

Results of Competition: ICURe Follow On Funding

Competition Code: 1810_FS_CRD_CO_ICURE_R2

Total available funding is £1m.

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
ARCITEKBIO LTD	A new biotech process for xylitol production from ARCITEKBio Ltd.	£256,242	£179,369
Aberystwyth University		£32,055	£32,055
COST INSIGHTS LIMITED		£7,332	£5,132

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

Xylitol is a sweetener found naturally in fresh fruit and has 33% fewer calories than table sugar, inhibits tooth decay, is metabolised independently of insulin in the body, and as such has application in maintaining dietary, dental and diabetic health. While xylitol is present in plants, the quantities are so low that it is not economically feasible to extract it commercially and industrial production relies on chemical synthesis that uses acid, high temperature, pressure and a heavy metal catalyst to produce xylitol. Using proprietary microbes, the start-up company ARCITEKBio Ltd. has developed an environmentally friendly fermentation process to produce xylitol using crop waste such as wheat straw. The objective of this project is to enable ARCITEKBio Ltd. to scale-up the xylitol production process, validate the techno-economics of this industrial biotechnology (IB) against the traditional chemical synthesis method. Once the pure product is produced at scale, it will be shared with collaborative end-users for beta-testing and early stage regulatory assessments. With the market value for xylitol anticipated to reach £1 billion by 2025 and growing at a compound annual growth rate of 6.2%, ARCITEKBio Ltd is looking to secure further funding and partners within the supply chain to ultimately commercialise the IB-mediated production of xylitol in the UK and possibly further afield.

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MoniRail	Continuous railway track monitoring using passenger trains	£210,000	£147,000
University of Birmingham		£90,000	£90,000

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Project description - provided by applicants

This project looks to develop research undertaken over the last 10 years at the University of Birmingham into analysis of track data and its application towards predictive maintenance on the rail network. The project will develop commercially robust software and hardware that can collect and analyse track data to provide predictive track maintenance solutions that could significantly reduce delays on the rail network.

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FloodMap Live	FloodMap Live	£253,616	£177,531

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Project description - provided by applicants

FloodMap Live is a project which uses a combination of technological innovations to deliver continuous high confidence flood predictions at the street level, tailored to the needs of our customers. It is the first technology to offer highly-scalable flood nowcasting and forecasting products around the clock at high frequency, capturing every short-duration flood with high accuracy. This project addresses a major gap in flood predictions, saving lives and livelihoods. Our innovations include:

- * **Combined flood nowcasting and forecasting:** FloodMap Live utilises real-time weather nowcasts (<6 hours ahead) and forecasts (>6 hours ahead) for flood predictions. These are regularly updated and calibrated to deliver the most up-to-date predictions.
- * **Street-level resolution:** The system delivers high resolution products using FloodMap -- a leading academic software for flood inundation modelling. It has been widely used in many applications, including recently in New York City, Shanghai and Bangkok. These applications recorded high levels of accuracy using ground-truthed validation data.
- * **Real-time analytics and impact modelling:** Through years of research and development with key partners, we are establishing bespoke analytics and impact models to support our customers.
- * **Tailored visualisations:** The outputs of FloodMap Live can be delivered as a data feed, tailored alerts or visualisations over large spatial and temporal domains. These are continuously being developed together with our customers.

There is a growing need for cross-border early warning systems to strengthen the preparedness phases of disaster risk management. Our project will help improve the UK population, economy, exports industry and the quality of our aid delivery abroad.

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CellulaREvolution	CellulaREvolution: Bringing Continuous Processing to Cell Manufacture	£166,000	£116,200

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Project description - provided by applicants

There are a number of well-established and emerging commercial markets exploiting scientific advances in growing living cells to 'manufacture' new products, including pharmaceutical drugs, stem cells, gene therapies and cell-based meat. Companies working on these developments are addressing some of the major challenges facing the world over the coming decades, such as global hunger, global warming and pandemic threats.

Many of these applications rely on the use of adherent cells (cells requiring a solid surface on which to grow, such as the bottom of a culture flask). The standard approach to growing adherent cells has not changed in 50 years; cells are grown in batches, the size of each batch limited by the surface area upon which the cells are attached (e.g. flask size). Critically, traditional batch bioprocessing techniques for the culture of adherent cells cannot meet current demands (typical lot sizes are 10^{10} cells but needs in some markets are more in the range of 10^{30}) and is therefore a significant bottleneck to the future commercial potential of companies that produce or use adherent cells.

