Innovate UK

# Results of Competition: ICURe Follow On Funding Round 3

## Competition Code: 1812_FS_CRD_CO_ICURE_R3

Total available funding is £1 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 |
|---|---|---|---|
| ImmuONE | The Inhalation Challenge | £288,728 | £202,110 |

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| Project description - provided by applicants |
| --- |
| We breathe over 23 000 times a day. Along with the air in each breath we take, there are other substances present, which are largely dependent on the environment we live in. The chemicals we breathe in depend on lifestyle choices (smoking, cosmetics), occupation (industrial chemicals, particulates), location (exhaust fumes, pollen) and health conditions (medicines). It is well known that certain substances can cause direct damage to the lung when inhaled (e.g. asbestos) or be taken up into the blood stream and cause toxicity elsewhere in the body. Therefore, every new chemical, particle and medicine that could enter the lungs must be tested for safety before it can be marketed.<br><br>The standard testing methods are both costly and inaccurate with a heavy reliance on the use of animals such as rats, mice and dogs. Human lung cells grown in the laboratory are also used but these are not suitably representative of complex lung tissue, hence the need for animal testing.<br><br>We have developed a novel laboratory human cell-based model (ImmuLUNG) using the two main cell types in the small airways of the lung. Immune cells and barrier cells have been grown together in the model to assess if substances enter the blood stream and measure the initial immune response of the lungs. Advantages over other existing lung models are that substances can be delivered to the cells as they would be when you breathe in (as an aerosol), more closely resembling human lungs, and the model is easy to assemble and use. This provides end users with a convenient and more accurate safety assessment, saving money by reducing the number of costly and lengthy animal experiments required.<br><br>This 12-month project will fund the set-up and development of a micro-SME, ImmuONE to commercialise this technology. Specifically, it will fund the innovators of the project who have developed the technology in the laboratory to realise its commercial potential in the life sciences industry. The technology will be validated against market leaders to demonstrate its advantage over existing technologies and we will invest in commercial product development for scale up and supply. The business model will be developed to determine the best route to market for the product (either direct sales or via licensing deals/partnerships with contract research and life science organisations). |

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| HOLIFERM LIMITED | Enabling the bioeconomy with a platform production and integrated separation technology | £298,300 | £208,810 |

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| Project description - provided by applicants |
| --- |
| For many applications biobased chemicals produced by fermentation have enhanced functionality compared to petrochemically derived products but are significantly more expensive to manufacture and are therefore only used in niche applications. Most surfactants in use in the cosmetic industry are currently oil-based irritants, and many in the agricultural market are toxic endocrine disruptors, with bans coming into place for some of these surfactants. There is also a strong customer driver for improved performance and green surfactants.<br><br>We have developed a technique to reduce production costs for biobased chemicals produced by fermentation by around 40%. Fermentations use microorganisms to convert renewable raw materials into a biochemical product in a large stainless-steel vessel. During fermentation the bioproduct accumulates, causing mixing and other problems, and resulting in the fermentation having to be stopped. The novel gravity-based separation system we have developed can recover the product as it is produced, preventing the negative effects of product accumulation and allowing process intensification. The use of the technology can triple the output from a given vessel, reducing capital expenditure requirements 3x.<br><br>This technology has been demonstrated fully for one biosurfactant product, sophorolipid, for which we have performed scale up trials in collaboration with several active companies. We are now scaling up the technology for industrial production and applying the technology across a whole range of lipid bioproducts.<br><br>In this project, we aim to reach a pre-industrial validation of our technology with sophorolipid with a system configured for industrial use and a 750 l bioreactor. Whilst other integrated separation technologies have often been shown to be successful at lab scale, few are scaled up due to cost and complexity, and while we have already reached pilot scale a pre industrial validation will be another important milestone. We will also aim to demonstrate a 50% performance improvement with a second bioproduct, mannosylerithritol lipids, at laboratory scale, and generate a proof of principle, with a third product, rhamnolipids. As importantly, we will be building a team capable of delivering this project and subsequently developing a successful business. This will allow our company to be derisked to a sufficient extent to attract significant financial investment, as well as fully paying clients. This project contributes towards facilitating a move towards a circular bioeconomy and increased UK productivity in line with the UK bioeconomy and industrial strategies. |

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| 4D MEDICINE LTD | 4D Medicine: Development of a lumpectomy device (a University spin out following ICURe) | £281,700 | £197,190 |

