Proof of Concept 2

AWARDED JULY 2019

PROJECT TITLE	PROJECT SUMMARY	UNIVERSITY/ RESEARCH INSTITUTION	INDUSTRY PARTNER/S
Algae-powered MicroProcessors	We have shown that algal biofilms can generate small amounts of electrical power, which can be used to run small electronic devices. We aim to prove the concept that we can use a conveniently sized algal biofilm to power a microprocessor - a computer powered by algae.	University of Cambridge	Arm Ltd
Development of the first ESPRIT-AM antimicrobial self-sealing vascular access graft	Implanted medical devices improve quality of life for millions of people. However, a major complication of these devices is biofilm infection. Current implantable devices offer little resistance to biofilm formation. This project will develop novel anti-biofilm medical device coatings to reduce the incidence and severity of biofilm infection.	Nottingham Trent University	ESP Technology Ltd and Harman Technology Ltd
Enhanced biofilm detection methods and the use of UVC light in their remediation and control on historic buildings and artefacts	Biofilms growing on historic buildings and artefacts can cause serious damage, with critical implications for their conservation. This collaboration with Historic England will investigate novel on-site biofilm detection methods and the use of UV-C as a cost-effective, reliable and non-destructive remediation tool for many endangered historic buildings.	University of Portsmouth	Historic England and Isle of Wight Heritage Service, Isle of Wight Council
e-Biofuels from CO2 conversion using Microbial electrosynthesis	e-biosynthetic fuels from alternative resources rather than petrochemicals are essential to transition to a low carbon future with reduced green gas emission to tackle climate change, whilst meeting energy security. Microbial electrosynthesis is a promising way using microorganisms and renewable energy to convert CO2 to fuels and chemicals.	Newcastle University	Shell Research Ltd
Electrical Sensors for Environmental & Civil Engineers: In-situ online biofilm characterisation	Quantifying biofilms in drinking water pipe networks currently relies on removal of samples for laboratory analysis, which suffers from limits-of-detection, and is intrusive, costly and time-consuming. We propose a new electrical sensor to detect and quantify biofilms in-situ and in real-time, validating against current state-of-the-art laboratory measurements.	University of Sheffield	Environmental Monitoring Solutions Ltd, Water Industry Process and Automation & Control
Gas Plasma for the Prevention and Management of Osteomyelitis Biofilms	Osteomyelitis is a biofilm infection of bone which is difficult to treat. This project will develop a novel laboratory testing model to evaluate and optimise a plasma treatment for osteomyelitis biofilm infections.	University of Hull	Adtec

PROJECT TITLE	PROJECT SUMMARY	UNIVERSITY/ RESEARCH INSTITUTION	INDUSTRY PARTNER/S
Examining the potential of pharmaceutical agents (XF-drugs) to prevent and proactively manage bacterial and fungal infections in a dynamic ex-vivo ocular model system	Antibiotic-resistant bacteria and fungi pose a significant threat in ophthalmic e.g. microbial keratitis, resulting in vision impairment and blindness particularly in lower- to middle-income (LMIC) countries. The purpose of this study is to examine the effectiveness of novel antimicrobial-drugs, against clinically relevant bacterial and fungal species in a model system.	University of Sheffield	Destiny Pharma Plc
In-situ Underwater Optical Sensors	There is a growing market in the Marine and Freshwater sector for in-situ sensors to monitor water environments. A significant bottleneck is rapid instrument failure due to biofouling of sensor windows. This project will: (i) create smart antibiofouling windows and (ii) modify and upgrade current sensors for underwater biofilms identification.	University of Liverpool	Chelsea Technologies Group Ltd
Branched functional polymers for disrupting bacterial biofilms	Biofilms in wounds and on medical devices are a major problem that prevent the treatment of infection. They are produced by infecting organisms and protect it from treatment with antimicrobials and antibiotics. In this project we are using nanotechnology to disrupt these films to expose the organisms to treatment.	University of Bradford	5D Health Protection Group Ltd
The effect of electrospun nanofibre diameter and conditioning film on controlling active biofilm formation in wound dressings	Biofilm formation leads to significant failure of wound dressings, due to poor nanofiber design. This prolongs healing and increases the risks of invasive disease. In collaboration with Hybrisan, we will fabricate nanofibers of different diameters changing their morphology (size/shape) improving antimicrobial properties and colonisation resistance of wound dressings.	Swansea University	Hybrisan
HullSense	We will design, build and test a working prototype biofilm sensor that will sense microfouling, in real-time on ship's hulls. This direct measurement of biofilm will allow in water hull cleaning to be correctly scheduled to: extend longevity of coatings, reduce fuel consumption and reduce green-house gas emissions.	Plymouth Marine Laboratory	Valeport Ltd
Development of new antibiofilm agents through repurposing of existing licensed drugs	We have recently demonstrated the potential to repurpose existing drugs already used in human medicine as antibiofilm agents. This project will provide a comprehensive screen of available drugs to identify the best candidates for repurposing as antibiofilm agents, with an initial focus on catheter associated urinary tract infection.	University of Bath	Public Health England and King's College London
Detection of biofilms that give rise to wound infection; development of a prototype point-of-care device based on rapid detection and analysis of microbial volatiles	Wound infection results in poorer outcomes for patients and higher costs for the NHS. We aim to detect the gases produced by microorganisms that cause wound infection using nanomaterial-based sensors. This proof of concept device could potentially lead to future production of a novel point-of-care diagnostic tool.	University of the West of England (UWE), Bristol	University Hospitals Bristol NHS Foundation Trust

