



# VICTORIA PRIZE FOR SCIENCE & INNOVATION

## VICTORIA FELLOWSHIPS

—  
2021

**VICTORIA**  
State  
Government



# MESSAGE FROM THE MINISTER

Victorian scientists and researchers are the driving force behind innovation in our State, and they deserve our heart-felt praise and recognition for their ongoing achievements.

Over the past 20 years, Victoria has developed a globally competitive research and innovation ecosystem which has enabled some of the nation's, and the world's, best researchers, entrepreneurs and businesses to succeed.

Our innovation capabilities have helped us build one of the strongest economies in Australia and made Victoria one of the best places to live, study, work and do business. And, as the last 20-months has shown us, Victoria's innovation ecosystem is vital to our collective success and resilience.

It is through the efforts of our world-leading researchers, our outstanding clinical trial capabilities, the agility of our advanced manufacturing sector and our engineering sector that Victoria has both prevailed and played a leading role in the global fight against the COVID-19 pandemic.

Now, as we look ahead towards our recovery, it is clear our ambitions must go beyond restoration and extend to game-changing improvements which will help rebuild our State, create jobs and a brighter future for all Victorians.

Critical to our State's future are people like yourselves. People that will enquire, test and develop the treatments and technologies of the future, ensuring our State is ready to rise to meet whatever challenges the future may bring.

Since 2013, the Victorian Government has proudly partnered with *veski* to recognise the extraordinary contributions scientists make to Victoria and the global community.

The Victoria Prize for Science and Innovation and the Victoria Fellowships honour the outstanding skills of individuals in the fields of science and innovation technology.

These inspiring Victorians are not only making their mark on the world right now, they are paving the way for the next generation of researchers and innovators.

Congratulations to this year's Victoria Prize recipients and Fellows. Thank you for your unwavering dedication to your work and to improving lives here and around the world.



**The Hon. Jaala Pulford MP**  
**Minister for Innovation, Medical**  
**Research and the Digital Economy**



# VICTORIA PRIZE FOR SCIENCE & INNOVATION

## Physical Sciences



### Distinguished Professor Christopher Berndt

#### Swinburne University

As the Director of the Australian Research Council (ARC) Industrial Transformation Training Centre in Surface Engineering for Advanced Materials (SEAM), based at Swinburne University, Professor Berndt's innovative work has focused on advancements in 'surface engineering', in which he is a global leader.

Given the estimated cost of wear and corrosion is 4-5 per cent of gross domestic product in nations such as Australia, surface engineering generates important economic and environmental impacts. Coatings formed by a manufacturing process known as 'thermal spray' impact industrial applications that experience demanding operating environments, for example, in mining, power generating equipment, and heavy industry. The global thermal spray coating market exceeds US\$10 billion.

Outcomes of Professor Berndt's achievements in building reliable surface engineering capabilities and technology boost Victoria's international access to markets, and therefore Australia's position in advanced manufacturing. Professor Berndt's work supports business models in aerospace, mining and minerals processing, oil and gas, and power generation. Further, he has championed the manufacture of thermal spray biomaterial coatings for orthopaedic implants.

Among the key advancements to come from Professor Berndt's research are the world's first, high quality thermal spray deposited High Entropy Alloy (HEA) coatings, advanced High Velocity Oxygen Fuel (HVOF) coatings, and Liquid Thermal Spray (LTS) processes. His lab is the only facility in the southern hemisphere to further develop LTS and Australia's only research facility to explore the Extreme High Speed Laser Application (EHSLA). Berndt's co-authored review on HEA coatings has been downloaded 29,000 times since May 2020.

Professor Berndt's international reputation is highlighted through one key project. His team completed a unique data mining project of thermal spray materials to produce 'property-performance maps'. Classified as 'Material Genomics' this world-first relates properties of a surface engineering process to manufacturing processes and, thereby, enabling industry to make high-value decisions about manufacturing processes.

