



# 2020 PREMIER'S PRIZES FOR SCIENCE & ENGINEERING

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GOVERNMENT HOUSE  
SYDNEY

27 October 2020



## The Honour Roll

### *NSW Scientists of the Year*

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- 2019** **Scientia Professor Rose Amal AC**  
UNSW Sydney
- 2018** **Laureate Professor Nick Talley AC**  
The University of Newcastle
- 2017** **Professor Gordon Wallace AO**  
University of Wollongong
- 2016** **Professor Rick Shine AM**  
The University of Sydney
- 2015** **Laureate Professor Scott Sloan**  
The University of Newcastle
- 2014** **Professor Mark Westoby**  
Macquarie University
- 2013** **Laureate Professor Graeme Jameson**  
The University of Newcastle
- 2012** **Laureate Professor John Aitken**  
The University of Newcastle
- 2011** **Scientia Professor Michelle Simmons**  
UNSW Sydney
- 2010** **Professor Hugh Durrant-Whyte**  
The University of Sydney
- 2009** **Professor Stephen Simpson**  
The University of Sydney
- 2008** **Professor Martin Green**  
UNSW Sydney

# 2020 PREMIER'S PRIZES FOR SCIENCE & ENGINEERING

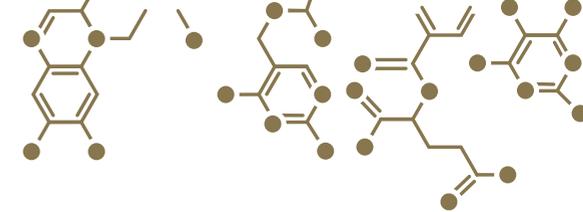


**GOVERNMENT HOUSE  
SYDNEY**

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**The 2020 Premier's Prizes for Science & Engineering are an initiative of the NSW Government, led by the Office of the Chief Scientist & Engineer, to recognise excellence in research and education, and to reward those whose cutting-edge work has generated economic, environmental, health, social and technological benefits for New South Wales.**



## **Order of Proceedings**

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**Welcome to the 2020 NSW Premier's Prizes for Science & Engineering, hosted at Government House, Sydney, on Tuesday 27 October.**

### **Introduction**

Master of Ceremonies:  
Professor Hugh Durrant-Whyte  
NSW Chief Scientist & Engineer

### **Keynote Address**

Her Excellency  
The Honourable Margaret Beazley AC QC  
Governor of New South Wales  
Patron of the NSW Premier's Prizes for Science & Engineering

### **Premier's Address**

The Honourable Gladys Berejiklian MP  
Premier of New South Wales

### **2020 Premier's Prizes Presentation**

The Honourable Rob Stokes MP  
Minister for Planning and Public Spaces

### **Address by the 2020 NSW Scientist of the Year**



GOVERNMENT HOUSE  
SYDNEY

## Message from Her Excellency The Honourable Margaret Beazley AC QC Governor of New South Wales



The Governor holding a Teams meeting with the CSIRO Energy Centre (Solar Technologies), 21 August 2020.



Visiting the Westmead Research Hub, 1 August 2019.

Australia has always excelled in the spheres of scientific research and engineering. This year, the work of the experts in these fields has acquired a public face, as New South Wales, along with other parts of Australia, has responded to three environmental disasters – drought, flood and bushfires – and then the health crisis of COVID-19.

The work of scientists and engineers, together with that of our medical professionals, has been at the forefront of the response to these crises. Science and engineering have enabled our biomedical engineers to fulfil an increased demand for ventilators while our universities searched for a vaccine in a year where, as we watched the rapid unfolding of a pandemic, we came to understand what epidemiologists do. The groundbreaking work undertaken during this time featured in an article entitled *‘Why we are living in the greatest era of scientific discovery’*, published during National Science Week.

For Science, Technology, Engineering and Mathematics teachers, it has been a challenging year, as classes quickly moved online. This makes *Category 9 – Innovation in Science, Technology, Engineering or Mathematics Teaching* a most significant award this year.

Online technology has also enabled businesses and communities to function during the pandemic. In July, I was able to ‘visit’ the National Marine Science Centre at Southern Cross University. In August, I joined a joint Australian Academy of Science and Australian Academy of Law symposium. Later, during Science Week, I met with partners of the CoVida Ventilator Innovation Project, the Office of the Women in STEM Ambassadors, the CSIRO Energy Centre, the COVID-19 Sequencing Project and a senior clinical pharmacologist.

This has been a year of urgency in science like none other. However, as hard as it has been, for our science community and our educators, this is your time. This is when your excellence in teaching and research, your agility and commitment to innovation, and your professional dedication to your colleagues and to the community has come to the fore.

Congratulations, NSW scientists, engineers and educators. As Patron, I – along with everyone else in New South Wales – am proud of you.

