2015 VICTORIA PRIZE FOR SCIENCE & INNOVATION

VICTORIA FELLOWSHIPS

VICTORIA
State Government

ISN: 01-046-15238-2083-631156.

MESSAGE FROM THE MINISTER

2015 Victoria Prize for Science and Innovation and Victoria Fellowships

Hon. Philip Dalidakis MP

Minister for Small Business, Innovation and Trade

Victoria is a globally recognised hub for life sciences research and development.

Our reputation in scientific research, engineering and new medical technologies is a testament to the high quality of innovators and researchers that Victoria's universities and research institutions produce.

The state's capabilities in the sector of life and physical sciences are vast and growing, which is why medical technology, pharmaceuticals and new energy technology have been identified as key emerging industries to drive economic growth and jobs in Victoria.

The Andrews Labor Government recognises the importance of science to our knowledge economy and has a plan to increase the number of science graduates, as outlined under Labor's Plan for Innovation.

The Victoria Prize for Science and Innovation and the Victoria Fellowships are an excellent example of this, allowing us to recognise our outstanding leaders in science and further support their research contributions to the Victorian community.

The Victoria Prize for Science and Innovation provides two individual awards, valued at $50,000 each, for work in the life sciences and the physical sciences. The 12 Victoria Fellowships, valued at $18,000 each, support researchers in science, engineering and technology, who are in the early stages of their career and would benefit from an international study mission.

This year, we again welcome the contribution of the Australian French Association for Science & Technology Victoria Fellowships, who will support a Victorian Fellow to undertake their study mission in France.

International opportunities will provide our most promising young researchers with unprecedented access to world-class facilities and new networks, while allowing them to demonstrate Victoria's promising research capabilities.

This prestigious prize and fellowship program allows us to recognise the work of our established researchers and provide talented early-career researchers with the opportunity to advance their own work.

The standard of applications was again exceptional this year, confirming the depth of talent and capability in Victoria - I thank the selection panel for their diligence in selecting the successful candidates.

And finally, congratulations to the 2015 Victoria Prize winners and Fellows for their unwavering dedication to their work and to bettering our community because of it.

VICTORIA PRIZE FOR SCIENCE & INNOVATION

Physical Sciences

Professor Calum Drummond

Professor Drummond is awarded the Victoria Prize for his outstanding contributions to advancing the fundamental understanding of the key factors governing molecular assembly, and particle and surface interactions in liquids. This fundamental research in chemistry has enabled the development and commercialisation of advanced high-performance materials for economic and societal benefit.

Detergents, surfactants, lipids, proteins and many macromolecules are classed as amphiphiles. Amphiphiles can utilise their molecular segmentation to self-assemble into highly-ordered structures in some liquids. These amphiphile self-assembly structures can be exploited to create advanced nanostructured materials. Professor Drummond's research primarily revolves around addressing three questions: (a) what drives amphiphile self-assembly (investigating the hydrophobic/solvophobic effect), (b) what governs the self-assembly structures that are formed, and (c) how can amphiphile self-assembly materials be used to enhance product formulations; including drug delivery vehicles, medical imaging contrast agents, membrane protein crystallisation media, environmentally friendly off-shore oil well drilling fluids, water-proof recyclable paper coatings, household cleaning products, and specialty chemicals for the construction industry.

Part of Professor Drummond's nanostructured materials research has also focused on strategies to improve the power density of energy storage devices. High power density supercapacitors are desired for consumer electronic products and can be used to highlight the calibre of Professor Drummond's contributions to this field. Professor Drummond served as the inaugural Vice President Research at CAP-XX, an Australian-based Intel Portfolio company. Advances made by his research team in device materials led to global market leadership in commercial high power supercapacitor performance, with 11 million devices sold to date. The World Economic Forum designated CAP-XX as a 2005 Global Technology Pioneer.

VICTORIA PRIZE FOR SCIENCE & INNOVATION

Life Sciences

Professor John Hopper AM

Professor John Hopper has made seminal contributions to understanding the roles of genetic and environmental factors on Australia's major cancers and other diseases with significant clinical and population health benefits. These advances were underpinned by his mathematical and statistical innovations alongside his establishment more than 20 years ago of Australian cancer family studies that bring an epidemiological (population-wide) approach to finding ways to prevent disease and improve health.

