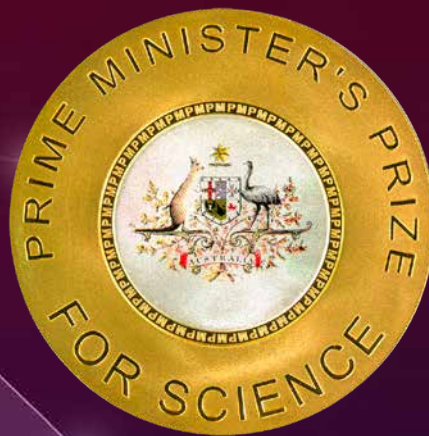




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THE PRIME MINISTER'S PRIZES FOR SCIENCE



CITATIONS AND PRIZE RECIPIENTS



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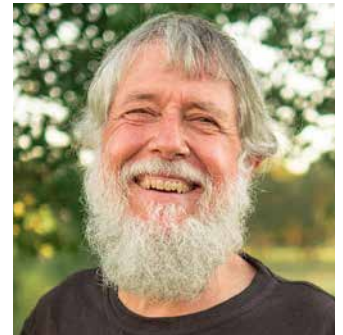
THE PRIME MINISTER'S PRIZES FOR SCIENCE

Emeritus Professor David Blair, Professor David McClelland, Professor Susan Scott & Professor Peter Veitch

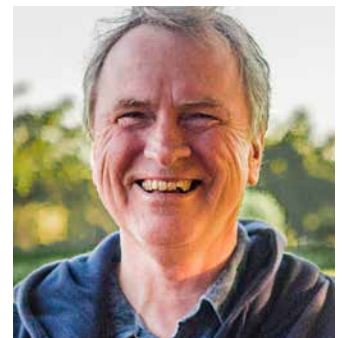
ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav)

2020 PRIME MINISTER'S PRIZE FOR SCIENCE

- Emeritus Professor David Blair, Professor David McClelland, Professor Susan Scott and Professor Peter Veitch are pioneering Australian physicists recognised for their critical contributions to the first direct detection of gravitational waves, thereby opening a new window into the Universe with gravitational wave astronomy. This is a groundbreaking discovery in the field of physics, which has been 100 years in the making.
- Albert Einstein first predicted the existence of gravitational waves in 1916. Gravitational waves are minute distortions in the fabric of space-time that are non-electromagnetic in nature and spread from their source at the speed of light. However, he believed they would never be detectable.
- In 1994, 78 years after Einstein's hypothesis, the world took a significant step towards gravitational wave detection with the construction of two four-kilometre, arm-length gravitational wave detectors in the United States, which formed the Laser Interferometer Gravitational-wave Observatory (LIGO). One year later, the Australian Consortium for Interferometric Gravitational-wave Astronomy (ACIGA) was formed, focusing on gravitational wave detection research and development.
- In 1997, ACIGA members, Emeritus Professor Blair and Professors McClelland, Scott and Veitch joined the LIGO Scientific Collaboration (LSC) to broaden their activities to cover all areas of LIGO research.
- In the decades following, this team has led critical work to develop our understanding of the existence of gravitational waves. This culminated in the first direct gravitational wave detection in 2015 – the signal coming from the collision of two substantial black holes 1.3 billion years ago.
- This was followed by a further detection in 2017, from the collision of two neutron stars. The first detection of its kind, this event solved a 50-year-old mystery confirming that these mergers are the source of previously observed high-energy gamma ray bursts, and of heavy metals such as gold, platinum and uranium in the Universe.
- The impact of their discovery has been immense, opening up previously unknown parts of the Universe such as hidden black holes, understanding the origin of gamma ray bursts (and with the potential to discover how supernovae explode), and to even peer back to the beginning of time at the Big Bang.
- For this 'discovery of the century', the 2017 Nobel Prize in Physics was awarded to the three American founders of the LIGO project. It was featured by the Australian Academy of Science as one of the top five international science breakthroughs of the last decade.



Emeritus Professor David Blair



Professor David McClelland



Professor Susan Scott



Professor Peter Veitch



THE PRIME MINISTER'S PRIZES FOR SCIENCE

Emeritus Professor David Blair

- Emeritus Professor Blair created a large-scale high optical power research facility on a remote site at Gingin, Western Australia, to mimic Advanced LIGO interferometers and investigate the subtle interactions between light, sound and heat that would occur in full-scale detectors.
- His pioneering work predicted that laser light would scatter from sound in the mirrors, causing parametric instability at power levels far below that needed to obtain detector sensitivity.
- When this theory was validated during LIGO commissioning, Emeritus Professor Blair sent team members to help implement stabilisation methods that allowed the detectors to achieve sufficient power levels to make the first detection of gravitational waves.

Professor David McClelland

- Professor McClelland has led Australia's partnership in Advanced LIGO since its commencement in 2009.
- He chaired the LIGO Scientific Collaboration's (LSC's) Instrument Science/Advanced Detector program from 2013 to 2017.
- He is the Principal Investigator for OzGrav in the LSC and represents OzGrav on the Gravitational Wave International Committee (GWIC).
- Professor McClelland led The Australian National University team that played a crucial role in designing, installing and commissioning Advanced LIGO's lock acquisition system, and in the construction and installation of Australian hardware for precision routing of the laser beam.
- His pioneering quantum 'squeezing' technology (now installed in all detectors) is essential for boosting interferometer sensitivity to the current level where signals are detected weekly when in operation.

