Innovate UK

Results of Competition: Shanghai-UK Industrial Challenge Programme - Open

Competition Code: 1704_EE_SHANGUK_OPEN

Total available funding is £10M

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Innovative Technology and Science Limited	Automatic Full Weld Inspection System for High Speed Rail(TrackBot) Theme: 37	£339,600	£237,720
TWI Limited		£140,158	£140,158

Project description - provided by applicants

Our railways are vital for the smooth operation of internal and trans border markets, and for the development of a sustainable and clean transport system. Building modern, competitive railway networks is therefore becoming a top priority for the UK, China and the rest of the world. To build and maintain safe high speed networks brings its own challenges. According to Scientific American, most rail accidents are due to broken rails and welds. Failure generally initiates from defects in the weld such as fatigue cracks, dead zones and flat spots. Despite these worrying statistics, some countries such as China still rely mainly on manual weld inspections, which is a slow, inconsistent and inadequate approach that is prone to human error. For defect detection in rail, the most common methods are ultrasonic and magnetic induction, which are slow and lack the ability to inspect the full volume of the weld. Phased array ultrasonic testing (PAUT) is an advanced NDT technique, with the capability to detect any faults within a weld. The consortium will develop TrackBot, an advanced automated universal weld inspection system that is based upon proprietary PAUT technology and systems developed by each of the consortium partners. TrackBot can rapidly detect all types of flaws in the full weld volume, increase inspection speeds, and reduce the number of skilled persons required to deliver efficient inspection and rail networks. In doing so, the consortium partners will generate combined revenue of £22.6million and deliver significant (>5x fold) return on investment.

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GeneFirst Limited	Improved liquid biopsy and sequencing technology for detecting cancer gene mutations in blood	£500,000	£350,000

Project description - provided by applicants

Cancer treatment has been changed radically by the introduction of targeted drugs, guided by mutation testing. Alterations in genes (gene mutations) have been validated as powerful predictive biomarkers in the management of various cancers and mutation testing is currently standard to personalise treatment decisions. It has been well documented that a broad spectrum of cancers release DNA into peripheral blood (ctDNA). There has been growing interest in use of ctDNA as a non-invasive biomarker to detect the presence of cancer, follow treatment response, gauge prognosis, and monitor for recurrence. Next Generation Sequencing (NGS) has revolutionised genomic exploration and is driving the implementation of precision diagnostics. However, the sensitivity and accuracy of current NGS methods and associated cancer panels are compromised by sequencing errors.This is a fundamental limitation, particularly when aiming to identify rare mutants in genetically heterogeneous mixtures, such as ctDNA. To overcome this limitation, GeneFirst has developed an improved NGS technology with increased sensitivity and accuracy for the concurrent detection of multiple mutations. This project proposes the development of a cost-effective and patient-friendly testing assay for the detection of cancer gene mutations in liquid biopsy, enabling clinically relevant cancer genotyping by non-invasive means.

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Helia Photonics Limited	Novel microwave plasma sputter deposition process providing enhanced optical coatings	£219,901	£153,931
Orion Photonics Ltd		£124,808	£87,366
University of the West of Scotland	NMPLAS	£145,732	£145,732

Project description - provided by applicants

The NMPAS project is focused on an innovation in the Materials & Advanced Manufacturing high growth sector, applying a cutting edge & innovative coating process - Microwave Plasma Assisted Sputtering (MPAS). This offers a room temperature process with up to 6-fold increase in optical coating production throughput compared to current predominantly used high temperature electron-beam deposition production processes. Moreover, MPAS enables use of an expanded range of thermally sensitive/strategic substrates, providing cost and optical coating peformance benefits. Optical coatings are predominant among high value manufacturing sectors & this project opens up new sustainable business for the partners by increasing both the UK's & China's competitiveness in lucrative current & emerging high margin global markets. MPAS technology transfer from Univerity of the West of Scotland (UWS) to the project's industrial partners will enable a step-change in capability for the SMEs. With circa 90% of the worlds optical coatings produced in China, exciting new opportunities for future growth in both capital equipment and coated component sales into the Chinese market. This business-led project brings together three industrial partners from the optical coating sector, UK SMEs Helia Photonics Limited (HPL) & Orion Photonics Ltd (OPL) & Shanghai-based Jason Vacuum Co.,Ltd (SJV), with UK academic partner UWS, pioneer of the MPAS process. The project advances the Technology Readiness Level (TRL) of MPAS to a late stage pre-commercial level, i.e. >TRL6.

