

Results of Competition: Innovation to Commercialisation of University Research (ICURe) Follow On Funding: Round 8

Competition Code: 2003_CRD_CO_ICURE_R8

Total available funding is £2 million

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
MINVIRO LTD	Converting 'MineLCA' into a licensable software tool to enable predictive environmental performance data to be undertaken for mining projects.	£294,012	£205,808

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Project description - provided by applicants

The mining sector generates 11% of global greenhouse gases (GHG) directly. Include indirect impacts, such as impacts associated with electricity generation to power mines and this rises to >35% [OECD/IEA, 2018].

The transition to a low-carbon economy is well underway and accelerating. But low-emission energy and transportation systems are more mineral-intensive compared to the fossil fuel equivalents. The transition means more mines will be required in Europe and around the world, allowing for a low-impact localised supply chain. For example, minerals used in low-carbon technologies are projected to rise by 965% for lithium, 585% for cobalt, 383% for graphite and 241% for indium by 2050 [World Bank, 2019].

New mines need to ensure they are extracting these critical minerals in an environmentally responsible way. Minviro has developed technology to assess the environmental impacts of different mining project configurations, which can support in reducing the carbon footprint of projects. The technology will be used: by mining and engineering companies to minimise the impact of their own projects; by investors to ensure that they are not putting money into a high-risk environmentally damaging assets; and by equipment manufacturers, such as electric car manufacturers, to ensure they are procuring metals from mines that have a good environmental performance.

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SOLENT SENSORS LTD	Assuring water quality : a new generation of miniaturised microfluidic chemical analysers	£299,392	£209,574

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Project description - provided by applicants

Assuring good water quality is vital for the health of our rivers, lakes and oceans, and is also important in regulating a range of industrial processes (including drinking water supply). At the moment, collecting data about important parameters such as nutrients (e.g. nitrate and phosphate) and dissolved metals (e.g. iron) is difficult and expensive. This is because it relies on the manual collection of individual water samples that are sent back to the laboratory for analysis.

This project advances a range of miniature chemical analysers that are able to perform this task automatically. They can be submerged in rivers, in lakes, or at the at the bottom of the ocean, collecting high-frequency data about the chemistry of the water. In many cases the data can be sent wirelessly back to the user for real-time information.

Compared to other sensors that are already commercially available, these miniaturised analysers provide data quality that is as good as (or in some cases better than) data collected via manual sampling and laboratory analysis. The analysers use microfluidics and lab-on-chip technology, meaning they use miniaturised versions of the high-quality wet-chemical analysis methods used in the laboratory, meanwhile consuming very low volume of reagents, sample, and power. This makes them suitable for long term (several months to one year) deployment. These analysers provide data that can be better trusted with very little human intervention, and are not subject to the same kind of sensor drift and interferences that plague many existing sensors.

The miniature analysers were developed for ocean science applications via 10 years of R&D at the National Oceanography Centre in Southampton. This project will allow necessary engineering steps to turn the miniature analysers from research tools into commercial products. Once commercialised, the technology will be available worldwide for many industrial and environmental applications.

This project overcomes the final hurdle in turning this technology from a research tool into a globally-accessible viable product. The true impact of this technology will finally be realised, as it is turned into a range of market-leading tools available to water quality managers, regulators, water companies, and industry worldwide

At the end of this project, the technology will have been turned into a product suitable for both ocean science and new larger markets, adapted so that it can be produced in a cost-effective manner, and validated via a series of demonstration deployments in new markets.

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TOPMD PRECISION MEDICINE LTD	ICURe TopMD Pathway Biomarker Catalogue	£293,720	£205,604

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Project description - provided by applicants

In this project, we are developing a catalogue, across diseases and treatments, of new, more powerful and informative biomarkers for use as companion diagnostics to predict treatment response in individual patients and for improving the efficiency of the development and testing of medicines.

Our AI-enhanced technology, TopMD, was developed at the University, innovatively uses known biological pathways as coordinates for measuring the 'shape' of global gene expression, accurately representing both the molecular phenotype as a robust 'pathway biomarker'.

Discussions with pharmaceutical companies and healthcare providers identified routes to market to maximise the value promised by this innovative technology. We were advised by a panel of experts at the Innovate UK ICURe market validation programme options roundabout to 'spin-out' a company, and create a library of TopMD pathway biomarkers as a networked catalogue of biomarker products.

This project will deliver libraries of TopMD pathway biomarkers of disease and treatment-induced gene expression. The accuracy of TopMD classification diagnosis of diseases and disease sub-types will be assessed and published via peer review. The libraries will act as high value catalogues of 'pathway biomarkers', positioning TopMD as a global leader in Precision Medicine and meeting 2/4 of the government grand challenges; AI & Data and Healthy ageing.

