been developed to modify surface properties of nanoparticles to increase the degree of packing possible and also to modify their bulk properties to support the sintering performance.	http://www.lboro.ac.uk/departments/materials/staff/bala-vaidyanathan/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk, Tel: +44(0) 1509 223858
University of Birmingham	Shaping NdFeB Rare Earth Magnets Using Hydrogen Ductilisation Process	NdFeB permanent magnets are hard and extremely brittle. To produce the final magnet shape they have to be machined and this is a time consuming, energy intensive process that produces a significant amount of material waste.	A net-shape manufacturing technique for NdFeB magnets based on a novel hydrogen ductilisation process (HyDP) to provide a ductile structure allowing mechanical shaping without fracturing the material.	https://app.in-part.com/articles/1797	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	Reduced Sugar Chocolate Emulsion System	Reducing the sugar levels in chocolate, where sugar content can be as high as 60%, has a detrimental impact on properties such as snap, gloss, texture, taste and mouth-feel, making it less appealing to consumers.	A low sugar composition comprising a water-in-cocoa butter emulsion where water displaces part of the solid phase, thereby reducing the overall sugar content while maintaining the organoleptic properties.	https://app.in-part.com/articles/1432	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	Metal Nanoparticles for Tissue, Cell and Materials Imaging	Nanoscale imaging probes can lead to breakthroughs in healthcare. Current imaging compounds are limited in multimodal use due to their synthetic complexity, poor photo-stability, short luminescence lifetimes and narrow wavelength separation between excitation and detection light.	A new method has been developed for attaching metal complexes to nanoparticles for imaging cells and tissues and other studies in materials science. This approach allows a high loading of luminescent or MRI probe materials on the nanoparticles providing nanoprobe with strong signal output.	https://app.in-part.com/articles/332	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	Robotic Grasp	Robotic hands are typically designed and made to perform a limited number of actions and have a limited ability to learn a grasp for a novel object which has not been encountered before.	A robotic hand which from one learned example can determine the optimal spatial relationship between each part of the hand and the surface contours of an object to maximize the likelihood of a grasp being effective.	https://app.in-part.com/articles/326	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	Surface Enhanced Raman Scattering (SERS) Molecule Detection: Novel Substrate Material and Manufacturing Process	Consistency and ease of manufacture of SERS substrates	New setup to easily manufacture consistent SERS substrates	https://app.in-part.com/articles/685	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	High-Performance Spinning Disc Atomisation Process	Atomised particles via Spinning Disc Atomisation are obtained via a trial and error approach	Fluidynamics of the process fully coded to control/predict the characteristics of the atomised particles	https://app.in-part.com/articles/3028	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Birmingham	Smart Emulsions for Timed Delivery of Hydrophobic and Hydrophilic Components	There is a need in many fields to efficiently deliver specific compounds to specific targets. This is particularly difficult when a triggered or controlled delivery of two segregated actives (e.g. hydrophobic active-1 and hydrophilic active-2) from a single structured simple emulsion is required potentially over different time scales.	We have developed a method to overcome this challenge by encapsulating one active inside submicron size particles that are subsequently used to stabilise the interface of a water-in-oil or oil-in-water emulsion, with active-2 encapsulated in its dispersed phase.	https://app.in-part.com/articles/331	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090

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Institution	Title	Problem it addresses	Solution	Further information source	Contact
University of Leicester	Novel Nanoparticles with Improved Magnetic Properties			https://app.in-part.com/articles/712	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Leicester	A self-adjusting passive control technique for the leakage flow of axial turbomachines			UK patent filed, Upcoming PCT stage in Nov 2018	red-commercial@leicester.ac.uk, +44 (0)116 223 1347
University of Nottingham	Technology for bone regeneration	A team at the University of Nottingham have developed a scalable manufacturing process that is capable of producing unique spherical glass materials with a high degree porosity. The properties of the microspheres can be tailored to meet the users' needs by adapting the manufacturing process and feed material composition. Porous glass materials potentially have significant utility in engineering, biotechnology and in healthcare where ongoing work has started to demonstrate the utility of calcium phosphate glasses in bone repair.	Glass microspheres can be produced via a patented procedure with properties tailored to the specific demands of the application. Sizes ranging from 60 microns to 350 microns diameter The level of porosity can be controlled from < 5% up to 80%. Degradation rates can be controlled from days, weeks up to months. The material can be chosen from phosphates, silicates, borates and glass ceramics.		gillian.shuttleworth@nottingham.ac.uk
