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Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)			Total ($)	Partner Organisation(s)
(Columns 1 and 2)	(Column 3)	2019-20 (Column 4)	2020-21 (Column 5)	2021-22 (Column 6)	2022-23* (Column 7)	2023-24* (Column 8)	2024-25* (Column 9)	(Column 10)	(Column 11)
Australian Capital Territory									
The Australian National University									
LE200100012 Moore, Prof Anna M	DREAMS is a revolutionary wide-field infrared surveyor designed to allow astronomers to unlock new science and foster international collaborations focused on important but elusive, infrared transient cosmic phenomena. Continually scanning the southern sky, DREAMS will provide “real time” data that will transform the depth and quality of astronomical observation. Combining off-the-shelf parts with scientific expertise from around the world, this telescope will help answer questions that are both practical and profound. DREAMS is an important component of a longer-term international strategy that will reinforce Australia’s global leadership in the realm of Infrared Transient Astronomy.	632,000.00	0.00	0.00	0.00	0.00	0.00	632,000.00	NATIONAL ASTRONOMICAL OBSERVATORIES: CHINESE ACADEMY OF SCIENCES, CALIFORNIA INSTITUTE OF TECHNOLOGY, USA, MASSACHUSETTS INSTITUTE OF TECHNOLOGY
	National Interest Test Statement DREAMS is an exceptional instrument that capitalises on the strengths of Australia’s scientific efforts within the global astronomical community. The telescope uses proven technology and benefits from our unique place in the southern hemisphere. DREAMS is the product of international collaboration, and will continue to foster close work across borders. The expected number of papers published in both industry and top-tier scientific journals will reinforce Australia’s global leadership in the realm of infrared transient astronomy. The data collected by this fast-moving survey telescope will help drive new graduate research as well, ensuring ongoing Australian thought leadership in this area of science. DREAMS also has practical applications and may lead to commercial development in satellite traffic management. The cultural and economic benefits enabled by DREAMS will allow the Australian community to build the cultural and intellectual capital that will help sustain Australia’s scientific leadership in astronomy for decades to come.								
LE200100032 Lu, A/Prof Yuerui	This project aims to build an advanced multi-functional Electro-Opto-Magneto-Mechanical analysis platform for characterizing nanomaterials and micro-/nano-scale devices. This platform expects to provide rich and unique characterization capabilities (electrical, optical, magnetic and mechanical) for hybrid devices with low temperature and high vacuum environment. The expected outcomes include multidisciplinary research collaborations and a wide range of next-generation technologies including non-invasive medical instruments, wearable devices, communication, quantum information systems and energy storage solutions. This should enable local design and construction of hybrid devices and advance the growth of local high-technology industries.	600,000.00	0.00	0.00	0.00	0.00	0.00	600,000.00	
	National Interest Test Statement Advanced materials science, quantum technology, nanotechnology and biomedicine are of great research significance for Australia, where strong international impact has been demonstrated over many years. With rapid worldwide progress in these fields, the establishment of this facility is timely and will ensure Australia can continue to play a leading role in these areas. This facility will provide national support to existing and future development and industry-linked grants, enabling significant expansion of local expertise. It will support the Science and Research Priority “Advanced Manufacturing”, as the research outcomes will stimulate innovation in novel functional materials, advanced light sources, quantum devices, bio-systems and early medical diagnostics. The proposed facility will also support research aimed at identifying the means by which Australia can lift productivity and economic growth. It will enhance Australia’s competitive advantage in critical sectors, such as optoelectronics, energy conversion, smart sensing, communications, quantum information and processing, and medical technology.								
	The Australian National University	1,232,000.00	0.00	0.00	0.00	0.00	0.00	1,232,000.00	
	Australian Capital Territory	1,232,000.00	0.00	0.00	0.00	0.00	0.00	1,232,000.00	

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New South Wales									
Southern Cross University									
LE200100022 Joannes-Boyau, Dr Renaud	The project aims to integrate a multicollector mass spectrometer with the existing laser ablation laboratory at Southern Cross University to establish a unique facility offering tandem trace element and isotopes analysis. This will provide new methodological advancement by expanding the analytical range and obtaining information otherwise inaccessible to stand-alone instruments using traditional standardisation methods. Specifically, the integration of an innovative split stream system allows precise matching of elemental concentration with isotopic ratios, crucial for microscale resolution and data accuracy. The new infrastructure will confirm Australia's leadership role and maintain its competitive advantage in geosciences.	580,000.00	0.00	0.00	0.00	0.00	0.00	580,000.00	
	National Interest Test Statement The Australian Academy of Science decadal plan 2018-27 "Our Planet, Australia's Future" advocates that Geoscience research infrastructure such as the one in this proposal has a demonstrable impact on the national economy. Strategic infrastructure Investment will revolutionise the type and quality of data available to Australian geoscience researchers transforming many disciplines into core capabilities. Moreover, the committee particularly stresses the need for "establishing a geochemical and experimental capability based on a collaborative and nationally accessible array of new generation instruments, in particular by expanding and enhancing the in-situ approach to trace-element and isotopic analyses originally pioneered in Australia which can provide imaging at the micro-scale" (AAS, 2018-27). Our proposal parallels the recommendations providing a critical cutting-edge infrastructure to Australian researchers in order to understand the workings of our landscapes and ecosystems and how we will face future challenges on our resources, agriculture, health, food, ocean, natural hazards, and evolving climate.								
