Technology Strategy Board
Driving Innovation

Results of competition: Technology Inspired - Collaborative R&D – Biosciences

Total available funding for this competition was £7.4m from the Technology Strategy Board and BBSRC.

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
Asymptote Ltd (lead) Fibromed Products Limited	Development and testing of technology for the cryopreservation of hepatocytes in microtitre plates for subsequent screening applications.	£540,107	£321,063
Project description (provided by applicants)			
This project will develop a consistent, highly functional and biologically robust technology for the cryopreservation of cells in microtitre plates. These cells will be used in subsequent screening applications, for example drug safety testing. Many cell types are used for screening applications, with hepatocytes being widely used to investigate drug safety and metabolism in pharmaceutical research. Microtitre plates are used for screening; these plates have either 96 wells (200 µL per well) or 384 wells (25 µL per well). However, with the exception of robust cell types, cryopreservation of cells in microtitre plates is unsatisfactory. A high quality frozen product would be disruptive, lowering shipping costs considerably and giving greater flexibility to end users.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Extraject Technologies Limited (lead) SPTS Technologies Limited Swansea University Cardiff University	Novel therapies for skin pigmentation disorders	£493,032	£328,506
Project description (provided by applicants)			
Vitiligo is a disease characterised by a long-term loss of skin pigmentation where areas of skin (commonly on the face and hands) lose their natural colour. Vitiligo affects 65 million people worldwide and around 600,000 in the UK. The contrast in skin colour at affected sites can be very obvious and patients suffer significant social and emotional consequences including low self-esteem, social anxiety, stigmatisation and depression. Current drug treatments for Vitiligo are fairly ineffective and prone to side effects. Ultraviolet light therapy can improve the efficacy of the topical drugs but this requires a significant number of costly hospital visits and the positive effects are reversible. Many Vitiligo patients therefore chose surgical procedures such as grafting skin from healthy to diseased areas. These surgical methods can repigment the affected area but the invasive surgery often leads to scarring. In this project we adopt a new technology-inspired innovation to overcome many of the disadvantages of existing therapies and surgeries providing vitiligo patients with a new treatment option that is simple, safe and cost-effective.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Green Biologics Limited (lead) University of York	Flexible Engineered solutions for Xylose metabolism using synthetic biology (FLEX)	£465,246	£323,941

Project description (provided by applicants)

With concerns over the future of natural resources and energy security there is a growing need for the UK to develop renewable and sustainable sources of chemicals such as butanol, a key precursor in the production of paints, polymers and plastics. Bio-butanol can also be used as a biofuel, directly replacing gasoline or blended with diesel and with many advantages over ethanol. However in order for these bio-based chemicals to compete with oil derivatives we need to improve the range of cheap, sustainable feedstocks that can be fermented by solventogenic microbes, and the efficiency of this fermentation process. Current commercial processes require the use of extreme heat and harsh chemicals to convert agricultural waste material to simple fermentable sugars. This not only reduces the environmental benefits of renewables but also makes the fermentation of waste feedstocks less economic when compared with easier substrates such as starch.

We are developing microbial strains that are able to use agricultural wastes that have undergone less intensive pre-treatment procedures to produce bio-butanol with high efficiency, thereby reducing the environmental impact of harsh chemical and high temperature processes and reducing the competition for food crops as fermentation substrates.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Green Biologics Limited (lead) University of Nottingham	HIgh Productivity HOmofermentative Process for butanol (HIPHOP)	£498,000	£210,000
Project description (provided by applicants)			
Biobutanol is an important chemical intermediate used to synthesize polymers, coatings and bioplastics. Biobutanol is also an attractive advanced biofuel due to its high energy density and excellent blending characteristics with both diesel and gasoline. In this project, Green Biologics Limited has formed an interdisciplinary partnership with the University of Nottingham to demonstrate a novel biological manufacturing (fermentation) process for low-cost biobutanol that reduces production costs. Success on the project will help reduce global dependence on fossil fuels and petrochemical feedstocks and provide new technologies to underpin the sustainable bioeconomy.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
M Squared Lasers Ltd (lead) University of Strathclyde Fraunhofer UK Research Limited	Low-cost, ultrafast laser sources for biological imaging	£493,166	£354,261

Project description (provided by applicants)

The microscope market was 2.7bn in 2011 and is expected to increase to nearly 3.4 billion in 2016. Multi-photon excitation (MPE) microscopy is the imaging workhorse of life science laboratories. An ultrafast laser is at the core of any MPE microscope and the state of the art for this is the Ti:Sapphire laser. While its output properties are highly desirable for MPE, its optical pump lasers are based on a complex, multi-stage wavelength conversion process, making Ti:Sapphire very expensive (£150k) and often impractical.

This project will address these shortcomings by developing a low-cost laser for biomedical imaging. This will be achieved by leveraging recent advances in gallium nitride diode lasers emitting at 450nm (originally motivated by multimedia projection applications). Crucially, this laser will be suitable for OEM integration into microscope systems opening up new markets in comparison to status-quo where microscope and laser are discrete systems. The feasibility of this project has already been proven by means of a Technology Strategy Board feasibility study and an EPSRC KTA programme. This project forms an essential final step before commercialisation of the technology.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Naturiol Ltd. (lead) Unilever UK Central Resources Limited Bangor University Croda International Public Limited Company	Highly bioactive saponins from a cell culture approach	£387,954	£236,763

Project description (provided by applicants)

Many plants contain compounds called saponins, which get their name from a link to soapiness. These have many applications in food and healthcare products, and there is an increased awareness of the need to use plant derived materials wherever possible to replace those derived from petrochemical sources - reducing the exposure of people and the environment to potentially damaging side effects such as exposure to pesticide residues.

Each plant contains a different, often complex mixture of compounds; this project will exploit the fact that saponins derived from the fruit of common English ivy are chemically a relatively simple mixture that can be transformed into a single building block for many product applications. We have shown that the molecules in ivy fruit have very strong beneficial effects in the control of fungal infections in plants, animals and humans, and in controlling parasites such as those in the dangerous disease, leishmaniasis, which has a foothold in over 80 countries.

Although the application levels required for the compounds to be effective are very low, each market is potentially very large, and significant quantities of material would be required for any single product even at a modest market share. Ivy is very slow to fruit, and to justify the investment required to get a major new product to market a guaranteed supply of the raw material is necessary. The aim of this project is to provide an alternative, guaranteed supply by growing the cells in culture, initially in the laboratory, then in a commercial production facility, to provide the required material. This approach has been achieved, on a laboratory scale, for a related plant containing different saponins.