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Seclea	Seclea – Building Trust in AI	£299,372	£209,560

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Project description - provided by applicants

Artificial Intelligence has the potential to improve our lives with rapid, personalised and assistive services. At the same time, it presents risks of negative impacts on both society and individual citizens. Recent debacles have demonstrated this impact; for example, Apple Credit Card has been called a 'sexist card' and Forbes reported that 'AI bias could put women's lives at risk'. Racial bias has also been exhibited by AI applications, like bail systems in the USA that preferentially let white people go home compared to black people. Such examples are just the tip of the iceberg.

There is a growing uneasiness around AI in the mind of the general public, but at the same time, AI is considered a global phenomenon that will transform our lives. The fourth industrial revolution is of a scale, speed and complexity that it requires the integration of autonomous agents powered by AI algorithms. Therefore, we want all the benefits of AI while limiting the risks associated with it -- especially the risks related to its Blackbox nature. Furthermore, we need mechanisms to build public trust and confidence in autonomous decision-making processes.

This can be achieved by making AI transparent, explainable, auditable and accountable. This will demystify AI applications and increase trust and confidence in AI for both the general public and businesses. Seclea is an innovative platform that achieves this goal. The Seclea Explainability Platform (SEP) is a cloud-based service that integrates with and supports an AI application through its entire lifecycle, ensuring that it is transparent, fair and accountable. During this project, a commercially viable and reliable SEP will be developed and released, so organisations can ensure their AI application(s) is fair and assists in safeguarding their investment in AI from any future regulatory changes.

Furthermore, Seclea is supporting the AI Grand Challenge identified in UK Industrial Strategy. The core business of Seclea is in line with the UK Industrial Strategy's goal of making the UK the global leader in 'safe and ethical use of data and Artificial Intelligence giving confidence and clarity to citizens and businesses.'

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NUNABIO LIMITED	Nunabio: Providing DNA Solutions	£299,265	£209,486

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Project description - provided by applicants

Biological matter can be precisely identified by the base sequence of its DNA. DNA detection is therefore of global interest where biological contamination is harmful to human health -- water that contains microbial infections, air samples that convey disease, water or food that is contaminated, weapons that disperse biological agents or genetic mutations that lead to the onset of disease.

DNA sensors are already utilised in a large number of commercially important market sectors including clinical molecular diagnostics, pathogen detection in food and water and biothreats to homeland security.

The current approach to DNA detection can be achieved by two methods including;

- 1\ NGS technologies which provide highly accurate results, however, they can be costly in terms of time, expertise and finances.
- 2\ Point-of-use devices which provide more affordable and rapid time-to-result, but with the drawback of a lower confidence in the automated result.

There is motivation within diagnostic companies to move from NGS technologies to point-of-care devices, however, there is an urgent need to improve the confidence in these results.

Our patented technology will enable the achievement of the higher confidence levels that are required to make quicker and better-informed decisions and subsequently improve user experience and feedback.

Following market research, we found our technology to be applicable within in a number of microbiological testing market sectors including, molecular diagnostics, food and water safety, and biothreat and security.

As a first route to market, we identified a pressing unmet need in the water testing market. There is currently no rapid, reliable water quality test available (UNICEF).

At Nunabio Ltd, our approach is to work with a global leader in water testing analysis, Palintest Ltd., in a joint-venture that will embed our patented technology into a testing platform that meets industrial requirements.

This Innovate UK funding will enable Nunabio Ltd. to set up as a technology development house, recruit new team members, develop and exploit current and new intellectual property in a comprehensive IP strategy to primarily impact the microbial source tracking in water. Accelerating the company development will attract further licencing opportunities of our technology into markets beyond water analysis.

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3FINERY LTD	3finery: Magical Transmedia Marketing in Augmented Reality	£150,241	£105,169

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Project description - provided by applicants

3FINERY proposes a cutting-edge tool in which any desired object could be used as a marketing channel for social transmedia virality. Our novel inbound marketing tool is capable of bringing any desired object to life. In this way, marketing can be brought to the customer, on and off-site, in the form of magical experiences in Augmented Reality.

Our solution enables objects to interact, play and receive messages remotely as if they were magically coming to life. Our software will provide a novel way of interaction with the user's environment and can be easily integrated to existing platforms and solutions. We offer unique interactive experiences with the ability to better understand needs by gathering interaction telemetry and other insights in an opt-in anonymized fashion. Our technology is built around social media with marketing virality as our main core growth proposition.

