Proof of Concept 1

AWARDED OCTOBER 2018

PROJECT TITLE	PROJECT SUMMARY	UNIVERSITY/ RESEARCH INSTITUTION	INDUSTRY PARTNER/S
Managing Aquatic Biofilms via Surface Manipulation	Biofilms within distribution pipes present a major risk to drinking water safety. In marine environments, coatings have successfully altered surfaces to mitigate biofilm risks. This project explores the novel application of marine-coatings to drinking water pipes to prevent/limit and manage biofilms by comparing biofilm behaviour using innovative analytical techniques.	University of Sheffield	International Paint Ltd (AkzoNobel) and Dŵr Cymru Welsh Water (DCWW)
Accelerating Antisense PMOs to the Clinic	We plan to hijack a mechanism used by bacterial pathogens to uptake essential nutrients, to deliver synthetic RNA fragments which can switch off the expression of specific genes required for survival and kill these pathogens in a biofilm. This innovative technology could potentially have a strong impact in combating AMR.	University of Nottingham	Belfry Therapeutics
A model oral system for oral healthcare risk assessment	Hundreds of microorganisms live in the mouth, many are harmless while others cause caries and gum disease. This project will utilise an in vitro model system to investigate how oral hygiene products may affect this complex oral microbiome to better predict product efficacy.	University of Southampton	Unilever Safety and Environmental Assurance Centre (SEAC)
PlasmaHeal: cold plasma to control biofilms in wound dressings and at the wound/ dressing interface	Biofilms are a major problem in non-healing and infected chronic wounds due to their recalcitrance to immune clearance and antimicrobial agents. Cold plasma technology is highly effective against biofilm contamination. This project will bring together expertise in biofilms, wound care and plasma to develop a novel 'plasma activated wound dressing'.	University of Liverpool	5D Health Protection Group Ltd
BIOFILMer: a super-resolution platform for the analysis of crystalline biofilms in urological devices	Urological devices are widely used in the clinic to treat kidney stones, tumours, and incontinence. They however suffer from biofilm formation, causing severe side effects. In this project, we will establish the first platform for super-resolution analysis of biofilms in urological devices, enabling development of safer and biofilm-resistant treatments.	University of Southampton	Oxford Nanoimaging Ltd (ONI) and Center for Biofilm Engineering (CBE), Montana State University
Development of a Moving Membrane Bioreactor (MMBR) for the automated cultivation and harvest of algae grown as a biofilm	Many microalgal species are grown commercially to produce a range of sustainable bioproducts, with further product diversification hindered by high production costs. This consortia has developed a membrane based technology to cultivate algae as a biofilm, reducing production costs and opening the possibility to cultivate novel high value strains.	Plymouth Marine Laboratory	Varicon Aqua

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Development and evaluation of a dual function dressing to combat biofilm infection and exudatein chronic wounds	Dressings have been designed to separately address problems associated with chronic wounds including exudate (wound fluid) and biofilms (microorganisms growing on surfaces that are highly tolerant to antimicrobials). This project will assess the anti-biofilm efficacy of a newly developed wound dressing capable of absorbing high levels of exudate.	University of Manchester	Systagenix Wound Management
The effect of low frequency ultra-sound on urinary catheter biofilms: a crossover study	Finding ways to reduce infections caused by catheters (tubes) in the bladder is a top priority in the NHS. We have evidence that an ultrasound device (Uroshield) that clips onto catheters could prevent infections. In this study we will use proven methods to find out if it really works.	University of Southampton	Nanovibronix Inc (Ideal Medical Solutions UK)
New generation colour-encoded coatings for surgical tools with intrinsic antimicrobial action	This project optimises technology to produce intrinsically antimicrobial coatings for surgical tools. This addresses an important NHS-identified need for self-cleaning surfaces, combined with distinct colour and lustre required for end-user compliance within surgical theatres. Detailed surface chemistry and biological testing will accelerate commercialisation of existing IP.	University of Liverpool	Gencoa Ltd
Measuring biofilm formation in venous catheters	The placement of catheters into a patient's veins is widespread in hospitals, but poses a serious infection risk due to biofilm formation. We will measure biofilm formation on a range of catheters provided by Kimal, to determine how catheter design can be improved to reduce the risk of biofilm formation.	University of Edinburgh	Kimal Plc
Corneal biofilm models and anti-biofilm nanoparticles	Bacterial and fungal keratitis is a major problem in many low/middle-income countries (LMIC). There is a need for stable and affordable treatments that can control diverse eye infections. Antimicrobial nanoparticle formulations can provide the antimicrobial and physical properties needed to destroy biofilm structures without damage to sensitive eye tissue.	University of Sheffield	Tecrea Ltd and Blueberry Therapeutics
Low dose nitric oxide for the effective treatment of chronic wounds	Wounds that don't heal are associated with bacteria in communities known as biofilms which are resistant to antibiotics. We have shown that low dose nitric oxide can help disperse lung biofilms in patients with Cystic Fibrosis. This project will test whether nitric oxide can also disperse biofilms from infected wounds.	University of Southampton	Smith & Nephew Ltd
Blue light treatment of listeria under environmental conditions	Listeria monocytogenes is an important foodborne pathogen, causing recent fatal outbreaks across Europe and South Africa. Listeria can persist in food factories in biofilms despite sanitising procedures. Blue light (~405 nm) could be an additional operator-safe disinfection measure, however its impact against listeria in factory conditions is unknown.	Quadram Institute	Chilled Food Association