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Teer Coatings Limited	Antimicrobial coatings by physical & chemical vapour deposition for application in aerorospace (ANCOP)	£352,611	£176,305
Aston University		£49,649	£49,649
Birmingham City University		£96,748	£96,748
Project description - provided by applicants			
Microbial and fungal growth in space environment are important challenges for the space industry. Typically, the number of microbial organisms is controlled through extreme disinfection and quarantine of astronauts but there is no established means of eliminating the organisms once in the space environment. The ANCOP project is focused on exploiting the disruptive innovation involving nano-cluster enabled Physical Vapour Deposition (PVD) coatings, nano-composite PVD coatings and functionalised Chemical Vapour Deposition (CVD) diamonds to address the problem of microbial growth in space environment both on surfaces and critical components in manned satellites. Nano-cluster enabled PVD & nano-composite PVD coatings will enhance and retain surfaces' antimicrobial properties by controlling the size of silver nanoparticles in the coatings. In parallel, CVD-deposited functionalised diamond will be developed, adding anti-microbial functionality to the hard, wear resistant and/or decorative aspects of that coating. Post-project, similar coatings will also be exploited in terrestrial environments, including healthcare, agri-food & transport (automotive, aerospace, rail, marine, etc.). This business-led project brings together one industrial partner in the UK, Teer Coatings Ltd (TCL), with two UK universities, Aston University (AU) and Birmingham City University (BCU) and a partner in Shanghai, Shanghai Aerospace Equipments Manufacturer (SAEM).			

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Flexenable Limited	Flexible Organic X-ray Image Sensor for Healthcare (FOXISH)	£493,922	£246,961
Project description - provided by applicants			
The FOXISH project looks into making low cost, light weight and robust digital flat panel X-ray detectors by replacing CR, analogue films and glass based digital X-ray flat panel detectors. The digital X-ray flat panel detectors made with amorphous silicon backplanes on glass will be replaced with organic thin film transistor arrays on low cost plastic substrates and the amorphous silicon photodiode will be replaced with an organic photodiode in order to make a low cost, light weight and robust digital X-ray detector that can be used in mobile X-ray flat panel detector units. If successful the X-ray flat panel detectors can revolutionize the healthcare services in resource poor locations in China through the availability of affordable early diagnosis and prevention.			

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Living Water Ecosystems Ltd University of Warwick	Energy from Ammonia during Wastewater Treatment using Electrochemical and Ecological Processes	£349,996 £149,914	£244,997 £149,914
Project description - provided by applicants			
The aim of this Shanghai-UK industrial challenge programme is to develop a proto-type electrochemical device which can efficiently remove ammonia from ammonia-rich effluents and recover the energy from ammonia during the wastewater treatment process through electrochemical and ecological processes. The project is led by UK and Shanghai wastewater treatment companies. The two academic partners from UK and Shanghai will work closely with the companies to develop the relevant technologies to be demonstrated, combining the expertise of the ammonia concentrating technology from Shanghai and the ammonia fuel cell technology at University of Warwick. Ecological treatment systems designed by Living Water will be used to treat the wastewater after ammonia has been recovered as fuel for ammonia fuel cells to generate electricity for further treatment or for local use. This technology will significantly reduce the energy comsumption of the wastewater treatment industry, leading to economic and environmental benefits. The success of this project will not only benefit the two partner industries, but will be beneficial to all industries that produce ammonia-rich effluents in both the UK, China and worldwide. The combined processes and technologies of our UK and Chinese Partners will provide a safe, clean, low-energy, cost-effective method of wastewater treatment and sustainable electricity production that will benefit society.			

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Solaquagen International Limited	LAT: Low temperature Ambient pressure Technology fo wastewater treatment	£497,805	£348,464

Project description - provided by applicants

Rapid economic development and urbanization have led to rising water consumption and rampant pollution in China. The Chinese government's 13th Five-Year Plan includes objectives to enhance environmental protection, emphasizing rigorous control of pollutant discharge and mandates water reuse and recycling in new and existing coal-fired power plants and coal-to-chemical refining facilities for treating complex industrial process waste streams. These 'œchallenges' represent business opportunities for UK-based Solaquagen International (SQG), and a niche for deploying SQG's awards winning innovative low temperature, ambient pressure, humidification-dehumidification technology, 'œLAT'. The project objective is to deploy LAT to 'œcleaning' highly variable wastewaters, that are typical of Landfill Leachate and Coal Chemical plants in China. The project is a partnership between SQG and Denovo (Shanghai, China), aimed at proving industrial research on a LAT pilot at a Shanghai site. The ability of LAT to address the challenges will contribute towards climate action, resource efficiency and raw materials issues facing the world. The impact on SQG as a business will be significant with sustained credibility as a leader of 'œgreen' water treatment technology and a return of £7.5 per £1 invested is expected, 2 years after the completion of the project.

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Lombard Medical Limited	Development of Key Technologies to Treat Aortic Aneurysms	£801,108	£480,665
Project description - provided by applicants			
This project targets the treatment of abdominal aortic aneurysms; a fatal pathology most common in men in their mid sixties. It combines the clinical and medical implant skills of Lombard Medical with Microport's expertise in medical device manufacturing technology. This progam will develop a minimally invasive implant that can be used in day-case aneurysm surgery. This will save money for healthcare system world-wide and allow patients to return home and to a normal life as rapidly as possible. By investing in unprecedented levels of manufacturing automation, the companies expect to be able to deliver this therapeutic benefit at no additional cost to healthcare providers. Day case surgery for aneurysms is currently experimental and minimally invasive implants to treat aneurysms are almost completely hand-made. This project aims to take dramatic steps in both clinical and manufacturing technology.			

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