Proof of Concept 3

AWARDED MAY 2020

PROJECT TITLE	PROJECT SUMMARY	UNIVERSITY/ RESEARCH INSTITUTION	COLLABORATOR/S
Develop a computational tool for marine biofilm management	Computational biofilm modelling has potential as a rapid, low cost route to accelerate ship fouling control coating research & development. This project aims to develop a unique computational tool to predict experimental data on marine biofilm erosion, deformation and drag at meso-scale flow cell as a proof of concept.	Newcastle University	International Paint Ltd (AkzoNobel) and University of Southampton
Biofilm Production of Phaeodactylum Tricornutum for Fucoxanthin	A membrane-based bioreactor system utilising biofilm forming microalgae has been developed to solve the economic and biological bottlenecks commonly associated with conventional microalgal production. This study will establish the economic viability of this novel process using the model marine diatom Phaeodactylum tricornutum for the production of the high-value pigment fucoxanthin.	Plymouth Marine Laboratory	Varicon Aqua Solutions
Novel XF drugs in the topical management of Candida albicans biofilms	Oral fungal biofilms are common and responsible for a significant burden of infection in people. Successful treatment is hindered by biofilm resistance and limited numbers of effective antifungal drugs. This project will evaluate the novel XF drugs in combatting Candida biofilms and reducing their infection risk using mucosal mouth models.	Cardiff University	Destiny Pharma
Development of molecular support to Detect biofilm causing pathogens within chronic infections	The same species of microorganisms colonize skin and behave as pathogens. The biofilm phenotype has been proposed as a trigger for infection chronicity however organisms are not routinely screened for this. This project aims to identify genetic markers linked to biofilm that can be utilised by clinicians to detect biofilms.	University of Huddersfield	Perfectus Biomed Ltd
Rotating Spiral Biofilm Reactor for Reliable Engineering and Control of Bacterial Communities and Environments for use in industrial biotechnology	This project extends an existing technology based on rotating spiral channels to the challenge of harnessing microbial biofilms for sustainable production of valuable chemicals currently uneconomical to synthesise through alternative routes. The constructed prototype will act as an enabling technology and open up new markets for the industrial biotechnology sector.	University of Sheffield	Unilever

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Manipulation of gut biofilms dynamics for enhanced iodine bioavailability	Biofilm aggregates (diversity, function) influence nutrients bioavailability from complex food matrices. We will define how gut biofilm aggregates influence iodine bioavailability (nutrient of public health interest) from seaweed, an iodine-rich food. Defining how to sustain/ engineer these biofilms will enable the industry partners to develop safe evidence-based products.	University of Glasgow	Seaweed & Co
DNA origami nanostructures as a tool in the disruption of P. gingivalis biofilms	We aim to fight the bacteria that contribute to gum disease, by creating origami-like DNA nanostructures loaded with antibacterial enzymes or proteins. We will optimise the DNA origami to bind specifically to the target bacteria and to improve the penetration and disruption of the biofilms that they form.	University of Cambridge	Frontier IP Group plc
To incorporate a quorum sensing blocker (lactams) into wound dressing platforms to control biofilms	The general aim of this proof of concept of study is to develop and evaluate a pioneering wound dressing to be used as a new, smart technology for the effective management of biofilms in wounds, which has the potential to greatly enhance patient outcomes and reduce healthcare costs.	University of Liverpool	5D Health Protection Group Ltd, Penrhos Bio and Unilever
Biofilm disruption activity of absorbent sustained action alginate and iodine combined wound dressings	Potential methods to treat wound infections include using absorbent dressings containing alginate for antimicrobial sustained-release. Alginate-Iodine combinations have shown considerable promise against single-species biofilms. Here we evaluate disruption of persistent polymicrobial inter-kingdom and single-species wound biofilms utilising different formulations of absorbent sustained-action alginate/iodine dressings in abiotic and biotic biofilm models.	University of Nottingham	Io-Cyte Ltd and University of Southampton
Novel hybrid biofilm technology to remove nutrients from wastewater	Nutrient removal represents a significant challenge to the water industry, housing development and local economy, particularly in the Solent region. This project aims to demonstrate a hybrid biofilm system in a full-scale prototype plant achieving total nitrogen and total phosphorus concentrations below 5 and 0.5 mg/L, respectively, in treated effluent.	University of Southampton	Plantwork Systems Ltd
Dry surface biofilms, understanding their formation and development of a test model for preventative surface cleansers	Surfaces within a healthcare environment can be coated with potentially infectious organisms which survive by forming a dry biofilm. The project seeks to further understand the form and function of these biofilms whilst generating a test method to assess preventative surface cleansers.	University of Huddersfield	Genesis Biosciences

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Development of an in vivo wound model to assess the effects of biofilm formation and anti-biofilm dressings on single-cell spray-on skin therapy to promote healing	Spray-on skin therapy, using patient's healthy cells, is a novel technology for treatment of burns. However, this therapy can fail if infection develops. Antimicrobials may prevent infection, however, their effects on spray-on skin cells are unknown. This project will determine the effects of infection and antimicrobials on spray-on skin therapy.	University of Manchester	3M Healthcare
Assessment of the Effect of Electrolysed Oxidising Water on Biofilm Removal from Water Supply Systems in Food and Refreshments factories	Biofilms in water systems used in factories present a product spoilage and consumer health risk that must be controlled. Electrolysed oxidizing water (EOW) could offer an alternative to current approaches since it is non-toxic. This project will independently assess EOW for its suitability for implementation by Unilever in production facilities.	University of Manchester	Unilever
To develop a synergistic enzyme-antibiofilm composition to impregnate into a wound dressing to reduce slough and the biofilms in chronic wounds	To develop and evaluate a game changing (patent protected) smart enzyme-antibiofilm combination wound dressing the effective management of biofilms (via EPS breakdown) and slough (known to house biofilms, increase infection risks and delays wound healing) in wounds, helping to enhance patient outcomes and reduce healthcare costs.	University of Bradford	5D Health Protection Group Ltd, Penrhos Bio and Unilever