Professor Susan Scott

- Australia's leading general relativity theorist, Professor Scott initiated the Australian effort in gravitational wave data analysis in 1998, and led Australian research in digging gravitational wave signals out of detector noise.
- Her Australian National University team contributed key components to the LIGO Data Analysis System through which the detection signal was processed in 2015; designing and conducting the first gravitational wave search to be carried out under Australian leadership.
- When LIGO made the first observation of a neutron star merger, the ANU SkyMapper telescope imaged the newly-born kilonova and determined its temperature profile.

Professor Peter Veitch

- Professor Veitch's University of Adelaide team invented and installed critical instrumentation for the Advanced LIGO detectors, namely their Hartman sensors. These sensors provide a solution to a major technological problem – the distortion of the laser beam within the detector – by measuring them simply and with a sensitivity that is 30-times better than any other sensor.
- The Hartman sensors are used at all stages of the detection process: commissioning, measurement and adaptive correction of the distortions, and optimising the detector sensitivity and stability.



THE PRIME MINISTER'S PRIZES FOR SCIENCE

Emeritus Professor David Blair

QUALIFICATIONS

- PhD., East Anglia (1972)
- B.Sc., Physics (First Class Hons), University of Western Australia (1967)

CAREER HIGHLIGHTS

- 2018 West Australian Scientists Hall of Fame
- 2017 Royal Astronomical Society Group Achievement Award 'A'
- 2017 Australian Academy of Science Bruno Rossi Prize awarded to the LIGO Scientific Collaboration
- 2016 Gruber Cosmology Prize awarded by The Gruber Foundation
- 2016 Special Breakthrough Prize for Fundamental Physics
- 2007 Western Australian Scientist of the Year 2007-8
- 2006 Western Australian Champion Award
- 2005 Australia-New Zealand Association for the Advancement of Science Medal
- 2005 Australian Government Eureka Prize for Promoting the Understanding of Science
- 2003 Clunies Ross National Science and Technology Medal
- 2003 National Medal for Community Service
- 2003 Centenary Medal for Service to Science
- 2000 Citation: Most Outstanding Review Paper, Reports on the Progress of Physics
- 1995 Australian Institute of Physics Walter Boas Medal
- 1993 75th Anniversary Award, The University of Western Australia
- 1992 NASA Group Achievement Award
- 1988 Marcel Grossmann Institutional Award for Research in Gravitation and Astrophysics



THE PRIME MINISTER'S PRIZES FOR SCIENCE

Professor David McClelland

QUALIFICATIONS

- PhD., University of Otago (1987)
- M.Sc., University of Western Australia (1981)
- B.Sc. (First Class Hons), University of Western Australia (1978)

CAREER HIGHLIGHTS

- 2019 Fellow of Australian Academy of Science
- 2018 International Organisation for Quantum Communication, Measurement and Computing Award for Outstanding Achievements in Quantum Experimentation
- 2017 Walter Boas Medal, Australian Institute of Physics
- 2017 Vice Chancellor's Award for Excellence
- 2017 Royal Astronomical Society Group Achievement Award 'A'
- 2017 Einstein Medal, Einstein Society, Switzerland
- 2017 AAS Bruno Rossi Prize awarded to the LIGO Scientific Collaboration
- 2017 Princess of Asturias Award for Technical and Scientific Research
- 2016 The Australian National University (ANU) Impact Award for Reach and Influence
- 2016 Gruber Cosmology Prize awarded by The Gruber Foundation
- 2016 Special Breakthrough Prize for Fundamental Physics
- 2016 Ecole Normale Supérieure Visiting Fellow, Paris, France
- 2013 Elected Fellow, Optical Society of America
- 2013 Joseph F. Keithley Award, American Physical Society
- 2010 Elected Fellow, American Physical Society
- 1997 Associateship, California Institute of Technology
- 1992 French National Centre for Scientific Research (CNRS) Research Fellowship



THE PRIME MINISTER'S PRIZES FOR SCIENCE

Professor Susan Scott

QUALIFICATIONS

- PhD. Mathematical Physics, The University of Adelaide (1991)
- B.Sc. Pure Mathematics (Hons), Monash University (1979)

CAREER HIGHLIGHTS

- 2020 Fellow of American Physical Society
- 2017 American Astronomical Society Bruno Rossi Prize
- 2017 Einstein Medal, Einstein Society, Switzerland
- 2017 Royal Astronomical Society Group Achievement Award in Astronomy
- 2017 Princess of Asturias Award for Technical and Scientific Research
- 2017 The Australian National University (ANU) Award "Vice-Chancellor's Award for Excellence"
- 2016 Gruber Cosmology Prize awarded by The Gruber Foundation
- 2016 Special Breakthrough Prize for Fundamental Physics
- 2016 ANU Award "Impact Award for Reach and Influence"
- 2016 Fellow of Australian Academy of Science
- 2016 Fellow of Australian Mathematical Society
- 2004 Fellow of European Academy of Sciences
- 2004 Fellow of Australian Institute of Physics
- 1999 Fellow of Institute of Physics (UK)
- 1992-98 ARC Australian Research Fellow
- 1986-89 Rhodes Fellowship, Oxford (worked with Roger Penrose – 2020 Nobel Laureate in Physics)
- 1985 Amelia Earhart Fellowship (USA)



THE PRIME MINISTER'S PRIZES FOR SCIENCE

Professor Peter Veitch

QUALIFICATIONS

- PhD., University of Western Australia (1987)
- B.Sc. (Hons), University of Western Australia (1978)

CAREER HIGHLIGHTS

- 2017 Royal Astronomical Society Group Achievement Award 'A'
- 2017 Australian Academy of Science Bruno Rossi Prize awarded to the LIGO Scientific Collaboration
- 2016 Gruber Cosmology Prize awarded by The Gruber Foundation
- 2016 Special Breakthrough Prize for Fundamental Physics
- 2016 Elected Fellow, Optical Society of America
- 1991 Max Planck Research Award