Her Excellency the Honourable Margaret Beazley AC QC  
Governor of New South Wales



The Premier during the mission to the UK and Germany to further grow the pipeline of investment in a world-class Advanced Manufacturing and Research Precinct within the Western Sydney Aerotropolis, 16 August 2019.

## Message from the Premier of New South Wales

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This year has highlighted the contribution of scientists and engineers to our society and economy as never before.

In our response to the drought, bushfires and the COVID-19 pandemic, we have drawn heavily on the knowledge and expertise of our scientific community. You help us to understand and manage these challenges, mitigate the impacts and build resilience so we can all enjoy a better, safer future.

Our reliance on your skills will only increase in the years ahead, especially given that the NSW Government has hard-wired science, technology, engineering and mathematics into our COVID-19 recovery plan to build the industries and jobs of the future.

The Aerotropolis in Western Sydney will create 200,000 jobs in the aerospace and defence, manufacturing, healthcare, freight and logistics, agribusiness, education and research industries. Special Activation Precincts will bring similar opportunities to regional NSW.

Sydney's Tech Central will become the biggest technology hub of its kind in Australia. With Atlassian as an anchor tenant, the precinct will create up to 25,000 innovation jobs and host start-ups, scale-ups and innovation partners.

Our education and vocational training reforms will focus on the core competencies of english, maths and science and address skills shortages in key trades and emerging industries.

We are adopting innovative digital models to revolutionise the way people interact with government and positioning Western Sydney to become the national capital for advanced manufacturing.

All of these initiatives demand a strong, inquisitive research and development sector.

The NSW Premier's Prizes for Science & Engineering recognise cutting-edge work that has generated economic, environmental, health, social or technological benefits for NSW. They also provide an annual benchmark of our ability to innovate and execute bold initiatives.

I congratulate the 2020 NSW Scientist of the Year, our nine category winners and all those researchers and educators nominated for this year's Premier's Prizes.

Your endeavours shape our daily lives and hold the key to our future prosperity.

The Honourable Gladys Berejiklian MP  
Premier of New South Wales



The NSW Chief Scientist & Engineer with a successful entrant at the inaugural Physical Sciences Fund Announcement Event, The Calyx, Royal Botanic Garden Sydney, 10 December 2019.

## Message from the NSW Chief Scientist & Engineer

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Welcome to the NSW Premier's Prizes for Science & Engineering. A sincere thank you to our Patron, the Governor of NSW, Her Excellency the Honourable Margaret Beazley AC QC and Mr Dennis Wilson for allowing us to hold tonight's ceremony at Government House.

My gratitude to the Premier, the Honourable Gladys Berejiklian MP, for her continued strong support of science and research. Presenting the Prizes tonight is the Honourable Rob Stokes MP, Minister for Planning and Public Spaces. My office has no greater supporter in the work we undertake, both in the publication of independent reports to solve difficult policy problems and in bringing the state's research and development sector together with industry to drive innovation and commercialisation.

It has been a busy year for the Office of the NSW Chief Scientist & Engineer. Significant projects have included collating the state's water data for the Minister for Water, Property and Housing and delivering both the *NSW Decarbonisation Innovation Study* and the *Advice on the Protection of the Campbelltown Koala Population*.

The inaugural year of the \$5 million Physical Sciences Fund (PSF) has been a great success, supporting new technologies with immense potential for NSW, including an unmanned drone for environmental data collection and a magnetic resonance analyser to assess ore quality in real time at the mine site. Judging for the second year of the PSF is well underway with some similarly exciting candidates being considered.

The PSF embodies why our state needs a vibrant research and innovation ecosystem. Research delivers new ideas, devices, services and skills in areas including advanced manufacturing, energy transition and decarbonisation, and medical technologies. Technological innovation in these and other sectors will drive the state's prosperity, attract international investment and create new high value jobs.

Of course, research and educational excellence is why we gather here tonight. It is my great pleasure to welcome you to the 2020 NSW Premier's Prizes for Science & Engineering. Join me in celebrating the achievements of this year's winners.

Professor Hugh Durrant-Whyte  
NSW Chief Scientist & Engineer

## NSW Premier's Prizes for Science & Engineering

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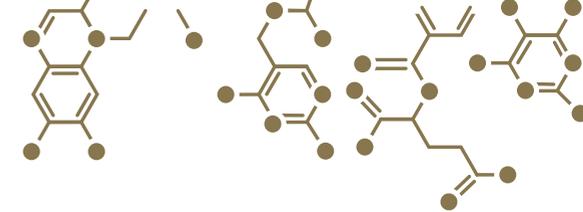
The NSW Premier's Prizes for Science & Engineering reflect the NSW Government's strong commitment to the local research and development community.

The Prizes seek to raise community awareness and appreciation of the important contribution scientists, engineers and teachers make to our daily lives, as well as to encourage careers in these fields.

