Innovate UK

Results of Competition: Open 24 to 36 Months
Competition Code: 1606_LO_Open_R1

Total available funding is £5m

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
CAT International Limited Shakespeare Foundry Limited	Development and commercialization of 3D printed ceramic/refractory carbonized items	£557,616	£250,927

Project description - provided by applicants

3D printing or additive manufacturing has revolutionised prototyping in many materials, but has seen very limited adoption to ceramics. This is because ceramics need high temperature firing after forming. Even in advanced, controlled-atmosphere kilns, this is not an exact process. Items shrink and intricate details, essential for function, are lost. Some shapes can even cause items to crack or fail catastrophically. We have solved this problem by introducing resins and antioxidants, either during printing or by soaking afterwards. Upon firing, the resins form a network of carbon bonds that protect the item from shrinkage. This project seeks to exploit this proven concept to deliver filters for metal casting (improved product) and a bespoke casting filter design service for complex metal pours. Project results will be taken up by foundries to reduce defective castings caused by previously unfilterable impurities. Costs of this are not publicly available, although CLAN ceramic consultancy estimates it costs £87m to the £2bn UK foundry industry. We will also explore other applications in this project. It has hitherto been difficult to machine ceramics. Before firing, they are too soft and would lose form during firing. After firing, they are too hard to machine feasibly and prone to breakage. Our technology removes the need for machining, by allowing a precise shape to be formed and retained through the firing process. We have already identified kiln furniture (shelves and supports for items in kilns) as a potential application and will determine how and if we should access this market.

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Nuplex Resins Limited	Development of the first low energy, low heat resin for the powder coating of wood, plastic and both conductive and non-conductive metals	£280,371	£108,644

Project description - provided by applicants

Coating resins are a key ingredient in surface coatings such as powder coatings that enhance and protect almost all man-made consumer items and capital goods. Current powder coating resins all require extreme heat to cure to the object being coated - 400°C in hot flocking and 180°C electrostatically. As such the range of materials that can be powder coated is limited and the excess heat generated is both costly and inefficient. Furthermore, both processes involve chemicals deemed harmful to human health and are subject to increasing UK and EU REACH legislation. Utilising recently developments in our liquid coatings, we intend to develop an innovative, low energy, lower heat, crosslinking technology for powder coating wood, plastic and metals. Not only will this allow the coating of new materials, opening up new markets, but it also offers significant advantages over current resins both in performance - appearance, durability, chemical and mechanical resistance, compatibility with temperature sensitive substrates- and SHE-characteristics, avoiding highly toxic cross linkers, reducing the energy required and enabling for low cure temperature applications. Now is the time legislatively, environmentally and commercially, to develop a low energy, environmentally friendly resin and coating process that can be used on woods, plastics and all metals substrates at <120 °C temperatures.

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Arid Agritec Ltd Colloids Limited Lancaster University Brunel University London	Pesticide free global horticulture (via smart light controlling crop cover technology) (PURELIGHT)	£999,912	£773,764

Project description - provided by applicants

Whilst the universal adoption of pesticides has provided previously unheard of improvements in crop yields evidence increasingly suggests multifaceted problems linked with long term exposure to these chemicals; issues spanning society, economy, environment & human health. Policy driven commercial pressure is therefore mounting to develop more sustainable solutions for the control of economically important pests & diseases in edible crops. Global agriculture is addressing this problem largely via genetic modification of crops for improved pest resistance but this approach that cannot be easily scaled for the diversity of high-value crops grown by global horticulture (fresh fruit & veg) even if consumers would accept it; which is far from certain. However, the fact that many horticultural crops are grown under protection (primarily plastic crop covers) offers a potential solution. Our unique research shows that crop pests and diseases rely on the presence of very specific wavelengths of sunlight to function, reproduce and spread & the removal of these wavelengths from the growing crop provides levels of control comparable to chemical pesticides. To bring this technology to the global horticultural industry we first need to develop a cost effective, highly stable and wavelength specific light absorber capable of being integrated into current crop cover manufacturing processes which does not currently exist. This project seeks to develop and test such an absorber with the aim of revolutionising pest control in global horticulture and building lucrative markets for our absorber product in the global crop cover industry.

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GeoGreen Power Limited University of Nottingham Environmental Process System Ltd Positive Homes Ltd Solar Ready Ltd	Low-cost Efficient Ground Source Heat Pump Technology with Enhanced Heat Transfer (EfficientGeoTech)	£867,419	£685,319

Project description - provided by applicants

The overall aims of the project is to investigate the technical and commercial feasibility of a novel technology that would enable Ground Source Heat Pumps (GSHPs) powered by low carbon energy sources to become economically viable for a wide range of space heating applications. It creates a new commercial opportunity for UK industry addressing fuel poverty by making space heating cheaper. In this project, the proposed EfficientGeoTech system avoids expensive, large drilling rigs required for conventional borehole, the use of portable piling machines allows GHEs to be installed on otherwise inaccessible sites. The project will demonstrate to house builders and local authorities significant potential for reducing buildings' energy consumption. Such improvements would benefit future occupants by reducing their heating costs and thus improving their standard of living. The work will also help more broadly in enhancing public awareness that sustainable heating is feasible if technologies are properly developed. The key features, i.e. low cost, high efficiency, ease of production and installation, will help stimulate the building and energy technology market, increasing the strategic role in the UK economy and, creating more employment.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Berry Gardens Growers Ltd Russell IPM Ltd NIAB	Autonomous SmartTraps for remote monitoring Spotted Wing Drosophila in fruit crops	£733,444	£522,628