Professor Hopper has also been Director of the Australian Twin Registry, created by Professor John Mathews, since 1990. He helped make it the world's largest volunteer resource of twins and their families contributing to health and medical research by facilitating more than 500 publications across a wide range of diseases and health-related conditions, many led or instigated by Professor Hopper. Today he leads the new NHMRC-funded Australian Centre of Excellence in Twin Research and has played a key role in establishing the International Network of Twin Registries.

In 1992, Professor Hopper showed that for diseases like breast and colorectal cancers there must be enormous variation in underlying genetic risk. For each disease, while a large proportion of the population is at minimal risk there is a very wide distribution of people at increased risk. This challenges conventional public health approaches and has enormous potential for improvements in health, in terms of more cost-effective prevention strategies and better use of the health budget.

The case-control-family design pioneered by Professor Hopper was virtually unknown when he and Professor Graham Giles obtained funding from the Victorian Health Promotion Foundation in 1992. With Professors Melissa Southey and Mark Jenkins, they are world leaders in demonstrating the power of the population-based cancer family studies for better health care and prevention. The resources they created are based on the data and blood samples donated by more than 100,000 Australians with the expectation that they be used for research of global significance. This has contributed to Victoria being a stand out contributor to international cancer research.

VICTORIA FELLOWSHIPS

Life Sciences

Dr Lauren Ayton

Centre for Eye Research Australia, University of Melbourne

The development of vision restoration treatments such as bionic eyes, stem cells and gene therapy offers emerging options for those blinded by eye disease or injury. Challenges remain in assessing patients, as they have very poor sight to begin with and the current treatments provide only modest improvements in vision. Dr Ayton works on the Bionic Vision Australia project, contributing to the development of a retinal prosthesis (bionic eye). On her study mission she will meet with collaborators at an international meeting in Germany, attend an invite-only World Health Organisation forum on rehabilitation standards in Rome, and visit the testing facilities of a bionic eye group, Pixium, in France. These activities will be invaluable for the future development of Australia's bionic eye and cement Dr Ayton as an emerging leader in the field of vision restoration outcome measurement.

Daniel Corp

Deakin University

In 2005, a retired professional National Football League player was diagnosed with Chronic Traumatic Encephalopathy (CTE) – a neurodegenerative disease caused by repetitive impact to the head, resulting in tangles in neural fibers, and eventually cell death. Mr Corp's study will measure the possible changes in activity of a number of different types of brain cells that occur as a result of repetitive head impacts sustained while playing sport. This project will help to characterise the effects of head injury, and aid future development of treatments. Working alongside the scientists at Harvard University, Mr Corp will have the chance to learn about the mechanisms and the prospective treatment of neurodegenerative disease due to brain injury.

VICTORIA FELLOWSHIPS

Life Sciences

Danielle Ingle

Peter Doherty Institute for Infection and Immunity, University of Melbourne

Food-borne outbreaks are a global problem with impacts spanning health, agriculture, food industries, international trade and travel. Ms Ingle's research has focused on bacterial infectious disease. Her PhD work has allowed her to utilise key technologies, such as high-throughput sequencing, which she applied to a particular subtype of E. coli that causes diarrhoeal disease in children all over the world. This technology is providing a method for tracking outbreaks of infection and revolutionising public health. From her study mission at the Institut Pasteur in France and Public Health England (PHE), Ms Ingle will return with training in the latest knowledge and technologies for dealing with these outbreaks.

Dr Severine Lamon

Deakin University

Skeletal muscle is the largest organ in the body, serving as a structural and mechanical unit enabling the maintenance of posture and the performance of gross and fine motor movements. To study the processes associated with the loss of muscle mass and the associated frailty in the elderly, it is essential to implement a technique that measures the amount of muscle proteins that are being built up in vivo following a pharmaceutical or exercise intervention. The use of stable isotope tracers to measure protein synthesis rates was developed at the University of Texas Medical Branch in the early 1990s. Dr Lamon will spend four weeks at the laboratory, studying this complex technique, which constitutes the current gold standard for measuring acute muscle protein synthesis in vivo.