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THE PRIME MINISTER'S PRIZES FOR SCIENCE

Professor Thomas Maschmeyer

The University of Sydney



2020 PRIME MINISTER'S PRIZE FOR INNOVATION

- Professor Thomas Maschmeyer is a Professor of Chemistry at the University of Sydney, where he serves as Founding Director of the Laboratory of Advanced Catalysis for Sustainability (School of Chemistry). He is also the Founding Executive Chairman of Gelion Technologies and Co-Founder as well as Principle Technology Consultant of Licella Holdings.
- He is being recognised for translating his outstanding fundamental research into two pioneering technologies: the Catalytic Hydrothermal Reactor (Cat-HTR™), and zinc-bromide energy storage design. These achievements greatly enhance Australia's reputation for leadership in science, and its application to solving sustainability problems.

The Catalytic Hydrothermal Reactor (Cat-HTR™)

- Cat-HTR™ enables the transformation of residues and wastes into valuable (petro)chemical feedstocks.
- The technology can process inputs that include pulp and paper processing waste, woody construction waste, mixed end-of-life plastics, used lubrication oil, shredded tyres and much more.
- The underlying fundamental research began at the Technical University of Delft, and continued at the University of Sydney. From here, it was brought to commercial demonstration at Licella Holdings (the company Professor Maschmeyer co-founded with its CEO Dr Len Humphreys in 2007).
- Professor Maschmeyer – together with large and varied teams – not only improved the understanding of their fundamental discoveries, but translated them into a process with global implications. An Australian plant to deliver this technology is now being designed with Licella's joint venture, IQRenew.
- Cat-HTR™ has attracted \$100 million of international investment for its development (\$85 million of this in Australia). Licella has created near 50 full- and part-time jobs in Australia, and another 15 overseas.
- The Cat-HTR™ development is enormously important for Australia. It addresses the sustainability of liquid fuel and chemical supplies by using renewable waste or end-of-life plastic inputs to support a circular economy. This reduces carbon dioxide emissions and plastic waste in the environment.
- In Prime Minister Scott Morrison's address to the United Nations General Assembly in 2019, Cat-HTR™ was specifically named as a technology that "...shows us a truly circular economy is not only possible, but is achievable".



THE PRIME MINISTER'S PRIZES FOR SCIENCE

Zinc-bromide energy storage design

- Professor Maschmeyer's zinc-bromide gel battery design is unlocking the potential of renewable energy and a low-carbon society by facilitating safe, low-cost, high-efficiency energy storage.
- This innovation launched Gelion Technologies, a company that has raised \$21 million over five years in local and overseas financial markets and employs 25 staff (two-thirds of whom are directly engaged in either research or technology development).
- Gelion's Endure Zinc-Bromide batteries are optimised for stationary energy storage, and to power off-grid and micro-grid installations for a range of industrial, agricultural (e.g. irrigation or desalination) and residential purposes. The Endure batteries are especially suited to hot and remote environments due to their high temperature capability, low fade and tolerance of any state of charge, including complete discharge.

QUALIFICATIONS

- D. Phil. (Science), The University of Sydney (1995)
- B. Sci. (Hons. I), The University of Sydney (1991)
- German Abitur, Hamburg (1986)

CAREER HIGHLIGHTS

- 2019 Federation of Asian Chemical Societies' Contribution to Economic Development Award
- 2019 Honorary Doctorate of Science, Universities of Ca'Foscari Venice and Trieste
- 2018 CSIRO Eureka Prize for Leadership in Innovation and Science
- 2018 Royal Australian Chemical Institute (RACI) R.K. Murphy Medal for Industrial Chemistry
- 2015 Founding Executive Chairman of Gelion Technologies
- 2015 Honorary Distinguished Professor, University of Cardiff
- 2014 Founding Director of University of Sydney's A\$150 million Australian Institute of Nanoscale Science and Technology (AINST, now 'Sydney Nano')
- 2014 Fellow, Royal Society of New South Wales
- 2013 New South Wales Science and Engineering Award for Renewable Energy Innovation
- 2012 Royal Australian Chemical Institute (RACI) Weickhardt Medal for Economic Contributions through Chemistry
- 2011 Royal Australian Chemical Institute (RACI) Applied Research Award
- 2011 Foreign Member, Academia Europea
- 2011 Fellow, Australian Academy of Science (AAS)
- 2011 Fellow, Australian Academy of Technological Sciences and Engineering (ATSE)
- 2011 Fellow, Royal Australian Chemical Institute (RACI)
- 2007 Le Fèvre Prize of the Australian Academy of Science for Outstanding Basic Research in Chemistry by a Scientist under 40
- 2007 Co-Founder, Licella Holdings
- 2006 Co-Founder, Ignite Energy Resources
- 2001 Founding Professor, Avantium



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THE PRIME MINISTER'S PRIZES FOR SCIENCE