The top award, the prestigious Premier's Prize for the NSW Scientist of the Year, will be presented to an outstanding individual who has made a significant contribution to the advancement of science, engineering or teaching which has benefited or has the potential to benefit the people of New South Wales.



The 2019 NSW Scientist of the Year, Scientia Professor Rose Amal AC, receives her award from the Premier in the presence of the Governor of NSW.



## 2020 Categories

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- 1 Excellence in Mathematics, Earth Sciences, Chemistry or Physics
- 2 Excellence in Biological Sciences (Ecological, environmental, agricultural and organismal)
- 3 Excellence in Medical Biological Sciences (Cell and molecular, medical, veterinary and genetics)
- 4 Excellence in Engineering or Information and Communications Technology
- 5 NSW Early Career Researcher of the Year (Biological Sciences)
- 6 NSW Early Career Researcher of the Year (Physical Sciences)
- 7 Leadership in Innovation in NSW
- 8 Innovation in NSW Public Sector Science and Engineering
- 9 Innovation in Science, Technology, Engineering or Mathematics Teaching in NSW

## CATEGORY 1



### Excellence in Mathematics, Earth Sciences, Chemistry or Physics

**Distinguished Professor Sue O'Reilly AC  
FAA FMSA FGSAu FRSN DHC  
Macquarie University**



**D**istinguished Professor Sue O'Reilly's research is enabling the discovery of critical metals, including rare earths, nickel, copper and platinum group elements hidden deep underground in Australia and globally.

By analysing zircons found on the surface she has produced a tool for identifying deep mineral deposits. The tool, patented as TerraneChron®, is being used by mining giants including BHP, Anglo American, Codelco, Vale and Rio Tinto to significantly speed up exploration and detection.

Sue's approach combines geochemistry, geophysics, geodynamic modelling and geology, and has revealed the structure and history of previously inaccessible regions as deep as 400 kilometres. This pioneering integration – now widely adopted – profoundly changed scientific understanding of the planet's crust and mantle, including the process of ore-formation. It also created a new discipline, known as "4-D Lithosphere Mapping".

Since 1995 Sue has led two ARC Research Centres (a National Key Centre and a Centre of Excellence), working with more than 300 researchers, mineral industry practitioners and manufacturing industry partners.

As Chair of the Australian Academy of Science's National Committee for Earth Sciences, Sue led the writing of the 2018 Decadal Plan for Geoscience. She serves on expert panels for the ARC and provides advice and submissions to Chief Scientists and governments.

Sue is a Fellow of the Australian Academy of Science and was awarded an Order of Australia (OAM) "for significant service to the earth sciences". During her 40-year tenure at Macquarie University, she has produced more than 450 journal papers, which have attracted over 45,000 citations. She has edited eight journal volumes and collaborated with more than 130 scientists.





## CATEGORY 2



### **Excellence in Biological Sciences** (Ecological, environmental, agricultural and organismal)



**Professor Ian J. Wright** FAA  
Macquarie University

Professor Ian Wright has made major contributions to plant science research, nationally and internationally. He is best known for global-scale analysis of plant traits, for careful quantification of plant structure-function relationships and for using concepts from economics to understand plant ecology and evolution.

His concept of a Leaf Economic Spectrum (LES) has become standard in textbooks covering plant ecology, physiology and ecological climatology. It describes coordination in carbon and nutrient investments in leaves, and the rates and durations of photosynthetic returns on those investments.

Both the LES and ‘least-cost theory’ – concerning co-optimisation of nitrogen and water costs for photosynthesis – are now embedded in global vegetation production models, providing a more robust theoretical basis for these important tools. In recent work, Ian and colleagues twinned fresh theory with empirical analysis to build a new narrative for the evolution of leaf size variation across the world’s species.

Ian’s work underpins the ability of scientists to ask novel, high-priority questions: Which plants will be winners and losers in NSW after climate change? How will our forests change and how will that affect fire risk? What Australian species have useful properties for crop improvement under future warmer and drier climates?

Ian was awarded the 2015 Fenner Medal by the Australian Academy of Sciences and elected a Fellow of the Academy in 2019. He has co-authored 135 papers in peer-reviewed journals, including *Nature* and *Science*, with more than 39,000 citations. The original LES paper, published in *Nature* in 2004, has been cited more than 5,600 times.

## CATEGORY 3 JOINT WINNER



### **Excellence in Medical Biological Sciences** (Cell and molecular, medical, veterinary and genetics)



#### **Distinguished Professor Antoine van Oijen** University of Wollongong

**B**iomolecular physicist Professor Antoine van Oijen is a pioneer in the visualisation of biological processes at the single molecule level. Since moving to Australia as an ARC Laureate Fellow, he has developed a research program that has transformed our understanding of how bacteria copy and repair their DNA and how these processes play a role in the development of drug resistance.