University of Nottingham	Microwave process for pre-treatment of minerals	The liberation of valuable mineral content from ores requires crushing and grinding to enable separation using physical or chemical processes. Crushing and grinding processes are extremely energy intensive.	Pre-treatment of a range of ore types with microwave power, including copper ores, significantly reduces the energy consumption in grinding processes and enhances liberation of valuable minerals.		george.rice@nottingham.ac.uk
University of Nottingham	Microwave processing of vermiculite	Vermiculite is an important industrial mineral that is widely used in sectors including fire retardants and in building insulation. The raw material must be expanded through furnace heating after mining, which is energy intensive and can lead to a reduction in product quality through overheating.	A microwave exfoliation system has been designed that supports reduced energy consumption, increased product yield and enhanced process control.		george.rice@nottingham.ac.uk
University of Nottingham	Satellited powders for selective laser melting	Users of additive manufacturing equipment that require powdered feedstocks would ideally be able to formulate their own alloys in process. However, powder supplies from distinct batches that are simply blended may not flow uniformly and may not consolidate/alloy sufficiently upon laser interaction to return acceptable material properties.	A material 'satelliting' technique has been developed whereby a finer powder fraction is adhered to the outer surface of a larger fraction whilst avoiding agglomeration The satellited powder feedstock then becomes an alloy during selective laser melting processing.		george.rice@nottingham.ac.uk
University of Nottingham	Porous glass microspheres	Spherical and porous materials enable a range of applications including as an injectable carrier of medical compounds but also as a potential filter medium. Glas and ceramic materials suitable for use in a wide range of applications can be difficult to manufacture.	A team at the University of Nottingham have developed a scalable manufacturing process that is capable of producing unique spherical glass materials with a high degree porosity. The properties of the microspheres can be tailored to meet the users' needs by adapting the manufacturing process and feed material composition. Porous glass materials potentially have significant utility in engineering, biotechnology and in healthcare where ongoing work has started to demonstrate the utility of calcium phosphate glasses in bone repair. The applicable base materials for the porous glass particles range from phosphates, silicates, borates and glass ceramics.		george.rice@nottingham.ac.uk
University of Nottingham	Bio derived polymers	Most of the polymers we consume are derived from oil and plastics presently account for a global annual usage of more than 7% of all fossil fuels. Renewable polymers currently account for a very small market share.	Simple but robust chemistry has allowed us to synthesise new terpene or pinene based acrylic monomers (eg. limonene from orange peel and pinenes from wood waste in such a scale that they can be polymerised. These materials represent potential partial or direct replacement for existing non-renewable materials in a wide range of applications.		george.rice@nottingham.ac.uk
University of Nottingham	Functionalised spider silk	Spider silk has a range of unique physical and biological properties that make it an ideal candidate for commercial exploitation in a number of applications such as body armour, composites, textiles and healthcare. However, to date there are limited examples of successful commercial exploitation of spider silk because of difficulties producing the material.	A Nottingham team can produce a recombinant spider silk in bacteria that, not only produces silk with the desired physical properties, but also incorporates a functionalised site on the silk that allows a wide variety of different active molecules to be attached including drugs, fluorophores, and peptides. An existing partnership is supporting scale-up production and engagements with potential end-users are now being developed.		george.rice@nottingham.ac.uk

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Institution	Title	Problem it addresses	Solution	Further information source	Contact
University of Nottingham	Enhanced body armour	Body armour is widely used by the military and civil protection forces. Armours can be heavy and bulky, making them difficult to wear.	A novel nanomaterial coating technology has been developed that significantly enhances armour performance against threats such as knife and spike. The increased protection performance could also support lighter and more flexible armours to be developed.		george.rice@nottingham.ac.uk