While our competitors base their technology in overlaying digital content on the screen, we directly bring the appearance of the real object to life. Our technology aligns to a more play-centered and gaming social experience which reflects user trends in this area. Apple, Snapchat and Epic Games are in close contact, and following the successes only enabled by this project we will then be poised to work further with them for future integrations and partnerships on this new technology.

Over this project, a commercial alpha mobile application version will be developed from TRL 6/7 to a market-ready stage for distributed marketing campaigns. This will contain a client application with its system infrastructure. This client application will utilize our patent protected tele-present AR framework, Intermediated Reality, for enabling distributed marketing campaigns with remote users. The outcome will be delivered in the form of a fully functional widely deployable product.

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QUOSIENT LTD.	EarthBlox: Making 'Space' for Everyone	£297,660	£208,362

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Project description - provided by applicants

This project will spearhead EarthBlox's commercial launch. InnovateUK will support our team to address the technical challenges needed to commercialise and ensure global deployment and growth.

The need for satellite data is global, expanding and transcends sector boundaries: it provides all decision-makers with timely intel on spatial-assets. Satellites and planetary-scale data now enable mapping of global changes (from deforestation, urban expansion, continental scale disasters), and modern instrumentation (atmospheric, land and ocean-based) reveal that we live on a fast-changing planet, leading to increased uncertainties and frequency of extreme events (droughts, floods, pressure on natural resources). To adapt and respond to these changes, planetary analyses are required and this is driving an explosive growth in Earth-observation missions (with 684 Earth-observation satellites now in operation, a 250% growth since 2014, Pixalitics 2019). While cloud computing now enables rapid data processing, harnessing the power of global satellite data still requires either coding skills, know-how or a hefty budget.

Our motivation with EarthBlox (Patent filed) is to remove these barriers to democratise the power of global satellite data and intelligence. EarthBlox's innovation leverages the power of cloud processing without the need for computer coding or high level Earth-observation expertise. It enables the processing of Terabytes of planetary scale geospatial data and the creation and download of actionable insights with unprecedented power and ease. It is "Lego for EO data processing". It offers full flexibility for users: novice users rely on pre-built EarthBlox solutions with simple instructions (workflows); intermediate users customise these workflows for particular needs; advanced users build entirely new workflows. Our prototype, tested in focus groups, already demonstrates how different users can exploit satellite data at the click-of-a-button, while allowing customisation on-a-par with expert users.

This project presents excellent value for money: it builds upon previous investments (totalling circa £500k, the most recent being a Royal Society of Edinburgh Enterprise Fellowship, an Innovate UK ICURE award, in-kind support as semi-finalists of the Converge Challenge and SetSquared training in the Space and Satellite sector). It also leverages significant funding/in-kind contributions including: Google's support through its Alpha Commercialisation Programme, UNEP matched funding for this InnovateUK project, and a committed Weareumi loan. We have now been selected to pitch at EIE-invest (postponed to October), the premier technology investor showcase featuring promising innovative, data-driven high-growth companies. All these have traction only if this InnovateUK application is successful.

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GlycoScoredx Ltd	GlycoScore: A reliable blood test to diagnose prostate cancer	£299,362	£209,553

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Project description - provided by applicants

In the UK, one in eight men will get prostate cancer within their lifetime. The prostate is a gland only men have, which helps make semen. As men get older the prostate can become larger. In many cases this change is normal, however it can be an early sign of prostate cancer. Prostate cancer develops when cells in the prostate gland grow in an uncontrolled way. Some prostate cancers grow slowly and don't cause any problems, but others grow quickly and need treatment to stop them spreading.

Currently, men who have symptoms of prostate cancer will have a blood test to detect 'Prostate Specific Antigen' or PSA. If your PSA result comes back positive, then you will be referred to a specialised doctor (called a Urologist), and recommended to have a 'prostate biopsy'. A prostate biopsy involves collecting tissue samples from the prostate using needles. These tissue samples are then looked at under a microscope to identify changes in the cells that could be cancer. Prostate biopsies are invasive, can be painful and carry the risk of infection, incontinence and erectile dysfunction. A raised PSA level can be a sign of prostate cancer, but many men with raised PSA levels don't have prostate cancer, and some men with a normal PSA level do have prostate cancer. This means that many men are having invasive procedures, such as biopsies, that are unnecessary and carry risks while others have their disease missed.

Newcastle University has developed a new blood test called 'GlycoScore' that is more accurate than other available tests, including PSA. The GlycoScore test can detect unique changes in blood that are altered in men who have prostate cancer. GlycoScore will drastically reduce over-diagnosis so that only men with a high risk of prostate cancer need to undergo biopsies. This will improve care for patients and also provide cost savings for health care systems. In addition, GlycoScore will also speed up diagnosis, identify aggressive cancers sooner and potentially save lives. We have discussed GlycoScore with patient groups, GPs, clinicians and healthcare providers and have identified a large and unmet market need for our test.