With the increased use of antibiotics in health care and agriculture, antimicrobial resistance is one of the greatest health challenges facing humanity.

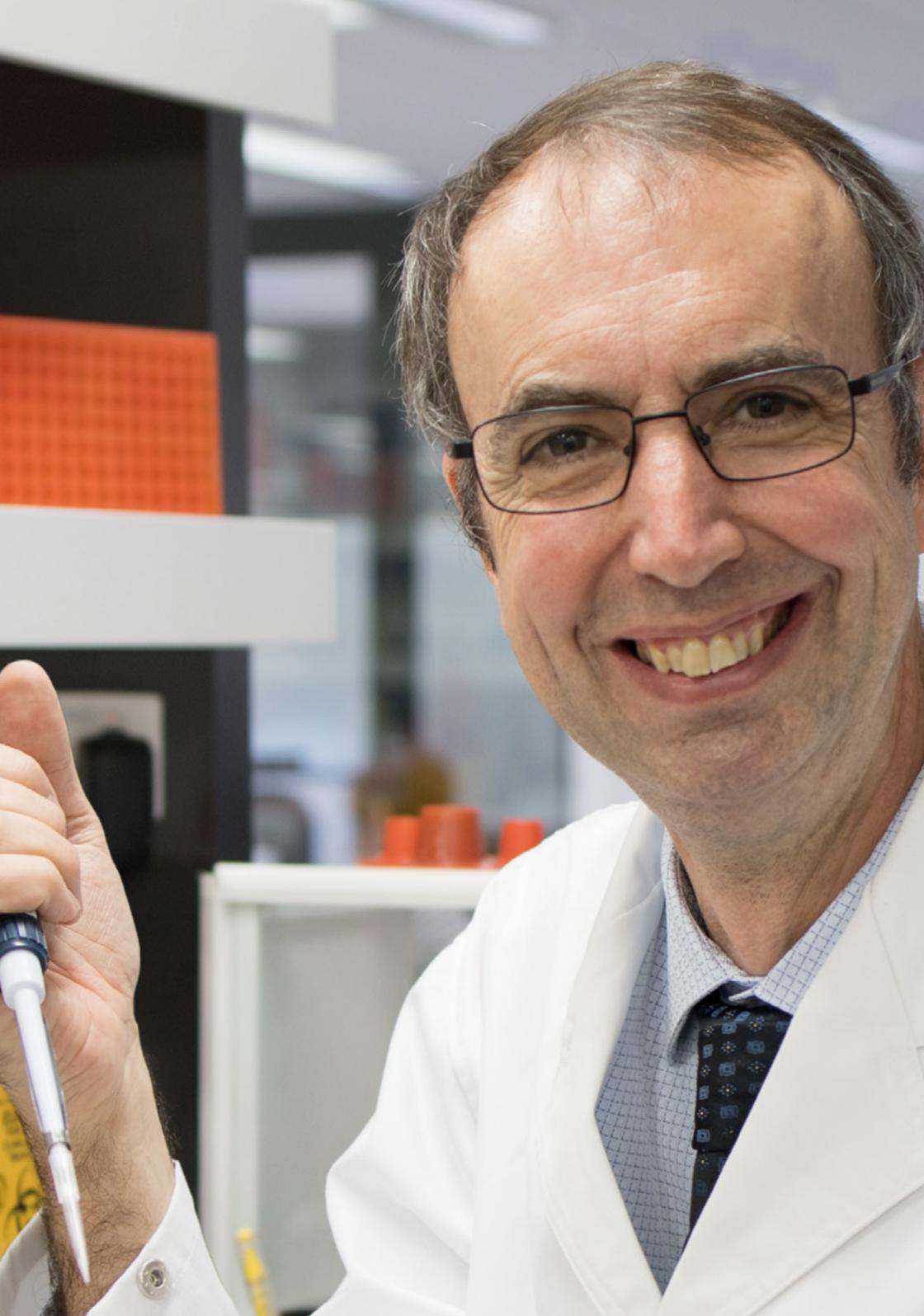
Antoine's research has attracted significant national and international funding to understand antimicrobial resistance at a molecular level and investigate the impact of antimicrobial resistance on the community.

He has brought together interdisciplinary researchers from universities and health care providers to tackle this challenge. This approach includes a whole-of-community research and awareness program and population-level health data studies to trace antimicrobial resistance and understand the impact of our use of antibiotics.

In parallel, building on his philosophy of using visualisation tools to understand disease, Antoine has led an \$80 million University of Wollongong investment to establish a world-class molecular life sciences institute, Molecular Horizons, and tackle the world's most pressing health challenges.

Before moving to Australia, Antoine led research labs in Europe and the USA, including at Harvard University. He has received prestigious fellowships from the US National Science Foundation, the European Research Council, the Australian Research Council and the National Health and Medical Research Council. He has published over 150 papers, resulting in more than 1,000 citations per year and an h-index of 52.