Professor Mark Dawson

Peter MacCallum Cancer Centre

2020 FRANK FENNER PRIZE FOR LIFE SCIENTIST OF THE YEAR

- Professor Mark Dawson is the Associate Director of Research Translation at the Peter MacCallum Cancer Centre and has a co-appointment at the Centre for Cancer Research at The University of Melbourne.
- He is a pioneer in the field of epigenetics and its impact on human health and disease. His achievements have revolutionised the understanding and treatment of blood cancers. The originality and impact of his work in the field of science is recognised around the world.
- Professor Dawson's research provides the molecular evidence for several novel, first-in-class epigenetics-based cancer therapies. He has guided these therapies through several stages, from discovery in the laboratory to clinical application, including leading several international clinical trials.
- These breakthroughs have allowed clinicians, for the first time, to precisely target epigenetic pathways for improved treatment of people with cancer. This provides patients with access to potentially life extending novel therapies.
- Professor Dawson's first fundamental finding was the landmark discovery that kinases (enzymes that regulate the biological activity of proteins) could act within a cell's nucleus to directly modify chromatin, altering transcription and contributing to the development of cancerous tumours.
- This major conceptual advance has been subsequently demonstrated for a number of signalling kinases, including across diverse fields, such as cancer, inflammation and metabolism.
- His subsequent work helped establish the paradigm of targeting epigenetic readers as a novel therapeutic strategy in cancer. He remains a world-leading expert in this field and his work in improved anti-cancer treatments has led to significant improvements to the welfare of people with cancer.
- His research into bromodomain and extra-terminal (BET) protein regulation of malignant gene expression (and how that could be inhibited) broke new ground and established this class of molecule as a therapeutic target for cancer therapy. This pioneering work ignited drug discovery and development programs in several international pharmaceutical companies, with several BET inhibitors now in clinical development in Phase 1 and 2 trials.
- His development of novel cancer therapeutics has expanded into the research of cutting-edge technologies to advance capabilities in preclinical drug discovery. This includes an innovative approach to allow real-time evaluation of drug kinetics in live systems, which is recognised as paradigm-shifting by world leaders in the field.
- The originality of Professor Dawson's research is reflected in his outstanding publication record as lead and/or senior author, including five publications in *Nature* and two in *Science*.
- Over the past 10 years, Professor Dawson has been a named Chief Investigator on major projects receiving more than \$12.5 million in national and international funding.
- Professor Dawson is already championing science to younger Australians and for the benefit of humanity. He is a compelling orator who promotes the excitement and the power of science whenever he can.





THE PRIME MINISTER'S PRIZES FOR SCIENCE

QUALIFICATIONS

- PhD, University of Cambridge (2010)
- B. MedSci., University of Melbourne (1999)
- MB.BS., University of Melbourne (1999)

CAREER HIGHLIGHTS

- 2020 McCulloch and Till Award from the International Society of Experimental Haematology
- 2019 Sir Edward Dunlop Fellow for the Cancer Council of Victoria
- 2019 Dame Kate Campbell Fellowship, University of Melbourne
- 2017 Metcalf Prize for Stem Cell Research
- 2017 Howard Hughes Medical Institute, International Research Scholar
- 2017 Elected as a Fellow of the Australian Academy of Health and Medical Sciences
- 2014 Senior Fellow, Leukaemia Foundation Australia
- 2014 Victorian Endowment for Science, Knowledge & Innovation (VESKI) Fellowship
- 2014 Herman Clinical Fellowship, University of Melbourne
- 2010 Wellcome-Beit Prize Fellowship
- 2007 Fellowship of the Royal College of Pathologists of Australasia
- 2007 Fellowship of the Royal Australasian College of Physicians
- 2006 General Sir John Monash Scholarship
- 2006 Cambridge Commonwealth Trust Fellowship



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THE PRIME MINISTER'S
PRIZES FOR SCIENCE

Scientia Associate Professor Xiaojing Hao University of New South Wales (UNSW)

2020 MALCOLM MCINTOSH PRIZE FOR PHYSICAL SCIENTIST OF THE YEAR

- Scientia Associate Professor Xiaojing Hao is a world-leading researcher in the field of thin-film solar photovoltaics (PV) at the University of New South Wales (UNSW). This work relates to the direct conversion of sunlight into electric power.
- Associate Professor Hao initiated a new line of research after completing her PhD in photovoltaics at UNSW, using emerging, earth-abundant and non-toxic thin-film material known as 'sulphide kesterite' (or Copper Tin Zinc Sulphide) to form solar cells.
- This compound material acts much like the traditional solar panels we see today. However, it does not use any of the toxic or scarce elements found in non-silicon thin-film solar offerings currently seen in commercial environments.
- While silicon is an almost ideal material for PV, there is a need for similar environmentally-friendly thin-film materials such as kesterite. These 'green' materials can be used in applications that are not well-suited to silicon solar cells (e.g. coatings on buildings or on the bodywork of solar vehicles), or can be stacked on top of standard silicon cells to boost their power output.
- Associate Professor Hao's mission is to create 'green' solar cells with abundant and environmentally-friendly materials, so that they can be deployed on a large scale and applied across all aspects of modern life.
- Associate Professor Hao and her team intended to prove that kesterite solar cells could function at a sufficient rate of energy conversion, and in the process, set four world records for pure sulphide kesterite solar cell efficiency. In March 2017, the team reached an energy conversion efficiency of 11 per cent – the first time that the 10 per cent efficiency threshold was broken for this type of solar cell. In late 2019, Associate Professor Hao and her team set another world record for a low bandgap kesterite solar cell, reaching an energy conversion efficiency of 12.5 per cent.
- These breakthroughs represent major advances in the development of solar cells because they are flexible, low-cost and environmentally-friendly. Her achievements could lead to 'green', low-cost industrial tandem solar cells with efficiencies of well above 30 per cent. Such high-power 'green' solar cells would speed up the global deployment of PV systems, a positive step given the threat of climate change.
- Associate Professor Hao's achievements has piqued the commercial interest of industry, and established her as the international leader in the development of thin-film solar cells. Her work is driven by a keen awareness that our current and future renewable energy demands will only be met with a wide-scale and significant increase in the use of PV. The technology must also be cost-effective and must not create new environmental problems via the use of toxic elements.