PROJECT TITLE	PROJECT SUMMARY	UNIVERSITY/ RESEARCH INSTITUTION	INDUSTRY PARTNER/S
Impact of ozone application on Listeria monocytogenes biofilms on drain covers under food processing-relevant conditions	Listeria monocytogenes is a food-borne bacterium that can cause serious and sometimes fatal disease in humans. Food factory drains can harbour listeria biofilms, hence the need for thorough cleaning techniques. This project will test the extent of reduction of listeria by Anacail's high-dose ozone in factory-relevant conditions on drain covers.	James Hutton Institute	Anacail Ltd
Bacterial networking; why it's not always beneficial to build bridges and make connections	Bacteria in wastewater treatment works can form complex network-like structures that can be detrimental to the treatment process. In this proof of concept project, we will perform experiments and computer simulations to understand the mechanisms by which these structures form. The insight gained will help us inhibit their occurrence.	University of Edinburgh	Veolia UK
Developing passive RFID technology to monitor Candida albicans biofilm growth on medical devices	Pathogenic yeasts can grow as biofilms on materials used to make medical implants, this represents a significant infection risk to vulnerable patients. We will develop methods to detect biofilm growth on medical devices within patients and in real-time using radio-frequency identification (RFID) technology, which will improve diagnosis and treatment.	University of Kent	Smiths Medical International Ltd
Label-free Multimodal Imaging Platform for Detection of Biofilms	Biofilms are groups of bacteria that are very difficult to detect. We're combining powerful chemical and molecular technologies in a volumetric imaging platform to analyse biofilms quickly through their unique characteristics. This will help in diagnosis, treatment avoiding anti-microbial resistance and remove or promote biofilms in health and industrial applications.	University of Southampton	M Squared Life Ltd and University Hospital Southampton
Rapid Screening Platform for Shortlisting Coatings Against Infection	Urological devices are widely used to treat kidney stones, tumours, and incontinence. However, they significantly suffer from biofilm formation, causing severe side effects. Here, we will develop the first microfluidic platform for rapid screening of coatings that prevents/addresses biofilms, enabling development of safer urological devices and with wider potential applications.	University of Southampton	Public Health England and Center for Biofilm Engineering (CBE), Montana State University
Advanced Biofilm Removal mediated by Targeted Microbubbles Generated by Fluidic Oscillation	In this proposal we will develop an innovative multidisciplinary approach to identify key components of bacterial physicochemical characteristics of both static and dynamic biofilms, which will provide a biomarker for biofilm stability and a target for biofilm removal using our patented novel technology of microbubbles generated by fluidic oscillation.	University of Sheffield	Perlemax Ltd
Automated in-situ detection and monitoring of marine biofilm erosion and mechanical properties via custom Optical Coherence Tomography	This project aims to adopt a uniquely designed automated in-situ testing rig to detect and monitor marine biofilm erosion and study their mechanical properties. This would address the influence of biofilms on the drag on marine vessels with the aim of improving development of anti-fouling coatings to reduce fuel costs.	Newcastle University	International Paint Ltd (AkzoNobel) and University of Southampton

PROJECT TITLE	PROJECT SUMMARY	UNIVERSITY/ RESEARCH INSTITUTION	INDUSTRY PARTNER/S
Validation of the Oxi-Cell Ozone System for the Elimination of Biofilms	Oxi-Tech have developed the ozone producing technology Oxi-Cell to combat bacterial biofilms. Oxi-Cell is fitted in-line to water systems to inhibit microbial growth. To validate this technology and facilitate the commercial uptake of Oxi-Cell, we will quantify the antimicrobial effects of this system on planktonic and biofilm populations.	University of Southampton	Oxi-Tech Solutions
Plasma for the prevention and management of chronic wound biofilms	Chronic wounds are costly to treat and significantly affect a patient's quality of life. Bacterial biofilms (specific bacterial structures) play an important role in chronic wounds, and are responsible for many antibiotic treatment failures. This project will test an exciting new technology to remove wound biofilms and promote healing.	University of Hull	Fourth State Medicine
Development of a non-thermal plasma applicator for the decontamination of medical endoscopes	This project will develop a novel non-thermal plasma applicator system for the decontamination of medical endoscopes during re-processing within hospital facilities. This addresses the current clinical and economic need to ensure that endoscope devices are free from the risk of cross contamination and potential infection for patients.	University of the West of England (UWE), Bristol	Creo Medical Ltd and Pentax Medical
Standardised complex wound biofilm models - a robust antimicrobial screening tool	Biofilms are rarely found comprised of one single type of microorganism, yet the development of new antimicrobials tends to focus on testing one bacteria. This project aims to develop methods and testing platforms that will allow industry partners to develop effective anti-biofilm compounds using a platform representative of wounds.	University of Glasgow	BluTest Laboratories
Rapid Early and Accurate Diagnosis of Wounds	To feasibility test an optical-fluorescence-based detection technique that seeks to quantitatively detect bacterial biofilms in infected wounds against a complex background of normal flora, and determine antibiotic susceptibility. The rapid single-step test, implementable at the bedside, can potentially transform wound care through improved clinical outcome and reduced costs.	Loughborough University	Smith & Nephew Ltd
Commercialisation of a burn wound biofilm model to provide a new service for pre-clinical research and testing in academia and industry	Biofilm formation in burn wounds is associated with treatment failure, poor clinical outcomes, and development of chronic non-healing wounds. This project will develop a UKAS-accredited pre-clinical model of burn wound infection, that can support both early-stage and commercial development of new products to control biofilm formation in wounds.	University of Bath	Perfectus Biomed Ltd