Professor Berndt is the recipient of many accolades. He has served several terms as President of the Australian Ceramic Society and is an Honorary Life Member. He was President, ASM International, the world's largest association of materials-centric engineers and scientists. He has been inducted into the Hall of Fame of the Thermal Spray Society and holds Fellowships in 6 professional societies.

A committed educator and teacher, Professor Berndt is a mentor and exemplar for early career engineers and scientists. Through the ARC's SEAM he leads 70 members from universities and industry throughout Australia with a focus on training industry-fit graduates. He unreservedly acknowledges the many mentors, colleagues and students who have truly inspired him, and continue to inspire him, to work in the amazing field of surface engineering, which 'covers everything'.

# VICTORIA PRIZE FOR SCIENCE & INNOVATION

## Life Sciences

### Professor Anne Voss & Associate Professor Tim Thomas

WEHI (Walter and Eliza Hall Institute of Medical Research)

Having spent more than 20 years at the Walter and Eliza Hall Institute (WEHI), Professor Anne Voss and Associate Professor Tim Thomas' pioneering research has led to a new chemical strategy to treat cancer. Their discoveries have uncovered key functions of the MYST family of proteins, which includes oncogenes. They have also validated the proteins as novel targets for anti-cancer therapeutics and led a collaborative team that discovered a new type of anti-cancer compound that 'puts cancer cells into a permanent sleep'.

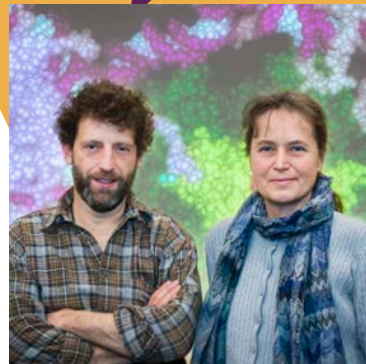
Working with the Cancer Therapeutics (CTx) CRC, researchers from the Monash Institute of Pharmaceutical Sciences (MIPS), CSIRO and St Vincent's Institute of Medical Research, Voss and Thomas have investigated ways to inhibit MYST proteins to treat cancer. A large chemical compound screen led to the development of inhibitors of the MYST proteins that have shown great promise in preclinical testing. This was followed by a collaboration with researchers from the Peter MacCallum Cancer Centre to expand the potential cancer spectrum that may benefit from MYST inhibitor treatment.

The research, conducted with their team at WEHI, identified the first class of anti-cancer compounds that cause some cancer cells to permanently exit the cell cycle (called cellular senescence) – putting cancer cells to 'sleep'. Crucially, in arresting tumour growth they do not damage the cells' DNA. This is a critical difference between this new class of compounds and standard cancer therapies, such as chemotherapy and radiotherapy, which work by causing irreversible DNA damage, causing collateral damage to healthy cells.

Voss and Thomas are international experts on the biology of MYST family proteins. Over three decades, they initially led research to discover the MYST family protein KAT6B, and later determined the biological functions of the other MYST proteins and their role in cellular senescence and cancer. These fundamental discoveries underpin their ongoing MYST inhibitor discovery project.

Over its history, Voss and Thomas's Victorian-based research initiative has attracted worldwide attention – generating landmark scholarly papers, including in leading journal Nature, and attracting global media coverage. They are inventors on the international patent protecting the first class of specific MYST protein inhibitors.

Voss and Thomas' achievements have been recognised by joint and individual awards. This year they received the 2021 Australian Academy of Technology and Engineering (ATSE) Clunies Ross Knowledge Commercialisation Award jointly with Professor Jonathan Baell at MIPS.



# VICTORIA FELLOWSHIPS

## Physical Sciences

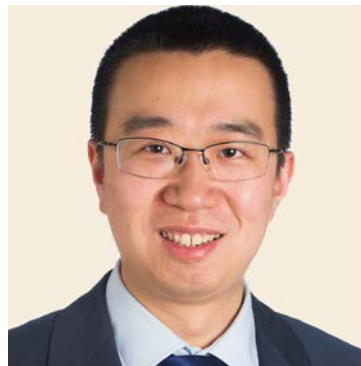


**Dr Marzi Barghamadi**

**CSIRO**

There is rapidly growing demand for higher specific energy in the battery technology market. Dr Barghamadi's work seeks to answer this challenge, with significant potential benefits for the transportation sector.

