



VICTORIA PRIZE FOR  
SCIENCE & INNOVATION  
VICTORIA FELLOWSHIPS

2018



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# MESSAGE FROM THE MINISTER

## 21 YEARS OF EMPOWERING INNOVATION

Victoria has always been Australia's home of innovation.

Our reputation in scientific research, engineering and design, cyber security, life sciences and medical technologies supports this, and is a testament to the high quality of innovators and researchers that Victoria's universities and research institutions produce.

We recognise the commitment and creativity of our leading scientific researchers, and the many benefits of encouraging early career scientists to travel and develop networks overseas.

That is why the Victorian Government has been proud to support the Victoria Prize for Science and Innovation and the Victoria Fellowships over the past 21 years.

Scientific innovation is shaping the future of Victoria's economy and helping us to face the challenges of our time such as fighting diseases, farming in a changing climate, digital disruption, and the move from traditional manufacturing to advanced manufacturing.

By supporting research at key stages of the process, we're working toward a future where our state will be an end to end provider of global solutions – from their inception through to commercial reality – growing Victoria's international competitiveness and creating local jobs.

The Victorian Government is proud to have partnered with **veski** since 2013 for the delivery of the Victoria Prize for Science and Innovation and the Victoria Fellowships, continuing to support and recognise leading scientists and their contributions to the global community.

I would like to take this opportunity to thank the panel for their continued efforts in selecting successful candidates for the Victoria Prize and Victoria Fellowships, and the support of the Australian French Association for Science and Technology.

Congratulations to this year's Victoria Prize and Fellowship recipients, whose achievements shine a light on Victoria's world-leading capabilities. On behalf of Victoria and those that will benefit from your life-improving work, thank you for your unwavering dedication.



**Philip Dalidakis MP**  
**Minister for Innovation**  
**and the Digital Economy**



# VICTORIA PRIZE FOR SCIENCE & INNOVATION

## Life Sciences



### Professors Andrew Roberts and John Seymour

Professors Andrew Roberts and John Seymour have been awarded the 2018 Victoria Prize in recognition of their pioneering research that enabled a basic science discovery in Melbourne 30 years ago to be transformed into a breakthrough new anti-cancer drug for patients with chronic lymphocytic leukaemia worldwide.

Venetoclax is the first drug of an entirely new class of medicines to become routinely available for clinical use. Together Roberts and Seymour led the very first trial of this drug in humans, building on laboratory-based research by Roberts and colleagues at the Walter and Eliza Hall Institute that had established how the drug worked and identified which types of cancer were most promising for initial clinical trial testing.



With the first three patients to receive the drug in 2011, the remarkable potential for Venetoclax to rapidly melt away chemotherapy-resistant leukaemia was immediately apparent. Venetoclax is now approved all around the world for routine use in patients with chronic lymphocytic leukaemia that has returned or never gone away after initial treatment with chemotherapy. This is the first of many expected uses for this breakthrough drug which can work where conventional chemotherapy does not. Flowing from these discoveries, there are now more than 100 clinical trials underway around the world using Venetoclax alone or in combinations.

Professor Seymour is Director of the Department of Haematology at the Peter MacCallum Cancer Centre and the Royal Melbourne Hospital. He was awarded the Member in General Division of the Order of Australia and elected to Fellowship at the Australian Academy of Health and Medical Sciences in 2015. In 2011 he was the recipient of the Distinguished Alumnus Award from the MD Anderson Cancer Center, in Houston USA.

Professor Roberts is Head of Clinical Translation at the Walter and Eliza Hall Institute, Metcalf Chair of Leukemia Research at the University of Melbourne, and a clinical haematologist at Peter MacCallum Cancer Centre and the Royal Melbourne Hospital. He was (jointly) awarded the 2016 Eureka Prize for Innovation in Medical Research and he is currently Chair, Cancer Research Advisory Committee, Victorian Comprehensive Cancer Centre and Co-Chair, Global Research Awards Committee, American Society of Haematology.

# VICTORIA PRIZE FOR SCIENCE & INNOVATION

## Physical Sciences

### Professor Douglas MacFarlane

Professor Doug MacFarlane has been awarded the 2018 Victoria Prize in recognition of his recent discoveries in renewable energy conversion, based on his pioneering development of a class of new materials offering significant advances in renewable energy solutions for the future.