LE200100083 Kelaher, Prof Brendan P	The loss and modification of natural habitats is a major threat to biodiversity that requires evidence-based management supported by excellent science. To this end, this project will create a facility for 4D habitat modelling (i.e. assessing changes in 3D habitat structure over time) that will underpin research innovation in marine systems. The new aerial and subtidal image acquisition technology will also be used to accurately measure changes in marine plants and algae over time, improve habitats provided by coastal protection infrastructure and support ecological field research. The new equipment will allow scaling up of field experiments and monitoring to enhance their impact and capacity to support effective management.	310,000.00	0.00	0.00	0.00	0.00	0.00	310,000.00	
	National Interest Test Statement The proposed 4D habitat-modelling facility will strengthen collaborative efforts to accurately measure habitat loss and modification in marine and estuarine systems. The facility brings together an isolated regional and a capital-city university to share the latest drone and underwater image acquisition equipment to support precise assessments of changes in marine habitats over time. These assessments will be used to scale up the results of ecological field experiments and biogeochemical research, enhancing their relevance to best-practice environmental management and value adding up to 25 years of ARC research investment. The new equipment will also support research on marine estate management, urban marine ecology, coastal protection infrastructure, wildlife conservation and climate change. A major outcome of the requested new equipment will be the delivery of innovative ecology and environmental science that better supports evidence-based management of natural habitats.								

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LE200100155 Eyre, Prof Bradley D	Biogenic volatile organic compounds (BVOC) play a key role in earth system processes but little is known about the amount of BVOCs emitted, and the mechanisms underlying their production in marine habitats, despite these being potential hotspots for BVOC emissions. The aim of this proposal is to custom build a portable equilibrator inlet proton transfer reaction mass spectrometer for measurements of BVOC's in coastal waters. This will be the first such instrument in the southern hemisphere and it will enable us to make in situ, high-precision measurements which will lead to ground-breaking advances that will revolutionise our understanding of BVOC cycling in coastal environments and their influence on the global climate system.	430,000.00	0.00	0.00	0.00	0.00	0.00	430,000.00	
	National Interest Test Statement This project will have economic benefit for Australia by providing infrastructure for research that will facilitate better understanding, predictability and ultimately mitigation of climate change. This will help protect coastal ecosystems, like the Great Barrier Reef, which have an estimated value for the Australia economy in excess of $50 billion. This project will have environmental benefit for Australia by helping alert the global community to a poorly understood potential additional effect of climate change, and this will assist in providing greater leverage on global governments to act in concert to lower CO2 in our atmosphere. The research infrastructure will also directly benefit thirteen currently funded, or requested ARC research grants, resulting in better outcomes for these projects.								
	Southern Cross University	1,320,000.00	0.00	0.00	0.00	0.00	0.00	1,320,000.00	
The University of New South Wales									
LE200100033 Tilley, Prof Richard D	This project aims to establish an In situ Environmental Electron Microscope Facility to characterise real-time and dynamic changes in nanomaterials at the atomic scale. We will combine a cutting-edge 'in situ' gas/heating/electrical bias holder with new camera and analysis technology on a transmission electron microscope. This facility will be a sophisticated suite of equipment that will innovate and transform microscopy in Australia to image structural and compositional changes of materials under stimuli at a speed and resolution previously unachievable. This project will drive pioneering research in the fields of Materials Science, Chemistry and Catalysis to solve problems in advanced manufacturing, energy, technology and the environment.	1,200,000.00	0.00	0.00	0.00	0.00	0.00	1,200,000.00	
	National Interest Test Statement This Facility will provide essential new imaging capability for, and will be open to all Australian researchers. It will build-upon existing investments in microscopy infrastructure to develop and cater to cutting-edge research programs in new and more efficient materials for solar energy, functional nanocatalysts for renewable energy storage and new catalysts to reduce atmospheric greenhouse gases. This investment will have a wide-ranging commercial and environmental impact in Australia and will serve to grow our reputation as world-leaders in advanced manufacturing, nanomaterials, and new technologies driving us toward a green future.								