University of Nottingham	Reactive inkjet materials for 3D printing	Additive manufacturing (AM) is widely regarded as a disruptive manufacturing technology. Currently, AM faces several challenges to further encroach on conventional manufacturing: quality; scalability and production speed. An AM technique that can overcome these challenges will push AM away from prototyping or small batch production towards mass production of bespoke products. Traditional single point-by-point AM technique can only achieve one or two of these requirements and rarely the aspects of scalability and production speed. Inkjet technologies still face several problems including challenges associated with thermal bonding.	Nottingham have developed a new 3D reactive inkjet and powder system (patent applied) which could overcome all the above for existing AM techniques. Instead of thermally driven fusion, reactive inks are selectively inkjet printed onto a powder bed to bond the "chemically designed" powder particles together through covalent bonding.		george.rice@nottingham.ac.uk
University of Nottingham	Graphene based coatings for wear reduction	Component wear is a significant challenge in a wide range of applications. Thermal spray technologies enable wear performance of parts to be enhanced, although these are primarily applied in very high value applications.	A team at the University of Nottingham have developed a recipe and an innovative process to incorporate graphene nanoplatelets (GNPs) into ceramic coatings from suspension spray which is cheap and highly efficient.		george.rice@nottingham.ac.uk
University of Warwick	Improvements to electrospray ionisation	Molecular analysis by mass spectrometry (MS) requires molecules to be charged. Electrospray ionisation is unreliable for random peptides and some protein samples, and requires additional sample preparation.	An ionisation device using protonated methane (CH5+) has been developed for improvement of ionisation in electrospray ionisation sources. This novel, physical approach combines electrospray ionisation with methane CI, under atmospheric pressure and inert conditions	https://app.in-part.com/articles/651	MICRA@warwick.ac.uk
University of Warwick	Two-Dimensional Mass Spectrometry In Any Inexpensive Linear Ion Trap	Tandem Mass Spectrometry(MS/MS) techniques usually requires ion isolation prior to fragmentation. In scenarios where isolation is not possible (such as when the resolution is limited, or masses are very similar, or the sample is very complex), interpretation of the spectra becomes difficult or impossible, as it cannot be determined which fragment is derived from which precursor.	Warwick team has developed methods for the implementation of 2D MS on ubiquitous, lower resolution MS instruments, by use of SIMION ion trajectory calculations. This simulation software is commonly used as a basis for developing novel MS instruments, and in this area of research is well aligned with development as the findings correlate well to commercial instrumentation. The product will consist of the necessary electronics and data analysis software, which uses the same hardware regardless of the sample nature.	https://app.in-part.com/articles/650	MICRA@warwick.ac.uk

Electronics, Sensors & Optics

Aston University	System and method for the transmission of optical signals	Distortion in signal of transmission within optical fibres is one of the largest limitations in data transmission speed. Issues of Kerr distortion means that simply increasing power does not allow for an increase in speed whilst still giving viable data transmission.	A system for the transmission of an optical signal using a twin fibre approach to reduce the drawbacks of Kerr distortion.		Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160
Cranfield University	Phosphate Sensor	Phosphate levels in water	An in-line device to provide continuous monitoring data on phosphate content	NA	rob.j.evans@cranfield.ac.uk
Cranfield University	Hollow silica waveguide gas cell with modified gas fittings	Gas sensing of very small samples	Use of optical capillaries	NA	rob.j.evans@cranfield.ac.uk
Cranfield University	Wavelength Control	Platform technology for sensing and communications	Control of emission wavelength of semiconductor laser sources	NA	rob.j.evans@cranfield.ac.uk
Cranfield University	Fibre Optic Shape Sensing	Measurement of the shape of aerodynamic structures (wings, aerofoils, rotor blades)	Fibre optic arrays	NA	rob.j.evans@cranfield.ac.uk
Cranfield University	Fibre Optic Multiplexing	Distance measurement platform technology	Fibre optical methods	NA	rob.j.evans@cranfield.ac.uk
Cranfield University	Optical Waste Sorting	The requirement to analyse waste at waste transfer sites	Automated optical method of waste assessment	NA	rob.j.evans@cranfield.ac.uk