THE PRIME MINISTER'S PRIZES FOR SCIENCE

- Associate Professor Hao has also made significant contributions to the development of other top cell thin-film materials for the next generation of silicon-based tandem cell stacks. In these cell stacks, thin-film top cell candidates are stacked on the silicon to achieve dramatic increases in performance.
- The significance and commercial potential of Associate Professor Hao's pioneering technology is reflected in the \$23 million plus in competitive research grants that her work at UNSW has attracted since 2011.

QUALIFICATIONS

- PhD. Photovoltaic Engineering, University of New South Wales (2010)
- M.Eng., Northeastern University, Shenyang, China (2003)
- B.Eng., Northeastern University, Shenyang, China (2001)

CAREER HIGHLIGHTS

- 2020 Australian Research Council College of Experts
- 2019 Australian Research Council Future Fellowship
- 2019 Australian's Most Innovative Engineers 2019
- 2018 New South Wales Premier's Prize for Science and Engineering (Energy Innovation in New South Wales)
- 2018 University of New South Wales Research Staff Excellence Award (Faculty of Engineering)
- 2018 Best Poster Award, 7th World Conference on Photovoltaic Energy Conversion (combining the most two prestigious world PV conferences)
- 2017 Finalist (Top 3) of University of New South Wales Women in Engineering Awards of 'Professor Judy Raper Award for Leadership in Engineering'
- 2017 University of New South Wales Scientia Fellowship (Inaugural)
- 2015 Australian Research Council Discovery Early Career Researcher Award (DECRA)
- 2015 Named as one of UNSW's '20 rising stars who will change our world'
- 2011 Australian Renewable Energy Agency (ARENA) Postdoctoral Fellowship
- 2009 Australian Academy of Technological Science and Engineering-Early Career Symposium Fellowship (ATSE-ECSF)
- 2008 Chinese Government Award for Outstanding Overseas Student
- 2007 Best Poster Award, 17th International Photovoltaic Science and Engineering Conference, Fukuoka, Japan
- 2006 Endeavour International Postgraduate Research Scholarship (EIPRS) PhD scholarship



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THE PRIME MINISTER'S
PRIZES FOR SCIENCE

Associate Professor Justin Chalker

Flinders University

2020 PRIZE FOR NEW INNOVATORS

- Associate Professor Justin Chalker has invented a novel class of polymers synthesised directly from elemental sulphur (a waste by-product of the petrochemical industry), and renewable plant oils.
- The vast majority of polymers (such as conventional plastic and rubber) are made from unrenovable building blocks and many of these materials are non-recyclable. Associate Professor Chalker's ground-breaking research shows that low-cost and renewable molecules (such as limonene and canola oil) can react with sulphur to make a new class of sustainable and recyclable plastic and rubber.
- Associate Professor Chalker has demonstrated a range of real-world applications for his new sulphur-polymer materials, addressing critical issues facing humanity such as ensuring clean air, water and sustainable food production. These are outlined below.

Mercury remediation

- Environmental contamination caused by mercury is a serious global issue. Associate Professor Chalker's polymers are excellent agents for mercury capture. They work to remove contamination from the air, water and soil at a rate and volume competitive with current commercial sorbents.

Oil-spill clean-up

- Associate Professor Chalker's polymer has a high affinity for crude oil and diesel fuel, so can be useful in cleaning up oil spills. When the polymer is applied to an oil spill, it gathers the oil into a gel upon contact for easier retrieval.

Slow-release fertilisers

- Associate Professor Chalker has shown that fertiliser nutrients can be embedded in his sulphur-based polymer. This allows the slow release of nutrients, with the polymer acting as a source of the micronutrient sulphur. Since more than 50 per cent of all fertiliser applied globally is lost to run-off, Associate Professor Chalker's fertiliser formulation is a breakthrough in crop production.

Mercury- and cyanide-free gold mining

- Artisanal and small-scale gold mining is the largest source of mercury pollution on Earth, with nearly 20 million subsistence miners using mercury to extract gold from ore. In formal and large-scale gold mining, it is common to use highly toxic cyanide to leach gold. Associate Professor Chalker has recently patented a gold mining process that eliminates the use of toxic mercury and cyanide. The process features a novel and safe way to rapidly leach the gold in high yield. The sulphur polymer is then used to recover the gold. This process is being developed commercially for both gold mining and e-waste recycling.
- Associate Professor Chalker's technologies have been patented and assigned to Perth-based Clean Earth Technologies (CET), an organisation driving more environmentally sustainable approaches to mining.





THE PRIME MINISTER'S PRIZES FOR SCIENCE

- CET has invested heavily in Australian infrastructure on the back of the success of Associate Professor Chalker's patents, including a new production plant in Adelaide, South Australia. CET expects to invest more than \$2 million over the next five years into the operation, with CET CEO Kevin Fell reporting that Associate Professor Chalker's innovations have helped attract \$15 million in investment.