LE200100042 de Silva, Dr Charitha M	Microfluidics is ubiquitous in society - for example, biofluids and engineered lab-on-a-chip platforms. This project aims to establish a novel flow measurement facility tailored for microfluidic flows with capabilities beyond current commercial flow diagnostic systems. This will enable engineers and scientists to probe the fluid dynamics of these flows with unprecedented detail to explain their underlying physical mechanisms. Beyond fluidic measurement, the facility provides the capacity to accurately observe micro-organisms, biological activity (cell adhesion, thrombus stability, fluorescent receptor markers), thermal collector systems (high flux, microchannel-based solar receivers), and many more mechanical phenomena at the micro-scale.	340,000.00	0.00	0.00	0.00	0.00	0.00	340,000.00	

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	National Interest Test Statement The facility will deliver researchers and industry with a platform specifically designed to cater for 3D fluid-flow measurements over a broad range of micron to millimetre scale flows, spanning biofluidics, solar receivers, engineered lab-on-chip devices and biological activity. The insights gained will have a societal impact through improvements in public health, biotechnology and renewable energy technology. Moreover, the unique flow diagnostics methodology in the facility will also establish Australia at the forefront of flow-measurement capability for microfluidics through improved accuracy beyond current practices in research and industry and will benefit areas such as biotechnology, microelectronics and environmental monitoring.								
LE200100136 Stenzel, Prof Martina	The project will support research in a diverse set of fields such as biomedical engineering catalysis, energy storage and waste recovery, with cutting edge next-generation solid state (400 MHz) nuclear magnetic resonance capabilities and research expertise. The system enabling high sensitivity, high throughput analysis over extended temperature range will enable addressing of fundamental questions regarding the structure-property relationships of advanced functional materials. Accessible to a wide user base in fundamental and applied research, in medicine, energy, catalysis and recycling of waste, the project will extend the current facilities to develop Sydney as regional centre for advanced solid state nuclear magnetic resonance analysis.	1,100,000.00	0.00	0.00	0.00	0.00	0.00	1,100,000.00	
	National Interest Test Statement The proposed infrastructure will promote research excellence in the fields of drug delivery, environmental science,catalysis and energy storage. Many of the projects will have a significant impact in developing capabilities to remediate environmental hazards, develop ways to efficiently store renewable energy. Many of the projects to be supported by the new infrastructure have the potential for tremendous commercial benefit in developing cutting edge technologies and products.								
LE200100197 Hamilton, Prof Alexander R	This proposal addresses a major experimental capacity gap in Australian infrastructure for research and development of novel electronic materials and nanoscale quantum devices for future technologies. It will establish Australia's first non-contact, non-destructive, cryogenic scanning microwave microscopy facility for advanced materials characterization enabling new studies of these materials in the 2 to 300 Kelvin temperature range. The facility will provide crucial new information for the development of future quantum materials, enhancing our international competitiveness in the development of next-generation electronic materials and device technologies.	1,102,947.00	0.00	0.00	0.00	0.00	0.00	1,102,947.00	
	National Interest Test Statement This facility will directly support the development of new quantum materials and devices for future sensor and information technology applications. It will allow Australian researchers to see for the first time how electricity flows in these materials and devices with unprecedented spatial resolution. The facility will be the first of its kind in Australia, enabling researchers to remain internationally competitive in new breakthrough materials for future device applications. It will stimulate collaborative interdisciplinary research and promote innovation in materials science, physics, nanotechnology, electronics and quantum devices. These are fields of great research significance for Australia. With rapid worldwide progress in these fields, the establishment of this facility is timely and will ensure an Australian leading role. The proposed facility will assist in identifying means by which Australia can lift productivity and economic growth, and as a consequence will maximise Australia's competitive advantage in critical sectors, such as electronics and advanced materials engineering.								

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LE200100209 Regenauer-Lieb, Prof Klaus	We propose a multiscale X-Ray Microscopy (XRM) laboratory for time-lapse imaging. High flux X-Ray Microscopy (XRM) with resolutions from cm- down to Angstrom-scale is proposed by bringing Synchrotron technology to the laboratory. The laboratory aims at revolutionising imaging capability of evolving structures and physical properties in inorganic and organic materials used in mineral, energy, manufacturing, bioengineering, aerospace, automotive and a range of other industries. The expected outcome is an integration of XRM between USyd, UNSW, UQ, QUT and ANSTO. The added benefit is to perform long time scale XRM experiments with collaborations in the material- manufacturing, geo- and biomedical sciences and many engineering disciplines.	180,000.00	180,000.00	0.00	0.00	0.00	0.00	360,000.00	ANSTO
	National Interest Test Statement National and international Nuclear Facilities are allowing tomographic imaging of materials at an unprecedented spatial and dynamic resolution with seamless integration from the molecular scale to the conventional laboratory scale. Time-lapse (4-D) imaging of samples under biological, mechanical, fluid, thermal, electrical and chemical loads is a new research trend for which Australian researchers are highly sought after at the international light source and neutron facilities. As a world's first we develop, here in Australia, a portable network laboratory for rapid characterisation of samples, damage, deformation and growth phenomena in bio- and materials sciences identifying microstructural features such as cracks, porosity, and inclusions for metallurgy, ceramics, geology, dental, aerospace, agriculture etc. This will provide cutting-edge technology where experiments can be trialled prior to Synchrotron and Neutron studies, fostering new collaborations in the material- geosciences, engineering disciplines and related industries.								
