MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Catalyst Fund – 2017 Catalyst Strategic Call (Australia) Successful Proposals

Short Title	Key Organisations	Term (year)	Total funding (excluding GST)
Disruptive Technologies from Metal-Organic Frameworks	Massey University, CSIRO, University of Canterbury, University of Auckland, University of Otago, Revolution Fibres Ltd	2017-2020	$1,500,000

Summary

Porous materials have fascinated humankind since the ancient Greeks discovered zeolites: stones that could liberate water when heated. In more recent times, porous materials have become the bedrock of high-tech applications ranging from the petrochemical and pharmaceutical sectors to providing innovative solutions to the renewable energy sector.

A revolutionary new class of porous materials has recently transformed the scientific landscape. Known as metal-organic frameworks, these materials have properties that surpass conventional materials, including ultra-high surface areas and pore spaces that can be tuned to specific applications.

A cross-institutional cluster of high-profile researchers interested in metal-organic frameworks has emerged in New Zealand. Together with industry partners, we will forge a strong collaborative relationship with world-class scientists from Australia's premier scientific research organisation, CSIRO.

Our NZ-based team is primarily focussed on fundamental aspects of metal-organic framework chemistry, such as framework design, synthesis and characterisation. The CSIRO team has an industry-facing approach, and concentrates on the technological applications of metal-organic frameworks such as gas separation, sensing, and catalysis. They have facilities for producing metal-organic frameworks on an industrial scale. So an ideal complementarity exists between the New Zealand and Australian teams.

Catalyst funding will enable us to translate fundamental discoveries made in New Zealand into disruptive technologies by leveraging the research infrastructure and professional capabilities available at CSIRO. The disruptive applications that we plan to explore as part of this collaboration include new catalysts for eliminating nitrous oxide greenhouse gas emissions, materials capable of capturing carbon dioxide directly from air to mitigate global warming, and sensors that detect important trace biomolecules.

This grant will generate fundamental new knowledge, put the global spotlight on New Zealand science, and produce a trans-Tasman research ecosystem to allow some of New Zealand's most innovative companies to flourish.

Short Title	Key Organisations	Term (year)	Total funding (excluding GST)
New Zealand-Australia LifeCourse Collaboration on Genes, Environment, Nutrition and Obesity (GENO)	University of Auckland, Murdoch Children's Research Institute	2017-2020	$1,473,007

Good nutrition begins in early life and lies at the heart of health. New Zealand faces a crisis of over-nutrition and malnutrition (in other words, too much of the wrong foods), with a third of children and two thirds of adults overweight or obese, and an epidemic of inflammatory diseases of ageing.

The New Zealand-Australia LifeCourse Collaboration on Genes, Environment, Nutrition and Obesity (GENO) will create a powerful collaborative partnership between Australia's and New Zealand's leading child health research organisations, the Murdoch Children's Research Institute (Melbourne) and Liggins Institute (Auckland).

GENO will provide short- and long-term benefits to both countries through a world-class health systems biology capability that will augment our translational science capacities.

Over three years, GENO will:

- Leverage a state-of-the-art $A200 million Australian population resource that cannot be readily replicated within New Zealand, to mutual benefit.
- Synergise with the National Science Challenges "A Better Start" and "High Value Nutrition", which address diet-related health and disease from public health and food innovation perspectives.
- Take New Zealand's analytical capability in micro-nutrient platforms to the population level and to develop a holistic nutrition framework, which is vital to the country's future health.
- Lead discovery in networks between genes (organisation, expression, regulation), environment (diet), molecular physiology (metabolic, micro-nutrient phenotypes) and health (obesity, cardiovascular) across early- and mid-life.
- Offer PhD and post-doctoral opportunities that benefit from Trans-Tasman partnerships to develop New Zealand's future researchers in this area.
- Provide essential knowledge for next-generation translational research to improve New Zealand's nutrition, obesity and health.

GENO will generate enduring collaboration, novel knowledge and partnership, and strategic benefit to New Zealand's resources and capabilities, to improve the health of our children and future adults.

Short Title	Key Organisations	Term (year)	Total funding (excluding GST)
Myrtle Rust: a significant threat to Australasia and the Pacific	New Zealand Institute for Plant & Food Research, Department of Agriculture and Fisheries Queensland, New South Wales Department of Primary Industries, Scion, Wellington Botanic Garden, Royal Botanic Gardens Kew (UK).	2017-2020	$1,487,170

Summary

Plants in the Myrtaceae, a family predominantly found in the southern hemisphere, are at serious risk from several invasive plant pathogens including myrtle rust, Ceratocystis and Xylella, currently spreading throughout the world. The Myrtaceae include iconic native plant species such as pōhutukawa, rātā mānuka and kānuka, as well as several economically important species (forest eucalyptus species, guava and feijoa), and form the basis for New Zealand's valuable and growing mānuka honey industry.

All New Zealand indigenous Myrtaceae species are treasured as taonga by Māori, who have used, and continue to use, the properties of some species.

In early April 2017, myrtle rust was reported on Kermadec pōhutukawa trees on New Zealand's Raoul Island. In Australia, where it established in 2010, myrtle rust has extended its host range to over 350 species and is now found in numerous native ecosystems. Its impact on seedlings, saplings and mature trees/shrubs ranges from minor leaf spotting, varying degrees of defoliation, dieback and sometimes plant death.

The world-leading biosecurity capabilities of Australia and New Zealand will be linked by an ongoing collaboration between Plant Health Australia and New Zealand's Better Border Biosecurity. Building on the extensive knowledge of the myrtle rust invasion of Australia, this collaboration will engage with iwi, and regional/international initiatives including the Māori Biosecurity Network, to prevent the establishment of plant pathogens in New Zealand and to mitigate impact on valued plant species should
they establish.

In consultation with a range of end-users, but especially the Ministry of Primary Industries and the Department of Conservation, we plan to undertake research on key New Zealand plant species to:

- establish their susceptibility to myrtle rust;
- improve knowledge for effective seed (germplasm) storage systems; and
- develop rapid in situ plant pathogen detection/surveillance systems.

More broadly, biosecurity awareness and surveillance programmes within the region will be enhanced.