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University of Birmingham	Fibre-Optic Scrambler for Homogeneous Laser Illumination	Laser illumination homogenisation (i.e. interference-free) over short-time scale (microsec)	New setup for interference free laser illumination over a short-time scale (microsec)	https://app.in-part.com/articles/2887	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Birmingham	Electro Optical Infra-red Shutter	Most thermal imaging devices use a mechanical shutter in front of sensitive elements. Despite an apparent simplicity, the relatively bulky construction of the mechanical shutter with moving parts results in slow speed of modulation, which restricts applications of thermal imaging for high-speed measurements and in environments with high g-forces.	Electro-optical modulation is an attractive alternative as it simplifies operation, provides significantly higher modulation speed, shrinks dimensions, is resistant to mechanical shocks and is silent.	https://app.in-part.com/articles/330	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Birmingham	High Voltage Direct Current Power Converter	Switching systems in voltage sourced converter (VSC) based high voltage direct current (HVDC) power distribution grids are costly due to the high price of the DC circuit breakers used, which contributes significantly to the overall capital cost of developing DC grids.	The new solution provides fast DC fault control and protection from DC fault currents using a VSC Multi-level Modular Converter (MMC) topology in a two-terminal or multi-terminal HVDC power transmission system by reducing the current to zero through a novel routing managed by the VSC converter itself.	https://app.in-part.com/articles/3029	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk , Tel: 0121 414 9090
University of Leicester	Fast, Digital Confocal Microscope Module			https://app.in-part.com/articles/86	red-commercial@leicester.ac.uk , +44 (0)116 223 1347
University of Leicester	High Speed, Super-Resolution, Random Access Multiphoton Microscopy (SuperRAMP)			https://app.in-part.com/articles/532	red-commercial@leicester.ac.uk , +44 (0)116 223 1347
University of Leicester	Handheld X-Ray Diffraction Analysis			https://app.in-part.com/articles/421 https://le.ac.uk/enterprise/development/technology-transfer/analytical-devices-and-imaging	red-commercial@leicester.ac.uk , +44 (0)116 223 1347
University of Leicester	Hybrid Optical Gamma Camera for Security and Nuclear Decommissioning			Using 2 patents (PCT/GB01/05345, and PCT/GB2006/001773) on new domains of security and Nuclear Decommissioning	red-commercial@leicester.ac.uk , +44 (0)116 223 1347
University of Nottingham	Fast Raman Spectra Imaging				caroline.sykes@nottingham.ac.uk
University of Nottingham	Cheap optical transducers (CHOTS)	Non-destructive testing is important in a wide range of industries. Traditional sensors tend to be based on contact ultrasonics and require a couplant. This does not support applications that require non-contact and remote monitoring.	CHOTs are designed to address the limitations of existing ultrasonic transducers. CHOTs are optically excited by means of lasers enabling remote, reliable, couplant free operation with low impact on the inspected structure.		george.rice@nottingham.ac.uk
University of Nottingham	Acoustic Spectroscopy for non destructive characterisation (SRAS)	Imaging the grain structure of a part is becoming more and more important as aerospace materials are being put to work close to the physical limits of the material. SRAS is a new technology being developed at Nottingham University that can rapidly map the surface grain structure, giving information about shape, size and orientation of the grains making up the material.	SRAS is a novel and cost effective characterisation and nondestructive evaluation technique for imaging the microstructure of materials such as titanium, steel, aluminium, silicon and hard ceramics.		george.rice@nottingham.ac.uk
University of Nottingham	Fault detection and location in electrical circuits	The rapid detection and location of faults in long cable runs can be challenging, which increases the time taken for necessary inspection and repair. For example in airlines, ships and in lineside equipment in the rail industry.	A nottingham team have developed a method of accurately & quickly locating parallel arc and short circuit faults on both AC & DC transmission lines. This system allows for the fault to be detected and then located within a cable run.		george.rice@nottingham.ac.uk
University of Warwick	HDR video compression algorithm for mobile/OTT viewing	Unclear viewing experience as significant detail from bright, dark or widely varying conditions is often lost.	Full 32-bit HDR video compression algorithm offers significant advantages over existing technologies. Our patented compression techniques overcome limitations and make transmission of full HDR video possible whilst adapting the video displayed according to the capabilities (i.e. brightness) of the screen being used.	https://app.in-part.com/articles/3382	MICRA@warwick.ac.uk
Energy					
Aston University	Ablative Thermolysis Reactor	Current methods of fuel production, particularly those based around oils are unsustainable and environmentally damaging.	The invention comprises a thermolysis reactor for the conversion of solid biomass into bio-oil, for use in power and heat generation, as a precursor for biofuels, and as a raw material for chemicals and other speciality products.		Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160

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Aston University	Stable Biofuel Blends	The majority of widely used fuels, particularly those based around oils are unsustainable and environmentally damaging.	The invention relates to a liquid bio-fuel mixture, and uses thereof in the generation of electrical power, mechanical power and/or heat. The liquid bio-fuel mixture is macroscopically single phase, and comprises a liquid condensate product of biomass fast pyrolysis, a bio-diesel component and an ethanol component.		Luke Southan, l.southan@aston.ac.uk Direct Dial: 0121 204 5160