Dr Barghamadi has developed a deep understanding of all challenges facing lithium-sulphur batteries, particularly those related to the sulphur cathode, and her project team is investigating an advanced cathode formulation with potential to avoid capacity fading. One target application is for electric vehicles. She has also initiated a collaboration with the battery team at the Jet Propulsion Laboratory (JPL)-NASA to use the cathode formulation in batteries for space application in CubeSats, which shows promising performance in small scale battery cells. Dr Barghamadi will work with researchers from Helmholtz Institute Ulm & Centre for Solar Energy and Hydrogen Research Baden-Württemberg in Germany. This will give her access to world-class capabilities in prototyping and testing large batteries and post-mortem analysis.



**Dr Yi (David) Ju**

**RMIT University**

Dr Ju's research collaborations have developed innovative methods to characterise nano-bio interactions using plasma and whole blood models. However, there remain challenges to characterise protein corona compositions on soft nanomaterials due to the complex sample purification process for proteomics study.

Dr Ju's ongoing work will focus on developing techniques to isolate soft nanoparticles for protein corona analysis and a new kinetic model of nanoparticle-immune cell association. He will investigate how plasma variance among healthy donors influences protein corona formation. Further, gaining insights into downstream immune responses will be relevant to researchers in developing nanomaterials for biomedicine.

Dr Ju will engage with researchers at University College Dublin in Ireland and the University of Manchester in the United Kingdom to develop skills in areas relevant to nanoscience and nanotechnology.

# VICTORIA FELLOWSHIPS

## Physical Sciences



**Dr Raj Ladani**

**RMIT University**

Fibre-reinforced polymer composites are used extensively in aircraft. However, they are susceptible to cracking from accidental impact, potentially leading to in-flight breakup. Dr Ladani's innovative work involves tufting of shape memory alloy (SMA) wires through the thickness of composite joints, creating a new 3D composite that uniquely combines high resistance to cracking under impact with the ability to detect and repair cracks.

Dr Ladani's recent research shows that networks of 3D SMA wire can detect damage during flight. When detected, the damage can be repaired via thermal activation of the 'shape memory' effect of the SMA tufts. Future research will assess the effects of varying the SMA wire diameter, areal spacing and volume content on the manufacturability and mechanical performance of 3D SMA tufted composite. Working with leading collaborators at University of Bristol, National Composites Centre and University of Surrey, they will manufacture and test 3D SMA tufted composites and the thermally activated crack healing response.



**Dr Anna Lintern**

**Monash University**

While millions of dollars are spent to reduce waterway pollution, targets are not being met because conservation practices are not located in pollutant hotspots and are not maintained post-implementation by landholders. Dr Lintern's work focuses on building understanding of where to place conservation practices in the landscape to achieve optimal pollutant reduction, including how to identify the right locations in agricultural landscapes to implement conservation practices to meet water quality targets from a transdisciplinary perspective, a novel contribution to water quality research.

Dr Lintern will travel to the USA to build knowledge in statistical modelling of human behaviour and determining pollutant hotspots from high resolution spatial data. By engaging with world-class researchers at University of Montana and The Pennsylvania State University, she will gain insights in translating water quality management approaches into 'on-the-ground' practice and results.

# VICTORIA FELLOWSHIPS

## Physical Sciences



**Dr Faezeh Marzbanrad**

**Monash University**

Stillborn births and maternal mortality rates are higher in Aboriginal Torres Strait Islander & refugee communities than others; they are also higher in rural regions. Dr Marzbanrad's work aims to reduce these rates with mobile health technologies including foetal health monitoring systems.