LE200100221 Spicer, A/Prof Patrick T	The proposed research will greatly expand research into fluids with complex and valuable microstructures: this includes foods, adhesives, pharmaceuticals, and even blood. Key Australian X-ray and Nuclear facilities provide amazing insights into valuable and exotic material structures every day, but most of these measurements are on static samples. Because flow and mixing is critical to industry and advanced research processes that develop new materials, a facility is needed that allows the same careful study of material structure with the addition of controlled flow. We will build such facilities, enabling study of high-speed, stretching, and other complex flows, matching applied processes and giving Australia the lead in their study.	320,000.00	0.00	0.00	0.00	0.00	0.00	320,000.00	AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
	National Interest Test Statement The rheo-scattering facilities will provide access to controlled flow and mechanical property characterisation at two major Australian beamlines for the first time.They will be cutting-edge research tools enabling advanced training in the use of radiation scattering as a structural probe of deforming materials. The setup will advance novel structural studies and materials development, but will also create new capacity for Australian and international researchers.								
	The University of New South Wales	4,242,947.00	180,000.00	0.00	0.00	0.00	0.00	4,422,947.00	
The University of Newcastle									
LE200100016 Neilan, Prof Brett A	Genomics has led to the discovery of both the fine and gross characteristics of specific microbial physiologies. This project aims to take the genetic diversity inherent in microbial systems and exploit it for biotechnology applications, using the cutting-edge facilities available for synthetic biology. The acquisition of a long-read sequencing platform, droplet digital PCR machine, pulsed-field electrophoresis apparatus, DNA library system and small scale bioreactor will address the limitations of short-read sequencing, large fragment cloning and gene expression technologies, currently creating bottlenecks for synthetic biologists.	400,000.00	0.00	0.00	0.00	0.00	0.00	400,000.00	

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	National Interest Test Statement The instruments requested in this proposal will take bench-scale research in genomics to the next level by enabling characterisation of the genetic basis for a range of diverse metabolic pathways, as well as their capture, optimisation and exploitation in advanced biomanufacturing. This new, state-of-the-art capability will be used in a wide variety of applications by Australia's fledgling synthetic biology community. The work performed is expected have significant commercial outcomes in the fields of industrial, biomedical and environmental biotechnology. These impacts will in turn benefit the economy, human health and the environment.								
LE200100220 Moghtaderi, Prof Behdad	This project aims to establish a cutting edge adaptive electrical capacitance volume tomography facility for real-time metering / imaging of multi-phase flows. Optimisation of these flows which are encountered in many industries, is paramount in today's carbon-constrained global economy. This project expects to generate the new knowledge necessary for such optimisations. Expected outcomes include enhanced national capability for characterisation of multi-phase flows in real-time under both ambient and high temperatures. This should benefit and greatly facilitate the commercial rollout of novel technologies in industrial sectors as diverse as mineral processing, clean energy, fuels/chemicals, oil/gas, food and environmental remediation.	760,000.00	0.00	0.00	0.00	0.00	0.00	760,000.00	
	National Interest Test Statement Multi-phase flows such as two phase gas/solid or solid/liquid flows are vitally important in development and optimisation of technologies that underpin the competitiveness of critical areas of the national economy, for example, resources, renewable energy, mineral processing (including bulk solid handling), fuels/chemicals, and food processing. This project will significantly enhance Australia's research and innovation capacity in the field of multi-phase flows by establishing a fully-portable multi-node and multi-use facility for characterisation of two and three-phase flows. The knowledge generated from the use of facility will lay a strong foundation for the development of novel and exciting technologies beyond the project time-frame in a diverse range of industrial applications. The ability to optimise the performance of these technologies will lower their complexity and cost; de-risking their scale-up and commercial roll-out. The socio-economic benefits will include: research and development of innovative technologies; Intellectual Property revenue and licensing, market creation and export potential.								