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| Project description - provided by applicants |
| --- |
| Over 55,000 people in the UK are diagnosed with breast cancer annually. The original treatment is mastectomy (complete breast removal), a massively invasive surgery that causes extreme aesthetic/cosmetic changes to the patient requiring follow-up surgical procedures to remake the breast, causing this cancer to be not only physiologically but also psychologically traumatic. Tumour removal from the breast (lumpectomy) conserves the breast but significantly changes the breast's shape, and ~ 26,000 women have lumpectomies annually (UK). (Breast Cancer Care, 2017)<br><br>The most frequently used method in lumpectomy treatment is to leave an open tumour-void, with the breast's shape sustained postoperatively by the fluid-filled void. However fluid drainage causes the void to collapse and the breast to dimple or appear collapsed This may cause pain and prevent healing. Additionally, post-operative radiotherapy is difficult to precisely target, increasing the patient's risk of secondary cancer.<br><br>The emerging segment of the lumpectomy market focuses on tissue marking/void occlusion, represented best by the Biozorb device (Focal Therapeutics) (other major market players include Cianna Medical, Hologic Inc, Dune Medical Inc, and Boston Scientific). The problems with these devices, represented by Biozorb, are:<br><br>*difficult to fit to patients: "I can't change Biozorb's shape if I need to, I'm stuck with whatever size I've got" (consultant oncoplastic surgeon)<br><br>*device appeal is limited primarily to women +45-50 years due a lack of any cosmetic benefit<br><br>*painful swelling and irritation at the implant site<br><br>4D Medicine has prototyped the 4DLUMP tissue marker and lumpectomy occlusion device to improve patient quality of life by accelerating healing and enhancing breast aesthetic/cosmetic restoration. The 4DLUMP device will:<br><br>* Maintain natural breast cosmetics<br>* Stimulate rapid healing and be replaced by native tissue over two years<br>* Improve x-ray targeting to reduce patient risk<br><br>Establishing 4DLUMP will increase patient uptake and acceptability in a younger age group, increase patient quality of life, and increase a patient's treatment options when dealing with breast cancer. |

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| Speak:Unique | Enhancements to Personalised Speech Synthesis | £299,605 | £209,724 |

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| Project description - provided by applicants |
| --- |
| A number of medical conditions can result in the inability to communicate naturally. These can be degenerative diseases, like Motor Neurone Disease and Parkinson's Disease, disorders present from birth, such as Cerebral Palsy; or the result of a brain injury, such as a stroke. Individuals that can no longer communicate naturally, often end up relying on a communication aid. This can be in the form of a tablet or a more specialised eye-gaze machine. These devices, whilst valuable, come pre-installed with a generic voice, that rarely reflect the age, gender or regional accent of the user.<br><br>Recent advances in speech synthesis technology, have made it possible to create a personalised synthetic voice by using a recording of an individual. Speak:Unique has developed technology that allows patients to record their voice before it is lost and use this in their communication aid.<br><br>The technology in its current state, does however, have a number of limitations. The first is that synthesis technology lacks the ability to control _how_ a sentence is said e.g. it lacks intonation, emphasis and emotion. These features can subtly alter the meaning of a sentence.<br><br>Secondly, the technology Speak:Unique has developed requires users to record their voice in a specialised facility in Edinburgh, Scotland. This puts obvious limitations on scalability and accessibility for patients.<br><br>This grant will deploy cutting edge technology to address these unmet needs and enhance Speak:Unique's offering. It will make them more user-friendly, scalable and accessible, allowing patients to retain an integral part of their identity by communicating in a voice that is identifiably theirs. |

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| GREEN BIOACTIVES LIMITED | Green Bioactives: commercial acceleration of a sustainable production platform for bioactive ingredients utilising cultured plant cells | £268,102 | £187,671 |

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| Project description - provided by applicants |
| --- |
| Green Bioactives, a University of Edinburgh start-up, have developed innovative strategies to produce plant-derived natural products utilising plant cell culture with full freedom to operate. These technologies can significantly improve the yields of target natural products in cultured plant cells. This technology platform can be employed to produce high quality natural product ingredients for the cosmetic, pharmaceutical, food and agricultural industries. An ICURe funding award to Green Bioactives provided invaluable market intelligence. Green Bioactives is currently engaged with leading companies to provide natural product ingredients for their respective product ranges. |

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| URBANCHAIN LTD | eChain: a Blockchain/AI-based energy trading platform to disrupt energy market | £267,481 | £187,237 |

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| Project description - provided by applicants |
| --- |
| UrbanChain aims to develop world-leading products and services by using blockchain/AI technologies to integrate services in utility sectors, such as energy, transportation and health. We aim to transform these markets, democratise their structure, and optimise and integrate services to reduce the costs for end users. We will initially focus on the energy sector where there are controversial market failures such as energy poverty, and non-competitive renewable energy market.<br><br>In 2015, 11% of English households were not able to keep their homes adequately warm (BEIS 2018), and the debts of the households to energy companies has reached £1billion (e-Ofgem 2017). In addition, treating the health impacts of cold homes is costing the NHS an estimated £1.36 billion each year (Age UK 2016). Furthermore, despite small-scale generators contribute to 25% of energy production, they only have access to 5% of consumers. There is now a business need to significantly reduce energy costs for end users and bring renewable energy generators into the mainstream market.<br><br>Our innovative platform solves the above problems as it directly links energy consumers to the renewable energy generators, and automatically switches the consumer's daily energy consumption to the best tariffs available within 10 minutes. The other innovative features of our platform are that it automates billing in real time and optimises demand and supply management with our integrated AI algorithms. Furthermore, our platform provides a competitive energy market for renewable energy generators to directly sell their energy to consumers. We will enable renewable energy generators to come to the mainstream market and provide energy as a service to end users.<br><br>The Innovate UK follow up fund will be used to conduct a premarket trail followed by commercialisation of our technology in the second phase. We will offer our product directly to end users, including households and SMEs, by the end of this project. Furthermore, we are willing to provide licenses to local authorities and social housing site managers to benefit from some features of our product. Private property managers will also be able to subscribe to our platform to trade energy and manage their energy trading at their own sites.<br><br>During the project, we will constantly publish our findings suitable for various audiences, and will inform Ofgem and other government-related bodies such as BEIS and Energy System Catapult about our activities. Our ultimate aim from this project is to increase the UK's productivity by eliminating the middlemen. |