These materials, known as “ionic liquids”, are salts that are liquid at room temperature. Professor MacFarlane’s group has shown that they offer unique properties that are beneficial in a wide range of contexts, including green chemistry, and electrochemical devices, as well as biotechnology and medicinal chemistry. His discoveries are poised to have a significant impact on renewable energy opportunities for Australia, both in the local energy market and for export.

These include using ionic materials to efficiently produce ammonia from renewable energy sources. The technology developed by Professor MacFarlane’s group holds a world record by a very large margin for the efficient reduction of nitrogen from the atmosphere to ammonia, using renewable energy at room temperature. This development provides an urgently needed sustainable route to making ammonia for fertilisers. Moreover, it is recognised as the foundation of a viable energy carrier for export from the renewable energy rich areas of Australia to markets in Asia.

His work on the high-efficiency splitting of water to produce hydrogen as a store of renewable energy was published in top journals, including Science (2008) and Energy and Environmental Science (2012), as well as a suite of patents. This area is currently set to become a major renewable energy technology for Australia in the very near future.

Professor MacFarlane is a Professor of Chemistry at Monash University’s School of Chemistry. He was Head of the School of Chemistry at Monash 2003–2006 and Deputy Dean of Science 2000–2001. Professor MacFarlane was elected Fellow of The Australian Academy of Science in 2007 and Fellow of the Australian Academy of Technological Sciences and Engineering in 2009. In 2007 he was awarded an Australian Research Council Federation Fellowship and in 2012 an Australian Laureate Fellowship.





# VICTORIA FELLOWSHIPS

## Life Sciences



**Dr Cristina Giogha**

**Hudson Institute of Medical Research**

Shigella is a human specific pathogen, there are currently no appropriate methods for studying Shigella intestinal infections in vivo.

‘Shigella’ species are highly infectious bacterial agents that cause bacillary dysentery in humans that can lead to severe life-threatening complications including septicaemia and pneumonia.

However, technological advancements have now made it possible to use 3-dimensional miniature organ-like cultures called ‘organoids’ to study human diseases.

For Dr Giogha, this study mission to Weill Cornell Medical College in New York will provide training on how to perform highly efficient gene-editing on complex intestinal organoids, which is not currently performed in Australia and provide useful knowledge for Victorian researchers outside her field of host-pathogen interactions.



**Ms Claire Gorrie**

**Peter Doherty Institute**

Disease and infection caused by bacterial pathogens, particularly those that demonstrate antimicrobial resistance (AMR), are a significant public health threat across the world. To manage this threat a real-time, sustainable, automated approach is needed for surveillance and reporting.

Ms Gorrie plans to visit three leading UK institutions: the Centres for Disease Control and Prevention; Antimicrobial Resistance and Healthcare Associated Infections at Public Health England; and the Holden Laboratory, Infection and Global Health Division at St. Andrews University.

The study mission aims to bring back knowledge and training to develop the approaches required to monitor the introduction, evolution, and transmission – including outbreak detection – of antimicrobial resistant bacteria in Victoria, as well as insights into implementing effective surveillance and reporting.

# VICTORIA FELLOWSHIPS

## Life Sciences



### Mr Aidan Kashyap

**Hudson Institute of Medical Research**

Each year more than one million babies globally die on their first day of life. At birth, if the umbilical cord is clamped before the lungs are ready to take over, then the baby's heart is left without enough oxygenated blood to pump around the rest of the body.

For most infants delaying cord clamping for a few moments provides enough time to fill the lungs with air. However, some infants are unable to establish stable breathing and must be transferred to a resuscitation table - but moving the infant away from the mother requires the umbilical cord to be clamped immediately.

Researchers in the Netherlands have designed a resuscitation table - Concord, that allows infants to be kept close to their mothers while respiratory support is delivered. Mr Kashyap's study mission will investigate the feasibility of incorporating Concord into the delivery room at Monash Health and other Victorian hospitals.



### Dr Alistair Legione

**The University of Melbourne**

Pathogen surveillance minimises threats to important animal populations and agricultural industries, through methods that allow early detection of infectious organisms. The popular penguin parade at Phillip Island is worth nearly half a billion dollars annually. A sudden disease outbreak causing mass mortality, as has been seen in other Australian wildlife populations such as the Bellinger river snapping turtle, can drastically reduce the long term survivability of a wildlife population.