	The University of Newcastle	1,160,000.00	0.00	0.00	0.00	0.00	0.00	1,160,000.00	
The University of Sydney									
LE200100029 Meikle, Prof Steven R	This project will integrate a next generation small animal PET-CT instrument into the Sydney Imaging multi-modality imaging ecosystem. PET-CT enables the investigation of molecular function and anatomical structure in complex living organisms. This platform will enable research as diverse as the development and in-vivo characterisation of new chemical probes and nanoparticles that bind to specific protein targets in the body, investigating mechanisms of brain plasticity in predictive learning, understanding the molecular pathways involved in neurodegeneration and cancer, developing novel methods for multi-modal image analysis, and developing and validating new radiation detectors for the next generation of imaging technology.	700,000.00	0.00	0.00	0.00	0.00	0.00	700,000.00	AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
	National Interest Test Statement The infrastructure described in this proposal will support research that brings economic, social and health benefits to the Australian community. For example, several of the investigators on this proposal work closely with partners in the pharmaceutical industry on novel drugs and nanoparticles, while the imaging technologies developed by other investigators are of significant commercial interest to large multinational imaging companies. Similarly, the advances by our neuroscientists in understanding the biological mechanisms underpinning brain disorders, such as dementia and depression, have the potential to significantly lower the societal burden and healthcare costs associated with these chronic conditions. Finally, by integrating the requested state of the art imaging equipment into the multi-modality, open-access Sydney Imaging core research facility, the resulting combination of world class infrastructure and expertise will act as an attractor for international researchers and students, contributing to the impressive economic performance of the higher education sector.								

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LE200100043 Lay, Prof Peter A	This project aims to undertake fast probe-free biochemical/chemical imaging of heterogeneity within cells and materials surfaces with new infrared and Raman imaging. It will generate new fundamental knowledge on: cell heterogeneity and dynamic processes; technologies for optimising cell printing; understanding toxicity of microplastics; and protocols for measuring materials of technological relevance. Expected outcomes include: interdisciplinary collaborations in new protocols for in-vitro drug development; cell printing technologies; environmental impacts of microplastics; and materials design. Expected benefits include innovative approaches to early stage drug design; improved environmental controls and advances in innovative materials.	389,000.00	0.00	0.00	0.00	0.00	0.00	389,000.00	ANSTO, INVENTIA LIFE SCIENCE PTY. LTD.
	National Interest Test Statement This project aims to undertake fast probe-free biochemical/chemical imaging of heterogeneity within cells and materials surfaces with new infrared and Raman microscopies, which will enhance our fundamental understanding how human cells work (causes and treatments of diseases) and the design of technologically important materials. Specifically, it will generate new fundamental knowledge on: cell heterogeneity and dynamic processes associated with disease resistance; technologies for optimising cell printing for drug discovery; understanding toxicity of microplastics, which are major marine pollutants in the food chain; and protocols for measuring materials of relevance to many other processes. Expected outcomes include: interdisciplinary collaborations in new protocols for in vitro drug development; cell printing technologies; environmental impacts of microplastics; and materials design. Expected benefits include innovative approaches to early stage drug design; improved environmental controls and advances in innovative materials that will lead to financial and societal benefits.								
LE200100049 Tao, Prof Dacheng	Artificial intelligence (AI), as it continues to grow and evolve, is taking an increasingly leading role in strategic plans of the world's leading economies, IT companies, and universities, with the promise to be a key driver in innovation, science, education, and society. This project will establish a whopping Volta graphical processing unit Cluster (wVGC) with the aim of smashing current impediments to compute-intensive AI research. The wVGC features a contemporary HPC system equipped with 120 most advanced NVIDIA Volta GPUs distributed in 30 high capable nodes. The wVGC will transform AI research in Australia, putting us on the same footing as leading research groups around the globe, and at the forefront of the world's AI revolution.	900,000.00	0.00	0.00	0.00	0.00	0.00	900,000.00	
	National Interest Test Statement AI has proven to be one of the major driving forces of recent economic growth and social progress, but the demand for computational resources is constantly outstripping supply. The proposed computing infrastructure, wVGC, along with data and models developed through it on funded ARC projects and in response to the demands of our industrial partners, is foundational to virtually all the ARC Priority Areas, e.g. health, transport, and food. This wVGC is tailored to Australia's AI research and will boost cutting-edge research of world-leading AI researchers in Australia; provide essential support for enormous demands in major AI research topics; strengthen existing and develop new partnerships with local and global industry; provide a unique opportunity and unparalleled benefits for national industry in both the short and long term; cement collaborations with world-leading research scientists; provide fertile ground on which to train up the next generation of researchers and advance Australia's skill base in AI; unlock AI's full local potential; and keep Australia in the running in terms of the global AI race.								
	The University of Sydney	1,989,000.00	0.00	0.00	0.00	0.00	0.00	1,989,000.00	

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University of Technology Sydney									
LE200100003 Aharonovich, Prof Igor	This project aims to establish a revolutionary nanoscale fabrication and characterisation facility in Australia. The facility is an angle-based nanoscale etching system with integrated chemical analysis capabilities and will be the first instrument of its kind in Australia. The facility will enable unprecedented fabrication and characterisation of 3D nanostructures and new device geometries from semiconductors, oxides and metals that underpin modern nanoelectronics for innovative energy, nano-optical and quantum device applications. This unique equipment will facilitate breakthrough discoveries in nanomaterials, and foster collaborations amongst Australian researchers to accelerate industry in advanced nanodevice technologies.	400,000.00	0.00	0.00	0.00	0.00	0.00	400,000.00	
	National Interest Test Statement Australia has been at the forefront of advanced science and technology in recent years. The requested facility will help to maintain Australia's leadership and transform it to be Industry 4.0 ready. The equipment will facilitate state-of-the-art nanofabrication and nanocharacterisaton of advanced nanoscale devices needed for energy generation and storage, nanoelectronics, computing, optics, communications, and sensing. New generation of three dimensional etching process of advanced semiconductors combined with advanced characterisaton facilities will enable development of devices with new functionalities, beyond whats currently available. The unique facility will strengthen Australian's global leadership in advanced manufacturing and cybersecuirty, while providing excellent training for their graduates.								