## CATEGORY 3 JOINT WINNER



### **Excellence in Medical Biological Sciences** (Cell and molecular, medical, veterinary and genetics)

#### **Professor Merlin Crossley**

UNSW Sydney

Professor Merlin Crossley's fundamental work in gene regulation has recently revealed a new approach to treating important inherited blood disorders, such as Sickle Cell Anaemia and Thalassemia. These are the world's most prevalent single gene defects, with more than 400,000 people affected. Developing treatments to these lifelong conditions will both help patients and reduce the burden on health services.

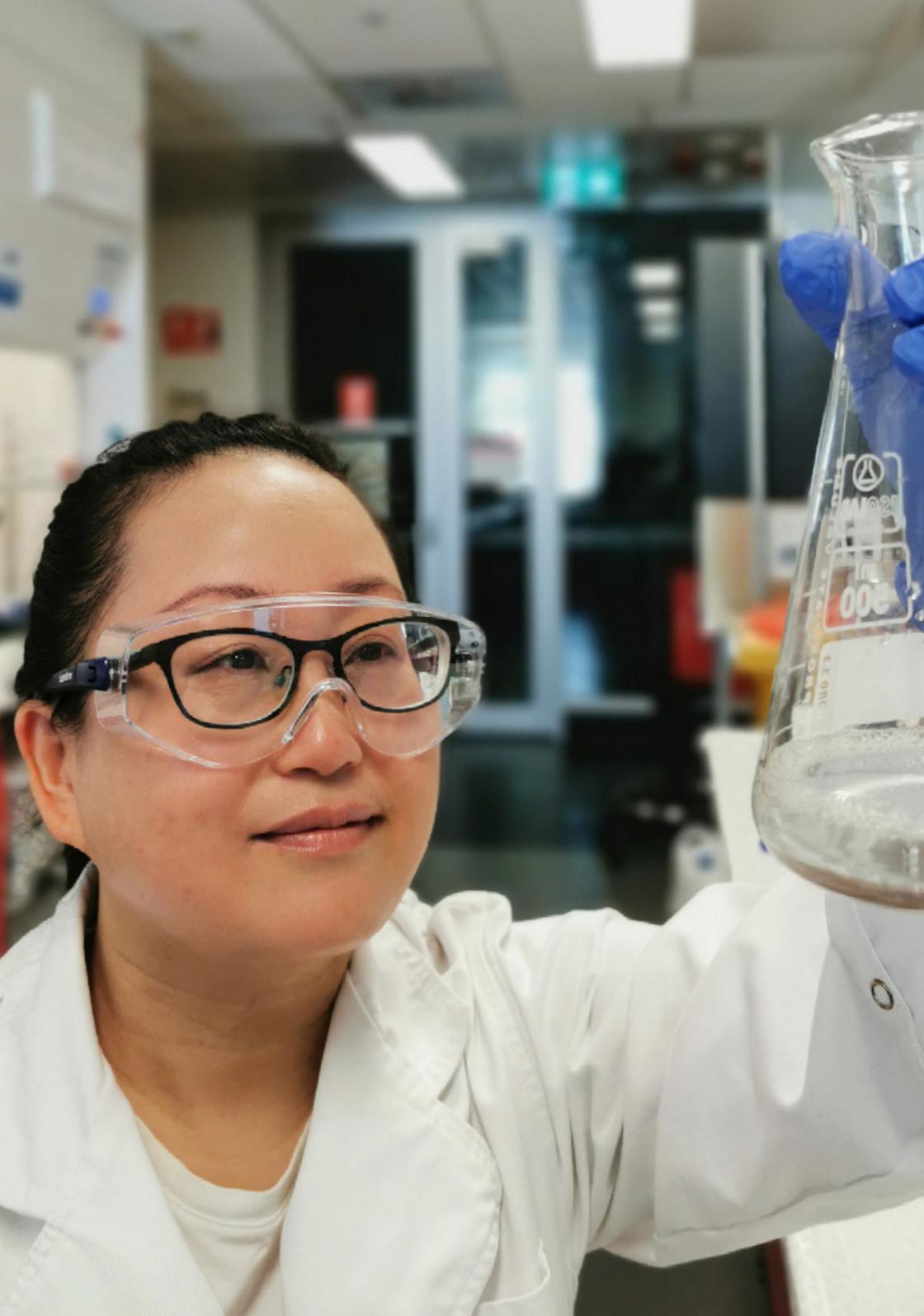
In 2015 Merlin published a landmark paper in *Nature Communications* illustrating how CRISPR-mediated genome editing could introduce naturally occurring beneficial variants to treat these diseases. This is considered preferable to conventional gene therapy that involves introducing foreign genetic material.