VICTORIA FELLOWSHIPS

Life Sciences

Dr Jodie McClelland
La Trobe University

Knee replacement surgery is the most common treatment for severe arthritis of the knee. In Australia, the number of knee replacements performed each year has doubled since 2003 and further growth is expected with the ageing population and the rising incidence of obesity and joint injury. Although knee replacement improves pain and quality of life, function is not restored to normal, and the benefits of surgery may start to decline within three years. Often, these limitations in outcome are related to the need for further surgery in other joints or revision of the original knee replacement. Being able to predict who will need further surgery will help the design of better interventions. Dr McClelland's study mission to leading universities and prosthesis manufacturers in the United States and Sweden will provide a valuable opportunity to investigate the factors that contribute to the increasing need for further surgery following knee replacement.

Dr Janine Trevillyan
Monash University

Dr Trevillyan is an infectious diseases physician and researcher with an emerging reputation in the field of non-infectious HIV-related co-morbidities. This study specifically targets one of the key areas in which HIV-positive patients still experience high rates of disease. It will generate results that will directly affect clinical decision making and guide further studies. The collaboration between UCLA and the Victorian HIV Service will allow a large number of suitable patients to be enrolled in the study trial, and also formalise an important new collaborative link between Victoria and the United States. Further, this study mission will allow the formation of an exciting new multi-national collaborative research network that has the capacity for enduring, productive relationships of benefit to Victorian research and researchers.

VICTORIA FELLOWSHIPS

Physical Sciences

Dr Madhu Bhaskaran
RMIT University

Electronic devices are a part of daily life. Transparent and wearable electronics promise enhanced functionality while making devices less obtrusive. Dr Bhaskaran has realised scientific advances that allow integration of ultra-thin layers of functional materials with rubber-like materials.
Her work will combine frontier materials science, and micro-/nano-electronic processing, to develop functional devices. These will have significant economic and social impacts, through widespread market adoption, health applications, and human and environmental monitoring. The study mission to the United States and Europe offers Dr Bhaskaran the opportunity to gain international exposure at leading research institutions, and with potential industry partners. She is looking forward to gaining insights into new techniques and industry needs in advancing creation of low-cost, wearable electronics.

Dr Daniel Gomez
CSIRO

Harvesting energy from light sources could meet some of our energy needs over the next century. To do this, we need to devise ways to transform light energy into chemical fuels. Dr Gomez's research into the physical chemistry of nano-sized metals and semiconductors has enabled him to create metal-semiconductor nanostructures for efficient solar to chemical energy conversion. This study mission to the United States and Germany will allow him to establish collaborative links with leading scientists, offering expertise and capabilities in diverse areas of plasmonics, including nanofabrication, and the synthesis, device fabrication and testing of plasmonic structures for direct solar to chemical energy conversion. The skills and knowledge Dr Gomez will gain from engaging with world leaders in these areas of research will strengthen his own contributions.

VICTORIA FELLOWSHIPS

Physical Sciences

Dr Nisa Salim

Carbon Nexus, Institute for Frontier Materials, Deakin University

Carbon fibres offer a solution to the growing demand for lightweight, low-cost materials to meet future design and performance requirements in automotive and aerospace manufacture by balancing weight and strength. This mission will allow Dr Salim to contribute to this emerging sector. Dr Salim will visit world leading carbon fibre research facilities in the United States and Europe to explore current practices and future directions in high strength and low-cost carbon fibre precursors. Access to the industry sites and advanced technological training on pilot scale wet spinning facilities will significantly advance her current research activities on next generation precursors. Dr Salim is looking forward to the opportunity to broaden her skills and expertise, and establish new collaborations.