QUALIFICATIONS

- Ph.D. Organic Chemistry, University of Oxford (2011)
- B.S., Chemistry, University of Pittsburgh (2006)
- B.A., History and Philosophy of Science, University of Pittsburgh (2006)

CAREER HIGHLIGHTS

- 2018 Royal Australian Chemical Institute (RACI) Youth Chemistry Lecturer, Tasmania
- 2018 AMP Tomorrow Maker
- 2018 South Australia Science Excellence Awards STEM Educator of the Year
- 2018 Eureka Prize Finalist for Outstanding Early Career Researcher (one of three in Australia)
- 2018 Organic and Biomolecular Chemistry New Talent Award
- 2017 Dream Chemistry Award finalist (one of five globally)
- 2017 Green Chemistry Emerging Investigator Award
- 2017 ChemSocRev Emerging Investigator Award
- 2017 David Solomon Award for commercialising research, Royal Australian Chemical Institute (RACI) Academic Sharp Brain Competition
- 2016 Visiting Lecturer, Marie Curie Training Network in Protein Conjugates, Institute of Molecular Medicine, Lisbon
- 2016 Tasmanian Alkaloid Visiting Lectureship, University of Tasmania
- 2016 South Australian Tall Poppy of the Year
- 2015 Australian Research Council, Discovery Early Career Researcher Award (DECRA)
- 2015 Vice-Chancellor's Award for Early Career Researchers, Flinders University
- 2014 Visiting Lecturer, Inaugural Summer School in Chemical Biology, University of Leiden
- 2013 F1000 Faculty Member of the Year, Chemical Biology Division
- 2012 Tulsa Undergraduate Research Challenge Mentor of the Year
- 2008 National Science Foundation Graduate Research Fellowship
- 2007 Eli Lilly Prize for Excellence in Organic Chemistry Research
- 2006 Rhodes Scholarship



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THE PRIME MINISTER'S PRIZES FOR SCIENCE

Mrs Sarah Fletcher

Bonython Primary School, Australian Capital Territory

2020 PRIME MINISTER'S PRIZE FOR EXCELLENCE IN SCIENCE TEACHING IN PRIMARY SCHOOLS

- Mrs Sarah Fletcher is a primary school teacher in the Australian Capital Territory. She has worked as both a classroom and STEM specialist teacher in several schools since 2003.
- She is renowned for using her deep knowledge of the curriculum, pedagogical skills and understanding of her students to develop flexible, engaging and quality education programs.
- Mrs Fletcher is innovative and imaginative, and seeks to maximise the resources at her disposal to inspire even the most reluctant learners. She believes that real learning happens when students have an emotional attachment to what is being taught.
- She teaches skills and content that link with real-life experiences, and accentuates her lessons by inviting working scientists into the classroom. For example, she connected a class of Year 1/2 students who were interested in snakes with the ACT Herpetological Association.
- Visits from working scientists generate excitement among students and propel them forward in their learning development.
- As a STEM specialist teacher, Mrs Fletcher works closely with classroom teachers to support the individual needs of each child, including those in Bonython Primary School's two Learning Support Unit-Autism (LSUA) classes.
- Mrs Fletcher also seeks opportunities for students to engage in science beyond the classroom. She encourages entries in Origin Energy's Big Little Idea initiative, the Science Educators' Association of the Australian Capital Territory's (SEAACT) Science Fair and a design challenge with the Australian National University's World Solar Challenge Team.
- She also plays a significant role in the operation of the SEEACT Science Fair.
- She has also facilitated after-school engineering workshops with the Australian National University (ANU) College of Engineering and Computing Science.
- Mrs Fletcher has been a member of the SEEACT council for 15 years and works with the wider education community to promote and improve the quality of science teaching.
- Mrs Fletcher leads professional learning sessions related to Primary Science education, including the annual Primary Science Teachers Workshop. She also coordinates ANU's Science Enrichment Event, to promote science in the Tuggeranong region.
- Mrs Fletcher also created the STEM Specialist Primary Teacher Network, which aims to help STEM teachers connect with one another in the ACT region.
- Mrs Fletcher is a respected voice in the education sector and is often approached to trial new science education resources.
- She also develops strong relationships with local schools and colleges to harness the power of cross-age mentoring and collaboration in the ACT community.
- Mrs Fletcher is passionate about building the confidence and capacity of her students, to ensure that every child views themselves as a scientist capable of analysing and solving problems.





THE PRIME MINISTER'S PRIZES FOR SCIENCE

QUALIFICATIONS

- B.Ed, University of Canberra (2002)
- B.A, Australian National University (2000)
- B.Sci, Australian National University (2000)

CAREER HIGHLIGHTS

- 2020 Developed and leads the STEM Specialist Primary Teacher Network to share resources and provide mentorship and a support network (12 teachers participating in program)
- 2019 Co-Presented 'Computational Thinking and Robotics in the Primary Classroom', STEMEd Conference
- 2019 Facilitated Australian National University College of Engineering and Computer Science Workshop
- 2019 Trialled and reviewed Science and Technology Education Leveraging Relevance's (STELR) 'A Day in the Life of a 7-Year-Old'
- 2019 Involved in review of new 'Primary Connections' website
- 2019 Participated in CSIRO's 'STEM in Schools' event
- 2018 Awarded Highly Commended for the Prime Minister's Prize for Excellence in Science Teaching (Primary Schools)
- 2016-2017 Science Educators' Association of the ACT (SEAACT) Science Fair Co-Coordinator and Host School Contact
- 2016 Published in Teaching Science (article about the Australian National University Enrichment Event)
- 2015-Current Australian National University Science Extension Event Creator and Coordinator
- 2015-2017 Australian National University Junior Extension Day (Tuggeranong Network) Science Year 2 Coordinator
- 2014-Current Developer and Manager of Inspiring Our Future in Science page on Facebook (linking primary teachers and primary science resource providers)
- 2013-Current Facilitator/Coordinator System Annual Primary Science Workshops
- 2009-Current Science Educators' Association of the ACT (SEEACT) Council – Primary Contact Officer
- 2009 Recipient Ruth Dirks Scholarship, Australian Science Teachers Association (ASTA)
- 2009 Facilitator Primary Standards Consultation Meetings on behalf of Australian Science Teachers Association (ASTA)
- 2009 Coordinated Australian Academy of Science's Primary Connections (Professional learning program delivered to primary science teachers in the ACT)
- 2007 Sat on a School Validation Panel
- 2006 Presented Curriculum Renewal to Turner School staff; presented Waste Wise environmental management professional learning to staff



