Business Interaction Vouchers Round 4 (January 2021)

PhotoBiopol: Photosynthetic bacteria for sustainable biopolymers production	
Lead applicant's name	Dr Konstantina Kourmentza
University/ research institute	University of Nottingham
Industrial partner	Douglas McKenzie
Company	Xanthella Ltd

In 2018, the total production volume of bio-based polymers reached 7.5M tons, representing 2% of the production volume of petrochemical polymers that almost reached 360 million tons worldwide. It is expected that production of bio-based polymers will continue to grow with a CAGR of 4% until 2023. Among current bio-based polymers solutions, polylactic acid (PLA) and polyhydroxyalkanoates (PHA) are leading the market with their production capacities estimated to respectively double and quadruple by 2023.

PHA is a family of biodegradable biopolyesters, which have recently attracted attention as an alternative to conventional petroleum-based plastics. They are produced by various microorganisms as carbon and energy storage materials and have a great market potential and various applications. They have been certified regarding their biodegradability in marine, freshwater, soil and anaerobic environments, approved as safe food contact materials, and are industrial and home compostable. Therefore, they can be used in food packaging, biomedicine, and agriculture, while its monomers are used as antimicrobial agents and chiral synthons.

The project underpins the remit of BBSRC IB, and one of the main HVB targets, as it aims to produce high value biodegradable PHA polymers, by designing a net zero carbon and economically viable PHA production process using purple photosynthetic bacteria (PPB) and optimizing photobioreactor (PBR) design, tailored for achieving maximum PHA productivity. We anticipate that our research will be at the forefront of developing an innovative and sustainable process of producing PHA polymers and have a significant impact on their wider commercialization, alongside with associated environmental, societal and economic benefits.

Validating a high-value, sustainable extraction process for bioactives from Suntory Blackcurrant waste stream in a model gut system	
Lead applicant's name	Professor Jeffrey Pearson
University/ research institute	Newcastle University
Industrial partner	Jon Farrimond
Company	Suntory Beverage and Food GB&I

Suntory is the 3rd largest beverage company globally, and aims to lead a sustainable drinks revolution. Suntory produce a lot of waste from the fruits and tea used for drinks production (including 150,000 tonnes blackcurrant pomace per annum from Ribena). This is currently used for low value applications. The main goal of this project is to prove the value of a new microwave based, sustainable extraction method for producing high value chemicals from waste.

Suntory have carried out 10 years of research into these extracts, showing high value applications in the health and wellbeing markets for extracts that have benefits for diabetes and obesity. But also for other applications including commercial dyes, industrial enzymes and environmentally friendly cellulose packaging. While these applications have been shown previously, we need to demonstrate that the new, extraction method can produce extracts with the same properties.

The current project based at Newcastle University will use chemical analysis, enzyme analysis, and testing in a patented model gut system that simulates the human digestive tract avoiding animal testing. This data will justify Suntory investing in the scale op of the sustainable extraction process by making a direct comparison between this and previous data.

If successful, this pilot scheme in blackcurrant pomace could be extended to all fruit wastes in Suntory and the results exported around the global Suntory network. This will help Suntory in their goal to move towards localised, close to source, circular economy in supply chains, using all fruit components for high value applications.