SCIENCE AND
INDUSTRY
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FUND

CASE STUDY OF IMPACT
December 2016

Creating versatile and simple ways to develop new, tailored materials for industry

CSIRO's Reversible Addition Fragmentation chain Transfer (RAFT) technology enables the development of new and advanced materials

The challenge

The ageing population with increasing life expectancy calls for improved, more efficient and affordable health care ranging from prevention, to early detection and safe treatment options. This includes new vectors for delivery of therapeutics and imaging agents, new responsive implantable biomaterials and scaffolds for regenerative medicine, wound care applications, and clinical diagnostic and laboratory devices.

To address these needs emerging polymer materials are being developed. Materials developed to date are predominantly designed to have suitable properties (e.g. elasticity, durability, degradability) and to be biologically inert or "passive". Further work is being done to develop the next generation of polymeric materials capable of promoting desired biological responses such as targeted delivery, interaction with specific cell and tissue types, or programmed cell responses.

RAFT technology is providing advances in multiple research areas, including in the treatment and management of breast, prostate, colorectal, and lung cancer.

CSIRO's Reversible Addition Fragmentation chain Transfer (RAFT) polymerisation technology makes it possible to produce an unlimited range of tailored and high performance materials with complex structures. The ongoing challenge is to work with partner organisations to use this existing technology to develop materials that are more functional and controllable, require less active ingredients, overcome previous technical challenges, and are more environmentally sustainable.

The response

The RAFT for Biomedical project funded by SIEF aims to use the versatility of the RAFT process to help deliver the next generation of polymer based materials for the Australian biomedical industry.

Through a SIEF-funded project, CSIRO was able to engage with organisations such as University of Washington, O'Brien Institute, Cochlear, Plant Innovation Ltd, and other partners in the pharmaceutical industry to develop innovative uses of this polymerisation technology.

The technology has been successfully applied to developing polymer coatings that modify the surface of implantable materials (such as those used by Cochlear's hearing implants); the joining (conjugating) of antibody fragments to one or more cytotoxic drugs which can be released to treat cancer; providing proof of concept for a new test (immunohistochemistry assay) for the presence of antigens in tissue sections containing tumour cells; and developing a new drug delivery mechanism for therapeutic drugs.

Additionally, the fundamental science developed through the project is informing a range of biomedical materials opportunities such as the development of new diagnostic systems, medical imaging applications, and wound care and stimuli responsive scaffolds for regenerative medicine.

The impact

This current RAFT research has resulted in important advances in polymerisation research and important potential health benefits for the broader Australian community.

Based on conservative valuations, the net present value of benefits of the RAFT project to 2035-36 is $48.44 million. The project has a benefit-cost ratio of 11[1].

[1] ACIL Allen Consulting. 2016. SIEF Impact Case Studies. Canberra: ACIL Allen.

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This case study was developed by ACIL Allen and CSIRO in 2016 as part of an overarching review of SIEF's Impact.