Merlin's subsequent papers in *Science* (2016), *Nature Genetics* (2018) and *Blood* (2017 and 2019) have demonstrated that disrupting the repressor sites that he identified could boost globin expression to alleviate symptoms. A new paper in *Nature Communications* in 2020 provided more data on epigenetic switches and gene control.

Labs around the world are trialling the new approach and Merlin is now collaborating with a major international biotechnology company and with researchers in the USA intent on translating this approach into the clinic.

Importantly, Merlin also contributes to science in NSW via leadership and advocacy as an Australian Museum Trustee, Chair of *The Conversation's* Editorial Board, Chair of UNSW Press, Deputy Director of the Australian Science Media Centre, and as a senior university leader and teacher.

Merlin has published 140 papers and his work has been cited more than 10,500 times (h-index 56).



## CATEGORY 4



### Excellence in Engineering or Information and Communications Technology



#### Distinguished Professor Zaiping Guo University of Wollongong

Distinguished Professor Zaiping Guo is a materials scientist with an exceptional track record in her field, which focuses on the applications of nanomaterials in energy storage and conversion technologies.

Zaiping's research is devoted to identifying the practical, physical and chemical properties of nanomaterials that can be used to improve the performance of energy storage devices, and batteries in particular.

Her research involves the development of next generation batteries that are safe, clean, high performing and low cost, with the aim of finding the most promising large-scale electrical energy storage solutions using renewable energy sources.

Zaiping's approach has included developing new nanoscale electrode materials to use in sodium-ion batteries, aqueous rechargeable zinc batteries and lithium-ion batteries. Her research has led to significant collaborations with other university researchers and industries in NSW and offers enormous potential for applications in future green energy use in NSW, reducing our dependence on fossil fuels, and facilitating a more sustainable state and nation.

Zaiping is an ARC Future Fellow with an outstanding record of continuous competitive funding for her research, including multiple ARC grants. The impact of her work is illustrated by her exceptional publication record: 469 publications, an h-index of 87, over 25,500 citations and a Field-Weighted Citation Index of 3.19.

Zaiping's influence has been formally recognised through her inclusion on the Institute of Scientific Information (ISI) Highly Cited Researchers list two years in a row (2018, 2019).



## CATEGORY 5



### NSW Early Career Researcher of the Year (Biological Sciences)



#### Dr Rachael Gallagher Macquarie University

**E**cologist Dr Rachael Gallagher is playing a critical role in the recovery of Australian plant species impacted by the devastating 2019-2020 bushfire season. More than 80 per cent of Australia's plant species occur nowhere else on Earth and their protection and recovery post-fire is a matter of global importance for biodiversity.

Rachael has a long-standing interest in understanding the diversity and function of the Australian flora. In her research, she uses data science approaches to combine location data from digitised herbarium specimens with information on their functional traits, to map and analyse patterns of plant diversity.

Rachael has driven the creation of the AusTraits database – a repository of ecological knowledge on the traits of Australia's plants. This ever-growing collection will allow researchers to easily access a wealth of information on native plants.

AusTraits was a critical tool earlier this year when Rachael was engaged directly by the Federal Threatened Species Commissioner to assess the impact of the unprecedented fire season on plants. She was able to rapidly prioritise species and ecosystems badly impacted, using criteria developed by leading NSW government scientists.

Her results are the only nationally comprehensive prioritisation of plants affected by the fires, assessing all the approximately 26,000 native Australian species. These results are being used to inform national recovery grant allocations and the process of listing at-risk species under state and commonwealth legislation.

Rachael is an ARC Discovery Early Career Researcher Award (DECRA) Fellow and Deputy Chair of the NSW Threatened Species Scientific Committee. She has co-authored 48 peer-reviewed journal articles and book chapters, including papers in *Nature - Ecology and Evolution*, and *Science*.

Her work has been cited 3,691 times. She has an h-index of 23.



## CATEGORY 6



### NSW Early Career Researcher of the Year (Physical Sciences)



#### Dr Jelena Rnjak-Kovacina UNSW Sydney

Dr Jelena Rnjak-Kovacina is an emerging leader in the field of biomedical engineering. Her research aims to develop novel therapeutic solutions for the treatment of cardiovascular disease.

Cardiovascular disease is the leading cause of mortality worldwide and affects over 1.2 million Australians. There is currently no effective treatment for the damage to the heart tissue caused by myocardial infarction, or the heart attack. Implantable biomaterial and bioengineered tissue grafts such as cardiac patches are a potentially revolutionary therapeutic option, but their use is currently limited by a lack of vascular supply.

Jelena has made major contributions toward the development of functional cardiovascular implants by engineering silk biomaterials that rapidly vascularise when implanted. Her work aims to understand the physical and biological cues that contribute to implant vascularisation and translate these to effective therapies.