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| VASCVERSA LTD | A novel vascular stem cell product ANGICYTE for regenerative medicine | £283,683 | £198,578 |
| CELL THERAPY CATAPULT LIMITED | | £12,709 | £12,709 |

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| VascVersa (Versatile Vascular Stem Cells for Regenerative Medicine)<br><br>Cardiovascular diseases are the top cause of death worldwide. There is an urgent need to find new treatments to repair damaged blood vessels as current approaches are not optimal. At VascVersa, we are committed to develop innovative regenerative medicine, and we have optimised a consistent way to manufacture highly pure vascular stem cells from a sample of blood. Our unique method of generation produces a stem cell therapy product ANGICYTE, of top quality with higher purity and superior growth capacity, when compared to other available cell products.<br><br>These vascular stem cells can be grown up in our laboratory to provide large numbers for treatment. As all tissue repair requires blood supply, ANGICYTE can be harnessed to target areas of blood vessel injury and promote repair of damaged blood vessels. We have experimental evidence that our Vascular stem cells can be used as a cellular therapy promoting new blood vessel formation. We are developing a novel cell therapy product ANGICYTE for regenerative medicine. In the first phase, we will use ANGICYTE to target wound healing as it was a key area of demand identified in our market research (through the ICURe programme) and includes diabetic ulcers, pressure ulcers, burns, wounds, and chronic non-healing ulcers; however, ANGICYTE can also be applied to other vascular diseases in the heart, brain, and limbs, and this will be the focus of our second phase. This Innovate UK grant will provide much needed start-up funding to allow us to spin out our company, develop our technology into a clinical grade product and meet with regulatory agencies that will guide the future development of these stem cells to effectively treat patients. |

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| ROBOTIC INSPECTIONS LTD | MAGNUS: A robotic inspection solution for hazardous and difficult-to-access environments | £210,167 | £147,117 |

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| Project description - provided by applicants |
| --- |
| **Opportunity**<br><br>Robotic Inspections Limited (RIL) has recently spun-out from the University of Leeds to commercialise a magnetic climbing robot for non-destructive evaluation and condition monitoring. Equipped with cameras (providing video and still images) and multiple sensors, this robot can undertake a broad variety of tasks, primarily inspections at height or in difficult to access locations.<br><br>Manual inspection of masts/towers, as with any tall infrastructure installation, is a hazardous occupation for those examining assets at height. RIL's robot technology provides a solution which will significantly de-risk this mandatory maintenance task.<br><br>Existing magnetic climbing robots on the market for condition monitoring and inspection work are too large to climb masts and towers, or unable to move around the supporting wires. RIL's robotic solution is small and highly manoeuvrable, meaning it can easily 'drive around' complex structures as it ascends the telecommunications mast. |

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| CIBUS ANALYTICAL LTD | Cibus Analytical - Empowering the fight against food fraud | £300,000 | £210,000 |

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| Project description - provided by applicants |
| --- |
| Food fraud costs British families £1.17billion per year according to National Food Crime Unit estimates. Due to the nature of adulteration, there are also increased food safety risks associated with consuming adulterated food and drink. Company revenue and brand reputations have been destroyed after implication in food fraud and safety scandals. The latest BRC global standards are pushing retailers to do more on authenticity/integrity testing. Conventional authentication methods are complex, laboratory based, require skilled operators are expensive and lack corroborative methodology. They are failing to meet the needs of the food industry stakeholders.<br><br>Cibus Analytical are looking to introduce an innovative step change in food fraud detection to address these issues, we are working on a two-tier approach:<br><br>* Customers will use handheld Near Infrared spectrometers to scan samples at point of sampling and will have access to cloud based chemometric models, that distinguish between authentic and adulterated commodities. Results will be delivered to their location in seconds allowing them to make informed decisions in a timely manner.<br>* Suspicious samples will undergo analysis at our laboratory using our spectroscopy and chemometric model based accredited methods. This will provide confidence and support to our customers in their decision making and will take a fraction of the time of conventional methods.<br><br>Within this project our aim is to develop and validate our first product offering, making our research more commercially relevant by creating a minimum viable product (MVP) to demonstrate our capabilities to customers and investors.<br><br>Specifically we will develop and validate our collection of chemometric models for food fraud detection and transfer these to a cloud based environment; develop the agnostic user interface that will automate data transfer, analysis and presentation of results for the field deployable device; validate the applicability of our product offering through a feedback loop of customer trials; develop and accredit the additional laboratory based chemometric models needed to corroborate in-field results. |