Dr Legione's study mission is to gain expertise in using innovative sequencing technologies for pathogen surveillance, microbial genomics, and outbreak analysis.

Each area contributes significantly to the Victorian economy, creating both jobs and produce that are vital to our way of life. He will visit experts at three UK institutions in Edinburgh, Birmingham, and Cambridge.



# VICTORIA FELLOWSHIPS

## Life Sciences



**Dr Benjamin Mentiplay**

**La Trobe University**

With an ageing population musculoskeletal conditions and orthopaedic surgeries are on the rise. It is important to understand and identify the movement patterns that are associated with these musculoskeletal conditions to reduce injury risk.

Dr Mentiplay is researching the biomechanics of patients with osteoarthritis or following orthopaedic surgery and examining innovative technology such as wearable sensors that include accelerometers and inertial monitoring units. Understanding how and why the body moves in patients with musculoskeletal conditions can identify abnormal movement patterns that may lead to further injury. He will travel to Singapore, Canada and the USA meeting with key researchers in musculoskeletal research. The technology for biomechanics assessments has the potential for further use in clinical practice across Victoria.



**Dr Nicholas Welch**

**CSIRO**

The success and viability of vital new implantable medical devices and cell therapies such as the cochlear implants, indwelling medical sensors, and diabetes islet cell treatment are severely hampered by the natural foreign body response (FBR) that results in the formation of a fibrotic capsule around the implant.

Dr Welch's study mission aims to understand how to modulate and overcome this tissue response and develop new types of biomedical devices and therapies, or provide important improvements in performance and longevity of existing devices. The first applications will be in the treatment of diabetes with indwelling glucose sensors and implantable cell therapies for insulin production, and in the electro-stimulation of nerve cells as with the cochlear ear implant. Dr Welch will travel to Switzerland, Germany, France and Greece to advance his research.



# VICTORIA FELLOWSHIPS

## Physical Sciences



### Dr Sepideh Afshar

#### Monash University

The dairy industry, particularly the milk sector, is one of the largest agricultural industries in Victoria. Fonterra, Murray Goulburn and Tatura milk industries are popular manufacturers, producing products such as milk powder, infant formula and whey protein.

Spray drying is a preferred method where heat sensitive materials are used in the dairy industries. However, the drying process is an energy intensive key manufacturing step. Dr Afshar is researching multi-stage spray drying systems.

A workshop in France, located at Institut National de la Recherche Agronomique is one of the world's premier sites for drying research.

This study mission will link her skills and experiences into the industry scale, reduce the manufacturing costs through technological innovation and bring updated knowledge of cost-effective spray drying to Victoria.



### Dr Nima Haghdadi

#### Deakin University

3D printing of metals has been studied and applied in recent years, however, the potential of smart manufacturing for manipulating material microstructures during printing that are currently in demand from the mining, aerospace and energy industries has yet to be explored.

3D printing technology leads to material savings of up to 90% and production cost savings up to 50%. However, there are some significant differences and complexities in the thermal aspects of the 3D printed component, compared to a conventionally processed part.

This study mission to Max-Planck Institute in Germany will see Dr Haghdadi design the 3D printing schedules so that thermal cycles will not deteriorate the properties but enhance the performance of these alloys. This knowledge will position Victoria as a leader in the production of high performance high entropy alloys.



# VICTORIA FELLOWSHIPS

## Physical Sciences



### Dr Liam Hall

#### The University of Melbourne

The application of “quantum sensing” to chemical reaction systems will be a new research direction for Dr Liam Hall.

He will progress this work during a study mission to the Institute for Quantum Optics at Ulm University in Germany. His research has so far focused on analysing the response of quantum mechanical defects in diamond, known as nitrogen-vacancy (NV) centres.

The technology developed during the study mission will allow Dr Hall to pioneer a new and independent research program in which quantum sensing techniques are applied to solve critical problems in fields of advanced manufacturing and synthetic chemistry.

The research will contribute to the development of many important technologies in Victoria that are reliant on process monitoring during manufacture, particularly in the development of clean energy technology.