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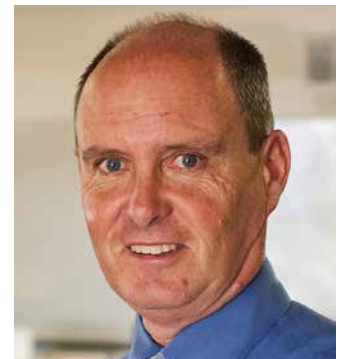
THE PRIME MINISTER'S PRIZES FOR SCIENCE

Mr Darren Hamley

Willetton Senior High School, Western Australia

2020 PRIME MINISTER'S PRIZE FOR EXCELLENCE IN SCIENCE TEACHING IN SECONDARY SCHOOLS

- Mr Darren Hamley has taught at Willetton Senior High School for 28 years. It is one of Western Australia's largest schools, with more than 2,500 students. He teaches science to Years 7 to 12 students and has coordinated the school's Gifted and Talented Education Program for 20 years.
- Mr Hamley's extensive knowledge and infectious enthusiasm gives him an innate ability to engage and inspire students. This cultivates students' love of science and lifelong skills in science inquiry.
- He develops innovative approaches to teaching and learning, helping young people understand how to apply science to the real world. He has established science-based extracurricular clubs for solar cars, chess, Rubik's Cube solving, dolphin and ocean conservation and astronomy.
- Mr Hamley was instrumental in including an observatory in the school's new science building. Willetton Senior High School is now the only public school in Western Australia with a fully robotic, 36-centimetre telescope.
- He also leads the school's solar car project, where students design and construct a full-size solar-powered car. Willetton Senior High School is one of only a few schools to have entered the World Solar Challenge (a 3,000km race from Darwin to Adelaide), and drive a 1,000km section of the Nullarbor on two occasions.
- Mr Hamley also fosters a passion for science among students who participate in the world-recognised Duke of Edinburgh's Award program. He takes students to Shark Bay (900km north of Perth) to produce wildlife-spotting brochures, which are designed to help tourists appreciate and conserve the environment.
- Mr Hamley has received multiple awards for increasing students' awareness and exploration of the environment, and for encouraging conservation through scientific efforts. His awards include the 2019 Murdoch University's Ocean Challenge for raising awareness of ocean pollution, and the 2015 Department of Parks and Wildlife (DPAW) Environmental Award for restoration of the Western School Prawn population in the Swan River.
- He has also led student research into the effect of dorsal fin damage on dolphin's swimming performance, following the death of a number of Swan River dolphins due to entanglement. Students used 3D printers to make accurate scale models and research hydrodynamic drag. As a result of this work, the students were invited to speak at an environmental conference, and they formed a conservation club called Trash4Splash to raise awareness of river pollution.
- Mr Hamley is an active member of the school's Aboriginal Education Committee, and works to promote a greater understanding and appreciation of Aboriginal culture in the community. He is an enthusiastic promoter of girls in STEM, and presented his 'Designing Projects to Encourage the Participation of Girls in STEM' at a Perth learning conference.
- Mr Hamley has made significant contributions to the science education community outside of Willetton Senior High School. He is always looking to promote and improve science education – from professional development sessions about Gifted and Talented Education, to contributing to Australian Geographic and presenting at science conferences.





THE PRIME MINISTER'S PRIZES FOR SCIENCE

QUALIFICATIONS

- Graduate Certificate, Harvard University (2019)
- Dip.Ed, Murdoch University (1984)
- B.Sci (Biology), Murdoch University (1983)

CAREER HIGHLIGHTS

- 2019 Winner of the Department of Biodiversity, Conservation and Attractions (DBCA) Monkey Mia Inspirational Volunteer Award for work on student-based dolphin echolocation research
- 2019 Winner of the Murdoch University's Ocean Challenge (Students) for promoting the awareness of ocean pollution
- 2018 Invited to join the Council of the Royal Society of Western Australia
- 2018 Winner of the Doug Clarke Medal awarded by the Royal Society of Western Australia (Science education award Primary, Secondary or Tertiary)
- 2017 'Cockatoos of Australia' published online by Australian Geographic; student-based project to photograph every species of cockatoo in Australia
- 2017 Nominated for the City of Cockburn's Inspirational Volunteer Awards (Category: Environmental and Animal Protection) for work on kangaroo rehabilitation
- 2016 Finalist in the United Nations Association of Australia's World Environment Day Awards; for student-based research on restoration of coral in the Ningaloo Reef
- 2015 Winner of Department of Parks and Wildlife (DPaW) Environmental Award for restoration of the Western School Prawn population in the Swan River
- 2015 Awarded Highly Commended for the Prime Minister's Prize for Excellence in Science Teaching (Secondary Schools)
- 2015 Finalist in the Murdoch University Distinguished Alumni Awards
- 2015 Winner of the Engineers Australia award for student-based work on solar-powered cars

PRIZE RECIPIENTS (2000 – 2020)