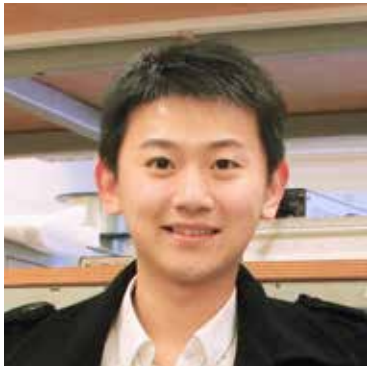
Alex Schenk

La Trobe University

Mr Schenk's research is in methods of modifying the surface electronic structure of materials for quantum electronics. His doctoral research focuses on the development of the diamond surface as a platform for quantum electronics and sensing. His work has included development of a novel surface termination, which may have implications for producing diamond nanomagnetometers. Mr Schenk's study mission will allow him to perform additional measurements on the newly developed silicon terminated diamond surface and the germanium terminated diamond surface, which cannot currently be performed in Australia. Mr Schenk's planned visits to the Peter Grünberg Institut in Germany and other prominent institutions in Europe will expose him to experience and expertise in using powerful techniques for characterising strongly correlated electron systems and types of engineered electronic structures.

VICTORIA FELLOWSHIPS

Physical Sciences



Dr Ke Wang
University of Melbourne

Dr Wang's research focuses on four major areas – high-speed optical wireless communications; reconfigurable optical interconnects; silicon photonics integrated devices and systems; and light field microscopy (LFM). Dr Wang will visit Stanford University and the Intel Corporation to carry out studies on LFM and silicon based optoelectronics integration. He will look to apply this to his current research on high-speed optical wireless communications and reconfigurable optical interconnects for prototyping products. The study mission will benefit Dr Wang's future career by opening up new opportunities to establish connections and collaborations with world leading universities and industry. He will return with an increased understanding of the detailed working principles and application of LFM, prerequisites in nanotechnology, bio-imaging, nanofabrication, neural sciences and engineering and clinical pathology.

Ada Wing Chi Yan
University of Melbourne

Chronic influenza infection occurs in people with suppressed immune responses, such as chemotherapy patients or organ transplant recipients, and is associated with the development of antiviral resistance, greater severity of disease and increased deaths. Ms Yan's research contributes to the understanding of temporary immunity, where infection with one strain of influenza virus prevents or delays infection with another strain or virus. Members of Ms Yan's research group have developed a within-host mathematical model for multi-strain influenza infection, taking into account both strain-independent and strain-specific components of the immune response. Her Toronto and Florida study mission will lead to increased quantitative understanding of the causes of chronic infection in immunosuppressed patients. This will aid development of specialised treatment regimes, consolidating Melbourne's status as an influenza research hub.

PREVIOUS WINNERS OF THE VICTORIA PRIZE FOR SCIENCE & INNOVATION

Year	Recipient	Research Area
2014	Professor Frank Caruso Professor Ashley Bush	(Physical) Nanomedicines (Life) Translational neuroscience
2013	Professor Lloyd Hollenberg Professor Alan Cowman	(Physical) Quantum sensing technology (Life) Malaria research
2012	Professor Ana Deletic Professor Terence (Terry) Speed	(Physical) Storm water management (Life) Bioinformatics
2011	Professor Andreas Strasser	Cancer cell research and apoptosis
2010	Associate Professor Voytek Gutowski	Manufacturing technology
2009	Professor Murray Esler AM	Cardiovascular neuroscience
2008	Dr Peter Colman	A new class of anti-influenza viral drugs
2007	Professor Colin Masters	Alzheimer's disease pathways
2006	Professor David Solomon AM	Polymer chemistry
2005	Professor Eric Reynolds AO	Remineralisation of dental caries
2004	Professor Keith Nugent	Quantitative phase imaging
2003	Dr David Vaux	Programmed cell death – apoptosis
2002	Professor David Boger	Fluid mechanics
2001	Dr Roger Francey & Dr Paul Steele	Greenhouse gas monitoring
2000	Professor Donald Metcalf AC	Haematology
1999	Professor Graeme Clark AC	Hearing solutions: Cochlear implants
1998	Mr Andrew Martin	Digital microwave radio systems

For further information on the awards and to view a full list of past Victoria Prize and Victoria Fellowship recipients visit business.vic.gov.au/vicprize or business.vic.gov.au/vicfellows

2015 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 currently awarded to two outstanding Victorian researchers (one in life sciences, one in 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 will be 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.

business.vic.gov.au/vicprize
business.vic.gov.au/vicfellows

October 2015