The innovation and quality of Jelena's research and leadership in the field have been recognised through:

- Grant funding, including a prestigious Heart Foundation Future Leader Fellowship
- Election to boards of leading bodies in the field, including the Australasian Society for Biomaterials & Tissue Engineering (ASBTE) and the Australian Cardiovascular Alliance Bioengineering Flagship
- Invitations to present her work at top domestic and international conferences
- Accolades, including a NSW Young Tall Poppy Science Award and the ASBTE Emerging Leader Award.

Jelena is a keen contributor to research training and Science, Technology, Engineering, Mathematics and Medicine (STEMM) communication in the wider community.

Her work has thus far resulted in 48 peer-reviewed articles in top international journals in the field (2,600 citations, h-index 24).



## CATEGORY 7



### Leadership in Innovation in NSW

**Professor Ewa Goldys**  
FOSA FTSE FSPiE FRSN  
UNSW Sydney



Professor Ewa Goldys is a world leader in the applications of light and fluorescence to biomedicine, nanotechnology and advanced materials.

Ewa's discovery of non-invasive fluorescent diagnostics of native colours and shapes in cells and tissues was recognised in 2016 with a Eureka Prize for Innovative Use of Technology.

This big data driven technique is capable of recognising cancer margins, diabetic complications, neurodegenerative motor neuron disease and fertilisation potential in reproductive medicine.

Ewa's technique allowed cattle breeders to predict successful pregnancy in cattle with 96 per cent accuracy, an improvement of over 10 per cent compared to state-of-the-art methods. This breakthrough has enabled breeders to employ embryo transfer to obtain consistently higher value calves with high quality genetics, resulting in calves valued \$600 higher than those produced through conventional mating or artificial insemination.

Ewa leads major research initiatives, including as Deputy Director of the \$40 million ARC Centre of Excellence for Nanoscale BioPhotonics, and as a leader of the \$15 million SHARP team at UNSW Sydney.

Internationally, Ewa is a Fellow of the Society for Optics and Photonics (SPIE) and the Optical Society, who recognised her "for research leadership in optical characterization and biomedical sensing that has promoted widespread interdisciplinary awareness of light in life sciences".

Ewa's leadership has consolidated the optics and biomedical communities establishing internationally prominent biophotonics research in Australia. A role model for women in senior leadership, Goldys has mentored more than 30 early career researchers.

Ewa has a distinguished publication track record with a total of over 300 publications, which have attracted more than 7,800 citations (h-index 43).



## CATEGORY 8



### Innovation in Public Sector Science and Engineering

#### Dr David Hopkins

NSW Department of Primary Industries



For 29 years, Dr David Hopkins has worked for the Department of Primary Industries to deliver beneficial outcomes to the wider community of NSW.

David's reputation in his field of meat science goes well beyond NSW to the national and international arena. David's research has focused on improving the consistency and quality of red meat. This work addresses the NSW DPI's goal to increase the value of Primary Industries in NSW.

An example of the significance of David's work is demonstrated through the lamb meat sector, which has undergone major changes in focus to provide consumer acceptable products of high quality. David's research has significantly contributed to these changes and the industry is now worth in excess of \$3.9 billion.

This impact cannot be understated. David's deep knowledge of meat quality and its structure has supported the development of many innovative technologies, including VIASCAN® for objective carcass evaluation and New Generation Electrical Stimulation and SMARTSTRETCH™/ SMARTSHAPE™ for the improvement of meat.

The quality of David's work is exemplified by the requests he receives to author internationally renowned books in meat science. David has held appointments as an Associate Editor for three journals, has been an Editorial Board Member of four journals and is the first Australian Editor-in-Chief of the international journal *Meat Science*.

David holds academic positions in Australia and overseas and has supervised post-graduate students across the globe. His publication record includes more than 750 scientific journal papers, chapters and technical/extension papers. He has received over 9,394 citations (Google Scholar) and has a Google Scholar h-index of 51 and a Web of Science h-index of 39.



## CATEGORY 9



### Innovation in Science, Technology, Engineering or Mathematics Teaching in NSW



#### Sophie Poisel

Emanuel School

Sophie Poisel is passionate about fostering curiosity in science, technology, engineering and mathematics (STEM) and empowering her students to see how STEM skills enable them to design and create a better world.

Sophie was a recipient of the 2018 Premier's Commonwealth Bank Teacher Scholarship for STEM and spent five weeks visiting leading schools and universities across North America. Inspired by her experience, Sophie has implemented innovative teaching practices in her school, both within and beyond the curriculum.

Within the curriculum, Sophie has worked collaboratively with K-6 teachers to develop interdisciplinary units of inquiry that focus on real-world problem solving, and building students' skills in Scientific, Systems, Computational and Design Thinking. She has connected industry experts with teachers to inspire students to pursue and maintain interest in STEM areas.