Project description - provided by applicants

The accurate monitoring of pests is vital to profitable crop and livestock production and to human health and optimises pest management through improved interventions. This project will develop a full SmartTraps system for remote autonomous monitoring of Spotted Wing Drosophila (SWD), an invasive soft and stone fruit pest that has increased the cost of production of soft and stone fruit by 10% in most production regions globally including in the UK. The SmartTraps system will rapidly and accurately identify the near microscopic SWD males and females amongst a myriad of non-target species attracted by a broad-spectrum lure, by machine learning image analysis in compact, autonomous, non-saturating (node) traps. The catch data from networks of individual (node) traps will be transmitted via gateway stations to the cloud, with real time cloud-based data integration accessible on the web and a variety of mobile platforms as an aid to scheduling management treatments for the pest. The feasibility of two of the key core processes in this system, automatically capturing images and identifying them, was demonstrated in Innovate UK project 131787 (completed 30 June 2016), an important technological development and advancement in science. The SmartTraps system will be a significant advancement in pest specific monitoring technology with wide application for numerous pests globally, establishing the UK at the leading edge of this new ground breaking technology with huge international market potential with diverse applications in agriculture, health and the environment.

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iXscient Ltd Brunel University Johnson Matthey PLC Lux-TSI Ltd Industrial Phycology Ltd	Laser Lighting for Algae growth and Water for the World (LIGHTWAY)	£821,153	£608,875
Project description - provided by applicants			
High efficiency solid state lighting (SSL), in the form of LEDs, is becoming the main light source for general lighting. Unfortunately LEDs cannot operate at high power without loss of efficiency, a problem which does not affect laser diode light sources. Algae growth and horticulture are areas where maximal efficiency with an optimal light spectrum is critical to achieving the lowest running costs. Laser diodes, correctly heat managed and integrated with spectrum selected, low cost phosphors capable of handling high light intensities, and integrated optics for channelling and spreading the light, offer a means of developing next generation light sources for plant growth. The project will integrate the technology components, including laser diode sources, their power supplies and heat management, new phosphor materials, designs for optical light guides and light spreading including the phosphors and their heat management, along with production techniques and integrate them into systems for submersible, full volume algae growth and area illumination plant horticulture. The prototypes will be installed and monitored in test sites for algae growth for waste water treatment and plant growth in an indoor farm.			

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Dunbia (Northern Ireland) University of Ulster	A novel approach to improving the nutritional content of beef for consumers	£946,276	£592,159

Project description - provided by applicants

Dunbia is an international food producer and a leading supplier of beef, pork and lamb products into the UK multiple retail sector and European markets. The company works closely with its customers to ensure the food it produces and supplies is of the highest quality for consumers. Continuous research and development, market insight and consumer intelligence drive our product innovation strategies. Dunbia is aware of its role in the production of great tasting, healthy and nutritious food, that meets and surpasses its customer expectations and the needs of consumers. This project seeks to develop a novel approach using advanced technology in the determination of the nutritional content of the food it processes. This is to support the development and launch of a range of red meat products which are of an improved nutritional content in regards to fat and salt. In addition to salt reduction and its substitution without detriment to taste and flavour, the project will seek to identify key nutrients within beef which are beneficial to nutrition and health and develop products which offer consumers informed choice in regards to the quality of the foods they wish to purchase and enjoy.

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Driscoll's Genetics Ltd Berry Gardens Growers Ltd University of Edinburgh	StrawGenSelect: Implementing genomic selection in cultivated strawberry for improved variety development	£917,007	£596,051
Project description - provided by applicants			
The UK strawberry industry is facing mounting challenges to its sustainability. The most significant challenges are: major increases in the agricultural living wage, increasing the costs of production in an industry where the main costs are labour; the reduced availability of seasonal labour; and the loss of many pesticides, leading to decreased yields, and increased resistance potential. To help meet these challenges, new varieties with larger fruit and greater yields are required to enable faster picking speeds and a greater return on investment for farmers. They must also have increased disease resistance to reduce the reliance on chemical inputs. Finally, to meet customer expectations and enhance consumer delight, new varieties must be attractive, with enhanced flavour and sweetness. The current methods of variety development are robust, but labour intensive and can be inaccurate. In order to make the breeding process more efficient, this project will implement a novel breeding method using genomic selection. The strategy involves using DNA information of all individuals in a breeding population, along with extensive measurements of fruit size, total yield, flavour, sweetness, and disease resistance. Statistical tests will be used to predict the plant characteristics by only looking at the plant DNA. In this way, decisions on which plants will be the best future varieties will be made more rapidly, leading to significant improvements in the appearance and flavour of the berries sold to consumers, a better deal for farmers, and more environmentally-friendly fruit production.			

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Mologic Ltd NIAB Berry Gardens Growers Ltd Warwickshire College	Semi-automated on-site quantification of airborne pathogen inoculum to predict the strawberry fruit rot risks	£782,230	£590,671
Project description - provided by applicants			
Reducing fungal fruit rot is a priority in strawberry production in the UK; annual economic losses due to fungal rotting are usually between £30 to £60M. Rot is mainly caused by Botrytis cinerea, Mucor spp. and Rhizopus spp., with their relative prevalence varying over time and growing site. Most strawberry production in the UK is under protection where the risk of fungal rot largely depends on the pathogen inoculum strength, and availability of susceptible tissues. Accurate risk prediction, and hence effective control of fruit rotting, is hampered by the difficulties in accurate and fast quantification of inoculum strength. This project will develop a device for semi-automatic quantification of multiple airborne strawberry pathogens and establish the relationship of both pre- and post-harvest rot risks with the quantified inoculum level. This will extend the marketable shelf life of individual strawberry lots and reduce fruit waste due to fungal rotting.			

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