Cranfield University	Carbon Stabilisation Reactor	Variability of gas composition produced by anaerobic digestors	System and device to regulate and stabilise the methane - CO2 mixture to produce a consistent supply of methane	NA	rob.l.evans@cranfield.ac.uk
Cranfield University	Membrane Ammonium Crystallisation	Production of ammonium from anaerobic digestion	Chemical processing and filtering techniques	NA	rob.l.evans@cranfield.ac.uk
University of Birmingham	Elimination of commutation failure in LCC HVDC power converter	Line commuted converter (LCC) high-voltage direct current (HVDC) systems are susceptible to commutation failures during faults on the AC side. Commutation failure can result in the system having to be shut down and restarted even after the fault has been cleared, potentially leading to a blackout.	Our converter topology provides firing angle control that provides fast independent reactive power control, completely eliminating commutation failure while reducing the component cost and footprint.	https://app.in-part.com/articles/3032	Dr Jonathan Watkins, j.watkins.1@bham.ac.uk, Tel: 0121 414 9090
University of Nottingham	Wind driven thermal pumping	Wind turbine technologies generate power whether the electricity is needed or not.	Wind_TP is a system that using compression of gas a means to store energy for release later when electricity is required onto the grid.		george.rice@nottingham.ac.uk
University of Nottingham	Multilevel power inverter	High efficiency, low component count, high power density and high reliability are key requirements of DC-to-AC inverters used in a number of applications ranging from renewable energies (e.g., wind, solar) to industrial drives. Presently, two- and three-level converters are used to provide high efficiency and reliability, e.g. in photovoltaic (PV) systems and industrial drives. However, a drawback of these topologies is that they require large filters.	A novel five-level topology enabling small filter sizes without degradation of system efficiency and complexity has been developed and demonstrated at high power rating.		george.rice@nottingham.ac.uk
Environment					
University of Warwick	Visualization and Quantification Tool for Climate Change at Specific Thresholds	Climate is intrinsically a distribution. Many climate-sensitive decisions are sensitive to particular thresholds in the relevant distribution at local scales. Combining observations over many years improves the statistical resolution of the distribution, but at the cost of it not being representative of the present day because the climate will have changed over the observational period.	A new methodology developed at the University of Warwick provides both visualization and quantification of changes in these distributions over the observational record at specific, decision-relevant thresholds. This information, in combination with distributions over the full time series, provides more detail about the present day distribution which is valuable for short term vulnerability decisions and also important for planning on longer timescales.	https://app.in-part.com/articles/649	MICRA@warwick.ac.uk
University of Warwick	Increased Epigenetic Variation in Plants	Genetic lesions or chemical treatments can induce heritable changes in the epigenomic landscape of plants that are associated with novel traits. However, these approaches also induce undesirable side effects, such as poor heritability, and genetic changes, which can affect plant viability. Therefore, this strategy is usually associated to costly and lengthy breeding programs aimed to remove these undesirable side effects.	The Warwick team has developed a novel strategy to generate novel epigenetic variation in plants avoiding these undesirable effects. The strategy allows reprogramming of somatic cells into zygotic initials that later develop into fertile plants. This epigenetic variation is stable over several generations and more importantly can generate functional diversity.	https://app.in-part.com/articles/646	MICRA@warwick.ac.uk
Loughborough University	Flood NowCasting	Current weather forecasting gives an indication of rainfall and the potential of flooding over large areas. The prediction of flooding on a street (or building) level has not to date been possible,	A suite of models has been developed to combine rainfall forecasting and topographical and drainage data such that a prediction can be made of flooding risk on the street level as little as 8hrs in advance.	http://www.lboro.ac.uk/enterprise/enterprise-awards/one-to-watch/flood-risks/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk, Tel: +44(0) 1509 223858
Transportation					
Loughborough University	Repoint	Railway switches have worked - and failed - the same way for more than 200 years	Repoint improves reliability, reduces maintenance and improves capacity of the railway	http://www.lboro.ac.uk/enterprise/repoin/	Dr Mark Bennett, m.r.bennett@lboro.ac.uk, Tel: +44(0) 1509 223858
Defence & Security					
Cranfield University	APEX Aircraft countermeasures	Surface to air anti aircraft missile attacks	A low cost, passive decoy, mimicing the radar profile of an aircraft	NA	rob.l.evans@cranfield.ac.uk