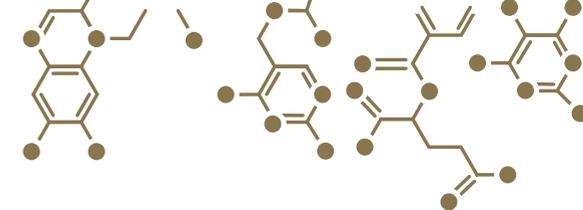
Beyond the curriculum, Sophie has worked with groups of students on projects related to personal passions or competitions. She designed and piloted an effective after-school program to develop students' interest, confidence and aspirations in STEM. The program sought to break the stereotypes of what a scientist looks like, and what working in a STEM field involves, through connections with STEM experts. These projects have served to motivate and raise the profile of STEM.

Sophie has spent the past two years creating and adapting the Primary Imaginarium. She has done extensive research to design the most effective space to encourage the exploration of scientific concepts through play, experimentation and tinkering.

Beyond the school, Sophie has taken opportunities to share her expertise by presenting at multiple conferences. Having been awarded a Google grant, Sophie designed and led a team to organise the DigiTech Deep Dive conference for primary school educators, providing excellent networking and shared learning opportunities.



# 2020 NSW SCIENTIST OF THE YEAR



**Professor Edward C. Holmes**

**FAA FRSN FRS**

**The University of Sydney**

Professor Edward (Eddie) Holmes is an ARC Australian Laureate Fellow at The University of Sydney, with concurrent appointments in the School of Life and Environmental Sciences, the School of Medical Sciences and the Charles Perkins Centre.

Eddie is a global leader in research on the emergence, evolution and spread of viruses. He has a particular interest in investigating how viruses are able to jump species boundaries and emerge in new hosts, occasionally causing disease epidemics and pandemics.

Eddie has made major contributions to our understanding of the fundamental mechanisms by which viruses evolve and helped to pioneer the use of phylogenetic methods to track the spread of viruses within populations. His other major research themes are using genomics to understand the epidemiology of major human and animal pathogens, and revealing the extent and structure of global virus diversity (the so-called “virosphere”).

His work has led to fundamental insights into the origin and spread of numerous viruses that have had a major impact on human and animal health, including hepatitis C, HIV, influenza, West Nile, dengue, Zika and Ebola.

Most recently, Eddie was involved in key research that demonstrated that the virus SARS-CoV-2 was the causative agent of COVID-19 and was the first person to publicly release the genome sequence of the virus in early January 2020, enabling diagnostic tests to be rapidly developed.



# 2020 NSW SCIENTIST OF THE YEAR



Preparing to sample bats in a cave in Zhejiang province, China in 2013. This resulted in the discovery of a number of novel coronaviruses. Inset: the cave entrance.

He followed this with fundamental research into the animal origins of SARS-CoV-2, helping to demonstrate the presence of related viruses in bats and pangolins, and showing that coronaviruses have a particular ability to jump species boundaries and emerge in new hosts.

Eddie received his undergraduate degree in Anthropology from the University of London (1986) and his PhD from the University of Cambridge (1990). Subsequently, he performed postdoctoral research at the Universities of California, Edinburgh and Oxford.

Between 1993-2004 he held various positions at the University of Oxford, including University Lecturer in Evolutionary Biology and Fellow of New College.

Between 2005-2012 he was a professor at the Pennsylvania State University, USA, simultaneously holding an adjunct position at the Fogarty International Center, National Institutes of Health. In 2012 he joined The University of Sydney as a National Health and Medical Research Council (NHMRC) Australia Fellow.

Eddie has received a number of awards and prizes for his research:

- In 2003 he was awarded the Scientific Medal by the Zoological Society of London
- In 2008 he became a Kavli Fellow of the National Academy of Sciences, USA
- In 2010 he won the Faculty Scholars Medal in the Life and Health Sciences at the Pennsylvania State University
- In 2017 he won the NSW Premier's Prize for Science & Engineering in the Biological Sciences.

Eddie was elected a Fellow of the Australian Academy of Science (FAA) in 2015 and a Fellow of the UK Royal Society (FRS) in 2017. He has published over 600 peer-reviewed papers and two books, and his work has been cited more than 76,000 times (h-index 140).



2019 NSW Premier's Prizes for Science & Engineering winners at Government House, Sydney (left to right):

Mr Stuart Garth, the Hon. Sarah Mitchell MLC, Professor David Keith, Professor Susan Clark, the Hon. Gladys Berejiklian MP, Premier of NSW, Professor Nalini Joshi, Dr Angelica Merlot, Professor Stephanie Watson, Scientia Professor Rose Amal, 2019 Scientist of the Year, Professor John Wiggers, Professor Albert Zomaya, Her Excellency, the Hon. Margaret Beazley AO QC, Governor of NSW, Dr Neeraj Sharma, Professor Hugh Durrant-Whyte, NSW Chief Scientist & Engineer, the Hon. Gabrielle Upton MP.