Year	Prize Recipient
Prime Minister's Prize for Science	
2020	Emeritus Professor David Blair, Professor David McClelland, Professor Susan Scott & Professor Peter Veitch
2019	Emeritus Professor Cheryl Praeger AM
2018	Emeritus Professor Kurt Lambeck AO
2017	Distinguished Professor Jennifer Graves AO
2016	Professor Richard Shine AM
2015	Professor Graham Farquhar AO
2014	Laureate Professor Samuel Berkovic AC & Laureate Professor Ingrid Scheffer AO PresAAHMS
2013	Dr Terry Speed
2012	Distinguished Professor Kenneth Freeman AC
2011	Professor Dr Ezio Rizzardo AC & Professor David Solomon AC
2010	Professor John Shine AC PresAA
2009	Dr John O'Sullivan
2008	Professor Ian Frazer AC
2007	Laureate Professor Peter Waterhouse & Dr Ming-Bo Wang
2006	Professor Mandyam Srinivasan AM
2005	Emeritus Laureate Professor David Boger AC
2004	Laureate Professor Graeme Clark AC
2003	Professor Jacques Miller AC
2002	The late Emeritus Professor Frank Fenner AC
2001	The late Emeritus Professor Donald Metcalf AC
2000	Dr Jim Peacock AC & Dr Elizabeth Dennis AC
Prime Minister's Prize for Innovation	
2020	Professor Thomas Maschmeyer
2019	Professor David Huang, Associate Professor Peter Czabotar, Professor Guillaume Lessene & Professor Andrew Roberts AM
2018	Dr Simon Poole AO, Dr Glenn Baxter, Dr Steven Frisken & Mr Andrew Bartos
2017	Laureate Professor Eric Reynolds AO
2016	Dr Michael Aitken AM
2015	Laureate Professor Graeme Jameson AO

Year	Prize Recipient
Frank Fenner Prize for Life Scientist of the Year	
2020	Professor Mark Dawson
2019	Associate Professor Laura Mackay
2018	Associate Professor Lee Berger
2017	Professor Jian Yang
2016	Professor Kerrie Wilson
2015	Professor Jane Elith
2014	Professor Ryan Lister
2013	Professor Angela Moles
2012	Professor Mark Shackleton
2011	Professor Min Chen
2010	Professor Benjamin Kile
2009	Professor Michael Cowley
2008	Professor Carola Vinuesa
2007	Dr Elizabeth Fulton PSM
2006	Professor James Whisstock
2005	Professor Harvey Millar
2004	Professor Jamie Rossjohn
2003	Dr Christopher Helliwell
2002	Professor Joel MacKay
2001	Professor Bostjan Kobe
2000	Professor Una Ryan
Malcolm McIntosh Prize for Physical Scientist of the Year	
2020	Scientia Associate Professor Xiaojing Hao
2019	Associate Professor Elizabeth New
2018	Associate Professor Jack Clegg
2017	Distinguished Professor Dayong Jin
2016	Professor Richard Payne
2015	Professor Cyrille Boyer
2014	Professor Matthew Hill
2013	Professor Andrea Morello
2012	Professor Eric May
2011	Professor Stuart Wyithe
2010	Associate Professor Katherine Trinajstić
2009	Dr Amanda Barnard
2008	Professor Tanya Monro

Year	Prize Recipient
Malcolm McIntosh Prize for Physical Scientist of the Year Cont'd	
2007	Professor Mark Cassidy
2006	Professor Naomi McClure-Griffiths
2005	Professor Cameron Kepert
2004	Professor Benjamin Eggleton
2003	Professor Howard Wiseman
2002	Professor Marcela Bilek
2001	Professor Peter Bartlett
2000	Professor Brian Schmidt AC
Prize for New Innovators	
2020	Associate Professor Justin Chalker
2019	Dr Luke Campbell
2018	Dr Geoff Rogers
2017	No award
2016	Industry Associate Professor Colin Hall
Prime Minister's Prize for Excellence in Science Teaching in Primary Schools	
2020	Mrs Sarah Fletcher
2019	Mrs Sarah Finney
2018	Mr Brett Crawford
2017	Mr Neil Bramsen
2016	Mr Gary Tilley
2015	Mrs Rebecca Johnson
2014	Mr Brian Schiller
2013	Mr Richard Johnson
2012	Mr Michael van der Ploeg
2011	Mrs Brooke Topelberg
2010	Dr Matthew McCloskey
2009	The late Mr Allan Whittome
2008	Ms Bronwyn Mart
2007	Mrs Cheryl Capra
2006	Dr Marj Colvill
2005	Mr Mark Merritt
2004	Mr Alwyn Powell
2003	Ms Sarah Tennant
2002	Mrs Marianne Nicholas

Year	Prize Recipient
Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools	
2020	Mr Darren Hamley
2019	Dr Samantha Moyle
2018	Dr Scott Sleaf
2017	Mr Brett McKay
2016	Ms Suzy Urbaniak
2015	Dr Ken Silburn
2014	Mr Geoff McNamara AM
2013	Ms Sarah Chapman
2012	Mrs Anita Trenwith
2011	Dr Jane Wright
2010	Ms Debra Smith
2009	Mr Len Altman
2008	Mr Clay Reid
2007	Mrs Francesca Calati
2006	Ms Anna Davis
2005	Mr Mike Roach
2004	Dr Mark Butler
2003	Dr Pamela Garnett PSM
2002	Mrs Ruth Dircks OAM

Detailed information about Prizes, prize recipients and their awards: industry.gov.au/pmscienceprizes

CELEBRATING AUSTRALIAN ACHIEVEMENTS AND EXCELLENCE

The Prime Minister's Prizes for Science are Australia's most prestigious awards for outstanding achievements in scientific research and research-based innovation, and excellence in science, mathematics and technology teaching.

The Prizes are awarded annually to Australian citizens or permanent residents in recognition of their contributions to Australia's current and future scientific and commercialisation capabilities, and to Australia's social and economic well-being.

They are a tribute to Australia's world-class science community, and the critical role teachers play in inspiring and encouraging the next generation of Australian scientists and innovators.

Australia takes great pride in its high achievers. In 2020, we mark the 21st year of the Prizes, and we again celebrate the people who are making significant contributions to Australia's future.

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