Working with collaborators, at universities in the USA and Canada, Dr Marzbanrad will focus on optimising a low-cost doppler ultrasound technique for remote use by non-experts. Novel signal processing and optimisation algorithms will be developed for online tracking of the signal quality changes. She will also investigate screening for preeclampsia & other maternal complications. Integration of a novel approach using automated urine testing with maternal and foetal physiological monitoring will potentially provide a comprehensive pregnancy health assessment which can be performed remotely by non-experts. This study mission will provide mentoring from world experts in tele-medicine for rural health, and an opportunity to see technology in use in rural Guatemala.



**Dr Mohammad  
Saberian Boroujeni**

**RMIT University**

Escalating use of plastic has become a worldwide problem. Moreover, the COVID-19 pandemic has exacerbated the situation with unprecedented utilisation of single-use plastics such as personal protective equipment. Plastic waste disposal by incineration generates huge greenhouse gas emissions, adds to landfill, and pollutes rivers and oceans.

Dr Saberian Boroujeni's work looks at applications to repurpose and reuse waste plastics in road construction, signalling significant advances for civil engineering and sustainability as well as the circular economy.

Dr Saberian Boroujeni will visit East Carolina University, University of North Carolina Wilmington, and North Carolina Department of Transportation to investigate various types of waste plastics adopted for bitumen and hot mix asphalt modification applications, with experimental and field-trial evaluations conducted mainly in the United States.



# VICTORIA FELLOWSHIPS

## Life Sciences



**Dr Alexis Ceecee  
Britten-Jones**

**The University of Melbourne**

A clinician-scientist, Dr Britten-Jones' work focuses on genetic eye diseases. She is part of a University of Melbourne team partnering with the Centre for Eye Research Australia to establish a world-leading Centre of Excellence for gene therapy. Until recently, there were no cures for blinding genetic eye diseases. However, in 2020, the Therapeutic Goods Administration approved the first in-human gene therapy treatment for inherited eye conditions.

Using comprehensive genotyping and phenotyping data, Dr Britten-Jones' work seeks to develop a well-characterised cohort of individuals to answer specific research questions and find potential participants for future gene therapy treatment. Her study mission to the UK will expand international collaborations with organisations including the University of Oxford and Oxford Eye Hospital and foster relationships with industry partners. In addition, this mission will support future gene therapy research in Victoria.



**Dr Xavier Hadoux**

**Centre for Eye Research Australia**

Dr Hadoux's work in retinal hyperspectral imaging has developed a method to detect signs of Alzheimer's disease using a specialised camera with a rainbow-coloured flash. With new medications for Alzheimer's disease relying on early detection, his work has taken on further significance. Dr Hadoux's team has developed a low-cost camera to enable eye care providers around the world to access this new technology and has shared prototypes with leading European research groups.

Since making this discovery a range of new disease markers have been discovered, but there is still a vast amount of high-quality data to study. Dr Hadoux aims to build a collaboration with a leading image processing group in France, to accelerate further discovery of disease markers, and to enhance existing collaborations with researchers at Belgium's KU Leuven and Sweden's Umea University. Further knowledge exchange and high-calibre researcher recruitment will develop medical technology capabilities in Victoria.

# VICTORIA FELLOWSHIPS

## Life Sciences



**Dr Marios Koutsakos**

**Doherty Institute**

Dr Koutsakos' work strives to understand how the immune system recognises viruses such as influenza to inform the design and development of vaccines. During a viral infection or vaccination, immune cells interact to build immunological memory that provides protection when the virus is re-encountered. These cells can be found in lymph nodes as well as bone marrow. Although immune responses can be partly analysed in blood, it does not capture the complexity of immune responses in lymph nodes and bone marrow. Assessment of immune responses in these anatomical sites has been limited by difficulties in acquiring and isolating samples.

Dr Koutsakos will visit researchers at Washington University in St Louis, USA who have been acquiring and analysing samples from lymph nodes and bone marrow from people after influenza or SARS-CoV-2 vaccination and infection. His research will benefit from access to these samples, and he will build expertise in their handling, processing and analysis.



**Dr Kallyanashis Paul**

**Hudson Institute of Medical Research**

Situated at the crossroads of materials engineering and women's health, Dr Paul's doctoral studies have demonstrated a novel method of surgical implant design for treating Pelvic Organ Prolapse (POP). POP is a debilitating condition for around 50 per cent of post-menopausal women who have given birth. There is no optimal therapy for POP with commercial, non-degradable meshes banned in Australia and other countries since 2017.