	University of Technology Sydney	400,000.00	0.00	0.00	0.00	0.00	0.00	400,000.00	
University of Wollongong									
LE200100047 Tieu, Prof Kiet A	This LIEF grant aims to upgrade an existing TI950 Nanoindenter with a new system that physically couples Raman Spectroscopy system with on a shared stage that uniquely enables combined assessment of materials with sub-micrometers or spanning millimetre-sized regions from room temperature up to 800oC. The equipment with much enhanced features will be unique in Australia with the added Raman and a hot stage. The combination of Raman and nanoindentation allows the mechanical property to be correlated to physical characteristics such as chemical bonds and physical state, volume fractionation of crystallinity, amorphous and unpolymerised phases, molecular orientation, residual strain, polymer cross-linking, surface treatment effects.	245,750.00	0.00	0.00	0.00	0.00	0.00	245,750.00	BLUESCOPE STEEL LIMITED
	National Interest Test Statement Conventional ex-situ techniques after cooling to a temperature available for handling may not be truly reflective of what occurred at high temperature, since the surface/interface composition is likely to change after cooling to room temperature, thereby obscuring the chemical phases that were active during the test. Characterisation by chemistry, structure and mechanical properties using different instruments where it is often difficult or impossible to locate the exact same region of interest (ROI) on a single sample. The proposed in-situ Raman indenter will address the problems described above and enables a true correlation of the surface chemical and phase compositions to mechanical phenomena for metallurgical research on tribology, rolling technology and oxidation. There are extensive research in metal forming and associated metallurgical at high temperature processes in Australia, and this equipment will enhance the research capability in these area and help boost the competitiveness of Australian manufacturing industry.								
	University of Wollongong	245,750.00	0.00	0.00	0.00	0.00	0.00	245,750.00	

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Western Sydney University									
LE200100201 Norris, Prof Raymond P	This project aims to upgrade the $150m CSIRO Australia Telescope Compact Array ("the telescope"), by replacing the signal processing electronics and doubling the bandwidth. This will significantly enhance the performance of the telescope, enabling more ambitious science by the 450 researchers and students who use it each year. For example, it will enable the telescope to study radio counterparts to Gravitational Wave sources, and it will enable it to make detailed observations of initial discoveries made with the Australian Square Kilometre Array Pathfinder and other Australian telescopes. In short, it will enable Australian researchers to do more ambitious research, and make more discoveries, across broad areas of astrophysics.	265,000.00	265,000.00	0.00	0.00	0.00	0.00	530,000.00	CSIRO
	National Interest Test Statement This proposal will deliver a major upgrade to CSIRO's $150m Australia Telescope Compact Array (a National Facility available to all researchers), enabling better and more ambitious science to be done by the many researchers and students who use the telescope each year. It will also provide tools, training, and expertise to maximise the return from other Australian telescopes. This upgrade will increase the value of the telescope, grow Australia's knowledge base and develop technologies in signal processing, and raise Australia's ability to contribute to international astronomy projects. The scientific outcomes of this project will be highly visible in the national press, and will advance the international standing of Australian science and technology, and attract the next generation of domestic and international students towards a career in science and technology. This project will increase the return on Australia's $150m investment in the Australia Telescope Compact Array radio telescope, and enable Australian scientists to bid for other international contracts to construct or upgrade radio telescopes.								
	Western Sydney University	265,000.00	265,000.00	0.00	0.00	0.00	0.00	530,000.00	
	New South Wales	9,622,697.00	445,000.00	0.00	0.00	0.00	0.00	10,067,697.00	

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Queensland									
Griffith University									
LE200100151 Litvinyuk, A/Prof Igor	Griffith University's Australian Attosecond Science Facility was established 12 years ago to facilitate internationally leading research into strong-field laser science. The facility is unique in Australia as it has the capability to precisely manipulate highly-amplified and ultra-short light pulses to investigate the dynamics of matter. The scientific outputs from the facility have delivered important new scientific advances in strong-field physics enabling the development of new technologies. This grant will be used to procure an upgraded laser system enabling an order of magnitude enhancement of the output light for the next-generation research and maintaining international competitiveness of Australian investigators in this field.	744,000.00	0.00	0.00	0.00	0.00	0.00	744,000.00	
	National Interest Test Statement Ultrafast and attosecond science is a cutting-edge fast developing field which is actively pursued by all scientifically advanced nations. This field is driven by technological developments resulting in increasingly advanced coherent light sources capable of probing ultrafast processes in matter in real time at the attosecond (10^-18 s) timescale. The detailed understanding of these processes will guide further fundamental scientific and technological research that will underpin the development of new materials, nanostructures and medicines, enabling Australia to remain internationally competitive in this growing field rather than to rely on others for those new materials and technologies. It is also a national interest of Australia to maintain a high level of expertise in those technologies. Establishing this state-of-the art facility in Australia will attract existing and enable training of new world-class experts in this advanced and sophisticated field thus helping to consolidate Australia's position as a leader in ultrafast and attosecond science and technology.								