A radical departure from traditional engineering solutions is required, i.e. an alternative to simply increasing surface area by using microcarriers, hollow fibres or multi-layered flasks, as these approaches can never practically meet the growing demand. At CellulaREvolution we aim at establishing a revolutionary method to culture adherent cells in serum-free medium. Our novel approach is to move from the traditional batch culture (with its overly complicated ways to increase surface area) to a simple continuous culture system where cells are produced unremittingly. Our innovation facilitates such an approach for the first time.

In light of this, the current proposal will enable the setting up of CellulaREvolution as a business via the appointment of a CEO, hiring qualified team members, renting lab/office space, paying for consultancy, legal costs and further market research. Accelerating the company development at this stage, will help CellulaREvolution to attract private investors to financially support initial development and sales of its products.

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Augmented Insights	Beta Testing CareTech.AI	£275,440	£192,808

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Project description - provided by applicants

In the Industrial Strategy, the Government identified the care needs of our ageing society as a key concern. Technology enabled care (TEC), which uses technology, such as software tools and sensor based monitoring, to augment care has the potential to help meet these needs. TEC solutions are cheap and used by a growing number of care providers but there is a problem that limits their impact; TEC systems produce vast quantities of data and require time and expertise to use that care providers do not have.

Augmented Insights, a spin-out from the University of Warwick, will address this problem. Our product, CareTech.AI will use machine learning (another focus of the Industrial Strategy) to reduce the time and expertise needed to use TEC systems, improve the way they process data and enable TEC to truly impact society for the better.

We imagine Alice (86), who lives alone. Her daughter, Kate, worries about Alice's health. Alice receives daily care visits, paid for by her local council. She would like to reduce these but everyone else disagrees. Alice has recently had a TEC monitoring system installed so Kate can make sure Alice is OK. Alice's carers could use the system too but they don't because they lack the time and expertise required.

Now, imagine that the monitoring system used CareTech.AI. Using machine learning, CareTech.AI learns Alice's normal patterns of behaviour; that she always gets up at 07:00 and makes a cup of tea, for example. These patterns, rather than raw data, can be used by the care provider to tailor Alice's care and support Alice's independence by reducing the care visits she receives. If Alice gets sick and her behaviour changes CareTech.AI can alert Alice's carers who can schedule additional visits to meet Alice's needs.

CareTech.AI creates value for everyone:

- * Alice is more independent
- * Kate has more peace of mind
- * Alice's care provider have improved their productivity
- * Alice's care costs less for the council

Improving care for Alice and others like her is the motivation behind the development of CareTech.AI. During this project, we will run a 12 month test programme with three TEC system providers that we identified through our ICURe journey, and the care providers that use their systems, to ensure we deliver the right insight in the right way to care providers. We will also expand our team to address our skills gaps, de-risk Augmented Insights and secure further investment.

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ChromaTwist (to be formed)	A new class of fluorescent compounds	£299,965	£209,976

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Project description - provided by applicants

Fluorescent dyes absorb light at one wavelength and emit it at another. Such materials are widely used in consumer and commercial products in markets as diverse as lighting and displays, solar power generation, and in biochemistry and medical applications. A typical fluorescent dye will absorb short wavelength light such as ultraviolet (UV) and emit longer wavelength light, for instance in the visible region. The change in the wavelength between the absorbed and emitted light is known as the _Stokes Shift_. In general, in order to have a large Stokes Shift, dyes are based on molecules containing heavy metals, which are potential environmentally damaging and toxic. Many such materials are also quite sensitive to heat and light and degrade easily.

ChromaTwist Ltd, is a spin-out company from the University of Birmingham. We have developed a new class of fluorescent materials. These compounds do not contain metals, and have very high levels of thermal and photo-stability compared to current products, allowing them to be used in a wide variety of applications.

Despite the lack of metal in the molecule we are able to produce a very large and very flexible Stokes shift -- we can tune the output colour to cover the whole of the rainbow from blue to red. This together with the high stability makes these materials ideal for use in the _security inks_ market, where a long lifespan and a wide array of colours is ideal. Even more importantly the ability to process the materials at high temperatures allows us to provide solutions for polymer-based printing, such as the new plastic money.

The flexibility of the molecules also allows us to attach the dye to biological and medical probe molecules such as antigens and biomarkers. This combined with the lack of metals in the material, the high photostability, and the ability to tune both the exciting wavelength and the emitted light, offers much potential in the _biological imaging_ market

This InnovateUK project will help ChromaTwist to develop these compounds into commercial products. The funding will be used to scale-up the materials for beta-testing at potential customers, and then allow tailoring of the materials to meet customer specifications via their feedback.

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