Dr Paul's alternative treatments use innovative 3D printing. His team has discovered rare perivascular endometrial stem cells (eMSCs) showing their regenerative and immunomodulatory properties to enhance POP treatment. This advancement will be improved by the bioprinting of therapeutic eMSCs at the University of Otago. He will also spend time with researchers at National University of Singapore. Dr Paul's next focus will be the development of a robust 'bioink' to print and retain cells with their therapeutic value intact and assessment of other developed bioinks.

# VICTORIA FELLOWSHIPS

## Life Sciences



**Dr Roshan Selvaratnam**

**Monash University**

Ultrasound is the key approach for detecting foetal growth restriction (FGR), the strongest risk factor for stillbirth. Dr Selvaratnam's research has found this approach detects only one-in-five FGR-affected pregnancies, with unnecessary interventions and babies delivered prematurely. Measures flowing from his research, to be introduced in Victoria in 2021, will mark the first occasion that balance measures have been used in population stillbirth programs anywhere in the world, providing an opportunity for Australia to lead in the safe reduction of stillbirth rates.

Dr Selvaratnam's study mission to the University of Cambridge in the UK will help him identify placental biomarkers that improve both the sensitivity and specificity of the detection of FGR. These methods are the next step toward individualised antenatal care for women to improve pregnancy outcomes, potentially transforming stillbirth prevention strategies in wealthy countries with high rates of unwarranted induction of labour and caesarean section.



**Dr Ye Tian**

**The University of Melbourne**

Dr Tian works in neuroscience, specialising in human brain imaging. Victoria is one of two Australian states to invest in ultra-high strength magnetic resonance imaging (MRI), which provides more detailed images of a person's brain structure and function than conventional MRI scanners. However, the advanced image processing techniques and computational methods required to process and analyse these brain images is limited in Australia.

Dr Tian's research will establish Victoria's capacity to personalise mapping of human brain function using one of two ultra-high strength MRI brain scanners in Australia. She will train in cutting-edge methods for brain image analysis at the Wellcome Centre for Integrative Neuroimaging, building capacity for personalised brain mapping that will benefit Victorian neuroscientists, psychologists, biomedical engineers and clinical researchers. Dr Tian's research will also bring together advanced neuroimaging and computational techniques, building links between Victoria and the UK.