	Griffith University	744,000.00	0.00	0.00	0.00	0.00	0.00	744,000.00	
The University of Queensland									
LE200100140 Fry, A/Prof Bryan G	Biomolecular interaction research in Australia is currently constrained by low-throughput, labor intensive techniques that impede research progress and often forces it overseas. This project aims to develop a world-class, integrated, multi-node bio-layer interferometry facility. This project expects to generate new knowledge in diverse areas of research ranging from biodiscovery to agricultural vaccine technology. Using biolayer interferometry, the leading-edge biomolecular interaction technique will provide significant benefits by developing high-throughput assay techniques, thus enabling diverse streams of national benefit research and propelling Australia to the forefront of biomolecular interaction research.	945,000.00	0.00	0.00	0.00	0.00	0.00	945,000.00	
	National Interest Test Statement Biomolecular interaction research is an important contributor to Australia’s economy in areas ranging from lead compounds for use in drug design and development through to vaccines for the agriculture and aquaculture industries. However, current research is constrained by techniques that have high labor and consumable costs, are low-throughput, and provide only limited kinetics information. The high-throughput and flexible nature of the proposed facility, combined with its extraordinary sensitivity and provision of full kinetics data, will lead to great success of such research projects. This will lead to outcomes that result in Australia being more competitive in market entry due to improved timeliness of results, which will facilitate more commercialisation. The attractiveness of this facility will lead to more collaboration not only within Australia but also with overseas partners, thus not only putting Australia in the lead of discovery but also commercilisation potential.								

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LE200100190 King, Prof Glenn F	Ion channels are ubiquitous pore-forming membrane proteins, with the human genome encoding >300 ion channels. The diverse roles of ion channels include action potential generation, control of ion flow across secretory and epithelial cells, and regulation of cell volume, motility and proliferation. Pharmacological modulators are powerful tools for probing ion channel function, but for most channels these tools are lacking. Thus, this project aims to develop the first comprehensive toolbox of ion channel modulators using an integrated in vitro/in vivo electrophysiology platform. These pharmacological tools will be made freely available to the Australian research community for probing the mechanism and physiological function of ion channels.	620,000.00	0.00	0.00	0.00	0.00	0.00	620,000.00	SOUTH AUSTRALIAN HEALTH AND MEDICAL RESEARCH INSTITUTE LIMITED
	National Interest Test Statement Ion channels are proteins that enable the flow of ions across cell membranes. They are the major targets of insecticides and the third most common human drug target. However, for many ion channels, the lack of molecules that can selectively modulate their activity limits our understanding of their physiological importance and their potential to serve as targets for insecticides and human therapeutics. The requested instrumentation will lead to the rapid discovery and characterisation of novel molecules that modulate the activity of ion channels. These compounds will be made available to the Australian research community for probing the physiological role of these ion channels in both vertebrates and invertebrates, which will provide advances in a wide variety of research fields including agriculture, biology, biophysics, neuroscience, and human health. Some of the molecules discovered in this project will provide leads for the development of environmentally-friendly insecticides and safer and more effective human therapeutics.								
	The University of Queensland	1,565,000.00	0.00	0.00	0.00	0.00	0.00	1,565,000.00	
	Queensland	2,309,000.00	0.00	0.00	0.00	0.00	0.00	2,309,000.00	

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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South Australia									
University of South Australia									
LE200100183 Hoffmann, Prof Peter	This application aims to renew Mass Spectrometry (MS) instrumentation to characterise and quantify Biomolecules towards a better understanding of biological processes. UniSA, Uni Adelaide, Flinders have established the Protein Quantitation Centre of South Australia (PQCSA) in 2013 through an ARC LIEF lead by CI Hoffmann and this application will renew and expand MS capacity towards metabolites, glycans and lipids. This will enable researchers in South Australia to work towards a full understanding of biological processes and towards expanding their knowledge to Systems Biology. Expected outcome of the projects are multiple interdisciplinary collaborations between the CI's and should provide significant benefits in research outputs.	950,000.00	0.00	0.00	0.00	0.00	0.00	950,000.00	AUSTRALIAN WINE RESEARCH INSTITUTE, SAHMRI
	National Interest Test Statement This application addresses four of the seven national priorities (Food, Advanced Manufacturing, Health and Safeguarding Australia). Multiple researchers will use the proposed instrumentation for food safety, wine and biopharmaceutical product enhancement and understanding biological processes in cancer and other diseases. Together with researchers from national security and law enforcement agencies, the equipment will be used to monitor illicit drug consumption, boost forensic toxicology capability and develop methodology for the detection of explosives and other national security threat materials.								