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Evaluating an innovative plasma (fourth state of matter) technology for prevention and management of biofilms in the food industry	In the food industry, increased resistance of bio-film-forming bacteria such as listeria has led to a need for new approaches for decontamination of food and food processing surfaces. This project will evaluate an innovative plasma (fourth state of matter) technology for biofilm prevention and management on food and hard surfaces.	University of Surrey	Fourth State Medicine Ltd
A novel laboratory biofilm model to accelerate the commercialisation of anti-biofilm products for the benefit of patients with chronic wounds	Organisation of bacteria as communities called biofilms in wounds delays healing. In the UK, currently one million patients live with the physical and emotional discomfort caused by non-healing wounds. This project will help bring to the clinic a unique, revolutionary cure that will accelerate wound healing by removing biofilms.	University of Sheffield	Neem Biotech and Welsh Wound Innovation Centre
Facile fabrication of a disruptive titanium technology using a polydopamine capturing platform	Titanium dental implants to replace damaged or missing teeth can sometimes get infected. We have taken inspiration from how edible mussels attach to rocks, jetties etc. by applying a thin film of the adhesive used by mussels on titanium. The film in turn can "hook" suitable agents to minimise infection.	University of the West of England (UWE), Bristol	OsteoCare
Biofilm Fluorescent Antibiotics Assay	The ability of antibiotics to penetrate the biofilm matrix is key to their clinical success, but hard to measure. We will assess a novel method to detect how well antibiotics penetrate biofilms in chronic lung infections. We will use fluorescently-tagged antibiotics within clinically relevant and UKAS accredited biofilm methods.	University of Warwick	Perfectus Biomed Ltd
Development of synthetic biofilm for calibrating the effect of coatings on reducing marine viscoelastic drag	Marine fouling biofilm contributes to thousands of tonnes excess fuel usage in the shipping industry. We will develop a test system that can more accurately predict how a coating may reduce biofilm viscoelastic drag to aid in the design and application of better, environmentally friendly coatings for marine vessels.	University of Southampton	International Paint Ltd (AkzoNobel)
QuorumClean	This project aims to develop a novel marine antifouling technology that outperforms conventional approaches, but with a reduced environmental impact. The approach works by disrupting cell-to-cell communication between marine microbes. Potential applications of the technology are diverse and include protection of ship hulls, marine sensors, desalination membranes and aquaculture infrastructure.	Plymouth Marine Laboratory	Unilever R&D Port Sunlight

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Advanced testing platforms to address key performance variables for antimicrobial products on domestic surfaces	Unravelling the effects of soiling events and surface chemistry on bacterial adhesion and biofilm formation over domestic surfaces under realistic environmental conditions. Moving away from model surfaces to add hierarchical levels of complexity: surface materials (hard surfaces initially) and biological inputs (single bacteria to multi-species colonies and associated soils).	University of Liverpool	Unilever R&D – Homecare Division
Treatment of zinc-contaminated slurry in steel production by BioElectrochemical Systems	In the steel industry, Basic Oxygen Steelmaking (BOS) generates significant amount of dust with high Fe contents. The presence of zinc limits Fe recovery as it would cause operational issues, leading to large amounts of dust being stockpiled. We propose a novel and sustainable BioElectrochemical System (BES) to tackle this challenge.	Newcastle University	Tata Steel Europe
Novel pharmaceutical agents (XF-drugs) to prevent and proactively manage bacterial biofilm and fungal infections in dynamic model systems	Antibiotic-resistant bacteria, particularly within biofilms and fungi pose a significant healthcare threat including respiratory conditions (e.g. Cystic Fibrosis) and chronic wounds such as diabetic foot ulcers (DFU). The purpose of this NBIC study is to examine the effectiveness of a novel antimicrobial-drug series in two mechanistically-distinct and clinically relevant model systems.	University of Southampton	Destiny Pharma Plc
Development of Next Generation synergistic antibiofilm treatments for wounds	Over 50% of chronic wounds develop localised infection due to biofilms, impeding wound healing. Current antimicrobials in wound care have limited effectiveness against biofilms. The aim is to determine the feasibility of combining new synergistic antimicrobial and antibiofilm agents into one formulation for incorporation into a hydrogel-based low adherent fibrous wound dressing.	University of Leeds	T-EDTA Ltd, Medipure Ltd and 5D Health Protection Group Ltd
Influence of phosphate dosing to prevent plumbosolvency on biofilm formation in drinking water distribution systems	Phosphate is added to drinking water to minimise lead dissolution from household pipes. However, phosphate, can favour microbial biofilm formation in drinking water systems. To optimise the way this chemical is used by water utilities we need to understand its impact on biofilm formation and on water quality and safety.	University of Sheffield	Dŵr Cymru Welsh Water (DCWW)
Biofilm evolution in microbial fuel cells fed Yeo Valley wastewater	Yoghurt production generates wastewater that requires considerable energy to clean. This project will look at cleaning dairy waste using bacteria that release electricity as a by-product. We will examine which groups of bacteria (biofilms) are best at producing power and where to find them in Yeo Valley's wastewater treatment plant.	University of the West of England (UWE), Bristol	Bio Loop