# RECIPIENTS OF THE VICTORIA PRIZE FOR SCIENCE & INNOVATION

## Year Recipient

2020 Professor Yi-Min (Mike) Xie  
Professor Kay Crossley

2019 Professor Anthony Burkitt  
Professor Michael Berk

2018 Professor Douglas MacFarlane  
Professors Andrew Roberts AM  
& John Seymour AM

2017 Professor Maria Forsyth  
Professors Jane Visvader  
& Geoffrey Lindeman

2016 Professor Min Gu  
Professors Jamie Rossjohn  
& James McCluskey AO

2015 Professor Calum Drummond AO  
Professor John Hopper AM

2014 Professor Frank Caruso  
Professor Ashley Bush

2013 Professor Lloyd Hollenberg  
Professor Alan Cowman AC

2012 Professor Ana Deletic  
Professor Terence (Terry) Speed

2011 Professor Andreas Strasser

2010 Associate Professor Voytek Gutowski

2009 Professor Murray Esler AM

2008 Professor Peter Colman AC

2007 Professor Colin Masters AO

2006 Professor David Solomon AM

2005 Professor Eric Reynolds AO

2004 Professor Keith Nugent

2003 Professor David Vaux AO

2002 Professor David Boger

2001 Dr Roger Francey & Dr Paul Steele

2000 Professor Donald Metcalf AC

1999 Professor Graeme Clark AC

## Research Area

(Physical) Architectural engineering  
(Life) Clinical sports physiotherapy

(Physical) Artificial vision  
(Life) Mental health

(Physical) Electromaterials  
(Life) Leukemia research

(Physical) Electromaterials  
(Life) Breast cancer research

(Physical) Nanophotonics  
(Life) Infection and immunity

(Physical) Chemistry  
(Life) Disease prevention

(Physical) Nanomedicines  
(Life) Translational neuroscience

(Physical) Quantum sensing technology  
(Life) Malaria research

(Physical) Storm water management  
(Life) Bioinformatics

Cancer cell research and apoptosis

Manufacturing technology

Cardiovascular neuroscience

A new class of anti-influenza viral drugs

Alzheimer's disease pathways

Polymer chemistry

Remineralisation of dental caries

Quantitative phase imaging

Programmed cell death – Apoptosis

Fluid mechanics

Greenhouse gas monitoring

Haematology

Hearing solutions: Cochlear implants

# VICTORIA PRIZE FOR SCIENCE & INNOVATION AND VICTORIA FELLOWSHIPS

## Victoria Prize for Science & Innovation

Created in 1998, the annual Victoria Prize for Science & Innovation and Victoria Fellowships program supports and recognises outstanding Victorian scientific research and innovation.

The prestigious \$50,000 Victoria Prize is awarded to outstanding Victorian researchers (in the life sciences and in the physical sciences) whose discovery or innovation, or potential discovery or innovation, has significantly advanced knowledge or has provided commercial or other benefits to the community. The Victoria Prize for Science & Innovation honours the life-long commitment and achievements of the recipients.

## Victoria Fellowships

The Victoria Fellowships encourage innovation and the commercial application of research among researchers in the early stages of their careers. Up to 12 researchers are awarded up to \$18,000 each to undertake overseas study missions offering Victoria Fellows the opportunity to broaden their experience, develop international networks and better understand where their activities fit into the local and international scene. A Victoria Fellowship also provides an opportunity to develop commercial ideas.

**For further information:** [www.veski.org.au/victoria-prize-fellowships/](http://www.veski.org.au/victoria-prize-fellowships/)

## Australian-French Association for Research and Innovation (AFRAN) Associate Awards

Victoria Fellowship applicants planning to study in France are eligible to apply for an AFRAN Associate Award (formerly the AFAS Associate Award).

AFRAN Associate Awards, valued at up to \$5,000, support study missions to France in conjunction with a Victoria Fellowship, and aim to facilitate science and technology innovations that are mutually beneficial to Victoria and France.

The AFRAN Associate Fellowships are supported by the Australian-French Association for Research and Innovation (AFRAN) and the Embassy of France, Australia.

# OTHER VICTORIAN FELLOWSHIP AND AWARD PROGRAMS

## Premier's Awards for Health and Medical Research

The Premier's Awards for Health and Medical Research recognise the exceptional contributions and capabilities of Victoria's emerging early career researchers in their PhD studies. The Premier's Awards include five category awards: Basic Science Researcher, Clinical Researcher, Aboriginal Researcher undertaking research in any field of health and medical research, Health Services Researcher, Public Health Researcher, with an additional award granted to the Premier's Excellence Award winner.

Current PhD candidates within a health and medical field who are at least two years into candidature at a Victorian academic or research institute, and post-doctoral researchers within health and medical field who have completed a PhD at a Victorian academic or research institute in the last two years, are encouraged to apply:

<https://djpr.vic.gov.au/medical-research/strengths/premiers-awards>

## veski innovation fellowships

The **veski** innovation fellowships bring Australian expatriates and leading researchers, with outstanding skills in science and innovative technology, typically in the top five percent of their respective fields, to Victoria.

Since 2004, **veski** has awarded 28 fellowships to scientists and researchers working across a range of basic, applied and clinical research fields from modern health issues such as cancer, dengue and obesity to innovative studies into nanotechnology and organic semiconductors.

Applications are sought from globally competitive individuals in the field of biotechnology, biomedical, advanced manufacturing (including food science and bioengineering), digital agriculture, cyber security, environmental and energy technologies, the enabling sciences and technologies, space and transportation.