Innovate UK are supporting the establishment of a new spin-out company called 'GlycoScore_D__x_ Ltd' that will finalise the development of the GlycoScore diagnostic test so that it can be made available as soon as possible for the benefit of patients in the UK and worldwide.

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Albotherm	Albotherm Responsive Coatings	£298,435	£208,904

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Project description - provided by applicants

By 2050, food demand is expected to increase between 59% and 98%, driven by an increasing global population coupled with decreasing amounts of arable land. In order to feed the world, we need solutions that maximise the productivity of the farming land still available to us whilst being both low cost and environmentally sustainable. This need has led to a drastic increase in the greenhouse film market size, which was valued at \$3.9bn in 2018 and is projected to nearly double to \$6.5bn by 2023.

Albotherm will produce a temperature responsive coating, that will passively regulate the temperature of the surfaces it coats by reflecting light away when the temperature increases. Greenhouses offer intensive crop growth under controlled conditions, extending growing seasons and increasing crop yields. However, glazing that raises crop temperatures in Spring and Autumn can scorch crops in Summer. Our aim is to use this coating to passively regulate greenhouse temperatures, to improve both crop-yield and quality.

We do this using a responsive polymer gel that transitions from clear to opaque at a specified temperature. The change in opacity is fully reversible, meaning the polymer only remains opaque above the desired temperature. This temperature can be tuned to anything between 18°C to 45 °C, making it suitable for any climate or crop.

Currently our materials exist as a water-based solution, which cannot be practically applied to greenhouses. This project will allow us to develop and test a powdered form of our responsive polymer, that can then be used as an additive for plastic greenhouse films and would allow passive control of the climate inside the greenhouse. The same additives can also be dispersed into paint, making a sprayable coating that passively cools on the surface it is applied to. This product would be versatile and applicable not only for plastic greenhouses, but it could also be applied to almost any surface including glass.

In the longer term, we plan to develop the product further to create a more durable paint, with the aim to target the commercial and ultimately domestic buildings market. The UK government has pledged to be carbon neutral by 2050 and to halve the energy use of new buildings by 2030, meaning we will need more passive cooling technologies than ever before. Our responsive paints could make a huge contribution in reducing our reliance on energy intensive, air conditioning systems.

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THERMAP SOLUTIONS LTD	Commercialisation of Advanced Thermal Characterisation Technology	£299,943	£209,960

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Project description - provided by applicants

Understanding how materials and structures conduct heat, i.e. knowing their _thermal conductivity_ accurately is critical for designing structures that need to withstand high heat loads, e.g. high-power electronics and batteries. Inaccurate thermal conductivity data can lead to design flaws and consequently, devices that overheat and operate inefficiently or even cause accidents. For instance, had the Boeing 787 Dreamliner battery been designed with adequate thermal insulation parameters between cells, it would have prevented the cascading thermal runaway and the resulting fire.

However, measuring thermal conductivity can be very challenging, e.g. on thin films and composites which are increasingly used in various sectors including electronics, battery, aerospace and nuclear. Our technology solves this challenge and helps engineers and scientists to accurately determine thermal conductivity, for developing materials and electronics with improved performance and reliability.

Our technology, developed at the University of Bristol, is based on the transient thermorefectance (TTR) method, which uses lasers for measurement. Until now, TTR has had only niche applications as it required complex, expensive equipment, and considerable expertise. We radically improved the technology in terms of reliability, accuracy, applicability and user-friendliness, which made the technology suitable for industrial deployment. We recently started to provide measurement services with our lab prototype.

In this project, we will develop a mature, robust commercial platform design for thermal characterization instruments. During the ICURe market research we identified the manufacturers of composite heat sinks, thermal interface materials, printed circuit boards and battery thermal management systems as early adopters. They also have very similar technical requirements. Following this project, we expand into high-impact industries, e.g. aerospace, nuclear and semiconductor; our technology can be easily adapted to all these applications. Our vision is to become the first thermal conductivity measurement equipment manufacturer in the UK and help manufacturers of electronics, batteries, engines etc. to reach unparalleled efficiency and reliability.

While developing the commercial prototype, we will also focus on working with the early adopters to validate the technology using their products. Obtaining independent verification of the accuracy and reliability of our measurement technology is another key project goal; we will work with the National Physics Laboratory to become the gold standard of thermal characterisation.

Some companies already expressed their strong interest in purchasing a TTR instrument once the technology is proven, hence our objective is to deliver 1-2 units by project end. This will demonstrate the readiness and commercial potential of the technology to investors.

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