### Dr Bartłomiej Kolodziejczyk

#### H2SG Energy (Aus) Pty Ltd

While the world slowly moves towards more sustainable energy solutions, batteries and hydrogen are gaining significant interest as potential energy storage technologies.

Dr Bart Kolodziejczyk’s study mission to China will investigate the recycling of “one-pot electrochemical sodium metaborate back to sodium borohydride”. The experience will allow him to perform similar recycling attempts in Victoria, with the aim of building an electrochemical cell (a solid-state hydrogen storage cartridge) with a function for electrochemical recycling in one device without generating any by-product.

If the prototype device works on a small scale in Victoria, Dr Kolodziejczyk and his team hope to create a spin-off company to do further R&D and manufacture complete hydrogen-based batteries.

# VICTORIA FELLOWSHIPS

## Physical Sciences



### Dr Flora Salim

**RMIT University**

In today's smartphone and Internet of Things era, assistive technology such as Google Maps that advise you of the best route in the current traffic conditions and fitness tracker apps that remind you to hit your 10,000 steps a day, are widely used. However, the usage and functionalities of these devices are often constrained to one particular application and domain.

This study mission aims to enable various applications, such as context-aware and location-based services, smart assistants, and intelligent monitoring, to be more effective and robust. If widely adopted, this has a great potential to boost Victoria's productivity, economy, public safety, and well-being, enabling city planners and operational managers to have increased awareness of dynamic situations.

Dr Salim will visit Kassel University in Germany and the University of Cambridge in the UK.



### Dr Sumeet Walia

**RMIT University**

We collect one billion times more data on our cars than our bodies. This implies that we're able to get diagnostic information from our car every time it is serviced yet most of us know little about how our bodies are performing. Research into multi-functional wearable electronics focuses on understanding the challenges that can enable large-scale incorporation of functional wearable electronics into remote healthcare diagnostics, digital monitoring, smart data storage and high-speed electronics.

Victoria will benefit from access to enhanced research capabilities, international networks of wearable electronics researchers, industry partnerships, and economic benefit through licensing of intellectual property. Dr Walia will travel to the USA & Canada to explore joint development opportunities and to understand the advanced manufacturing processes for wearable electronics.



## RECIPIENTS OF THE VICTORIA PRIZE FOR SCIENCE & INNOVATION

### Year Recipient

2017	Professor Maria Forsyth Professors Jane Visvader & Geoffrey Lindeman
2016	Professor Min Gu Professors Jamie Rossjohn & James McCluskey
2015	Professor Calum Drummond Professor John Hopper AM
2014	Professor Frank Caruso Professor Ashley Bush
2013	Professor Lloyd Hollenberg Professor Alan Cowman
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
1998	Mr Andrew Martin

### Research Area

(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
Digital microwave radio systems

# 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.

## Australian French Association for Science and Technology (AFAS) Associate Award

Victoria Fellowship applicants planning to study in France are eligible to apply for an AFAS Associate Award. AFAS Associate Awards support study missions to France, in conjunction with the Victoria Fellowship, and aim to facilitate science and technology innovations that are mutually beneficial.

## OTHER VICTORIAN FELLOWSHIP AND AWARD PROGRAMS

### Premier's Award for Health and Medical Research

The Premier's Award for Health and Medical Research recognises the exceptional contributions made by early career health and medical researchers in their PhD studies. The 2018 Premier's Awards included 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.

The award is open to PhD students or recently completed postgraduates, whose research has or is being undertaken in a Victorian research institution, in a field of health and medical research – 2019 will see the 25th year of the award.

[www.2.health.vic.gov.au/about/clinical-trials-and-research/premiers-award](http://www.2.health.vic.gov.au/about/clinical-trials-and-research/premiers-award)

### 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 27 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.

The call for applications for the 2019 **veski** innovation fellowship is now open. Applications must be lodged via the **veski** website by 5.00pm [AEST] Thursday, 21 February 2019.

[www.veski.org.au/vif](http://www.veski.org.au/vif)

**For further information on the Victoria Prize for Science & Innovation and Victoria Fellowship:** [www.business.vic.gov.au/support-for-your-business/awards](http://www.business.vic.gov.au/support-for-your-business/awards)