	University of South Australia	950,000.00	0.00	0.00	0.00	0.00	0.00	950,000.00	
	South Australia	950,000.00	0.00	0.00	0.00	0.00	0.00	950,000.00	

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Tasmania									
University of Tasmania									
LE200100086 Reading, Prof Anya M	We aim to establish an Antarctic-based set of seismic instruments, a mobile facility, to provide data to help predict how ice sheets will evolve and how the continent under the ice sheets will respond to changes in ice load. Our approach to tackling such significant questions is innovative, and makes use of newly available, rapid deployment instruments that may be deployed in ice by a small team with light logistics. Outcomes will include maps of sub-ice sediments and 3D images of the deep Earth. The facility will thus enable new knowledge relating to major ice sheets. Interdisciplinary use of the research will benefit Australia through an improved ability to plan for future sea level rise in areas with large coastal populations.	420,000.00	0.00	0.00	0.00	0.00	0.00	420,000.00	SWANSEA UNIVERSITY, UK
	National Interest Test Statement This facility contributes to Australia's national interest by enabling the generation of new knowledge relating to major East Antarctic ice sheets which contribute to current and future sea level rise. The data will result in potential environmental benefit in managing the increasing future risk to Australia's large coastal population. The rolling data collection programs, in Australian Antarctic Territory, and technique development thus enabled will enhance Australia's international reputation in international science. The research facility enables Australia to maintain its position as a leading nation in Antarctic field operations through a new and highly cost-effective approach to remote area data collection.								
	University of Tasmania	420,000.00	0.00	0.00	0.00	0.00	0.00	420,000.00	
	Tasmania	420,000.00	0.00	0.00	0.00	0.00	0.00	420,000.00	

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Victoria									
Deakin University									
LE200100175 Nahavandi, Prof Saeid	An Australian-first motion simulation facility consisting of a high-payload, high-fidelity Stewart platform mounted on a dual-axis linear track is proposed. The facility will allow high acceleration and high vibration manoeuvres, and large displacements through an eight-degrees-of-freedom range of motion. It can carry the entire control compartment of a heavy vehicle, a truck, an ambulance, a train, or a multi-operator cockpit of a mining vehicle for simulation. The outcome will provide significant benefits for virtual vehicle prototyping and testing, driver training and behaviour modelling, motion perception and motion sickness research; therefore advancing Australia as the global leader in motion simulation and vehicular technologies.	475,000.00	0.00	0.00	0.00	0.00	0.00	475,000.00	
	National Interest Test Statement The proposed motion simulation facility will be the first in Australia for conducting advanced research in driver-based and driver-less vehicular technologies in a safe, cost-effective, and high-fidelity environment. The proposed motion simulator allows virtual prototyping and testing of vehicles for the automotive industry. It facilitates design and testing of autonomous vehicles, ensuring user acceptance in terms of comfort analysis and motion sickness mitigation. The simulator is ideal for driver training and driving behaviour and performance evaluation, in order to improve road safety. Researchers, practitioners, and students will be able to gain cutting-edge expertise in vehicular technologies by using the simulator. It will be made available for use by industry, government, and research organisations; therefore disseminating benefits to the wider community. It is envisaged that the facility will act as a key catalyst for fostering research initiatives among all stakeholders nationally and internationally, propelling Australia to be at the forefront of motion simulation and vehicular technologies.								
	Deakin University	475,000.00	0.00	0.00	0.00	0.00	0.00	475,000.00	
La Trobe University									
LE200100117 Bacic, Prof Tony	The proposal aims to establish a multi-institutional integrated ‘systems-omics’ platform across two of Victoria’s leading research universities, and associated research institutes. The platform will consist of two cutting edge ultra-high resolution mass spectrometers (i) a Thermo Scientific Orbitrap Fusion LUMOS for rapid and comprehensive metabolomic profiling and detailed structural characterization, located at La Trobe University, and (ii) a Thermo Scientific Orbitrap Q Exactive HFX for high-throughput, deep and reproducible quantitative proteome analysis, located at the University of Melbourne.This platform will address applications across the agri-biosciences, medicinal agriculture and fundamental biomedical sciences sectors.	1,275,000.00	0.00	0.00	0.00	0.00	0.00	1,275,000.00	BAKER IDI HEART AND DIABETES INSTITUTE, THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH, PETER MACCALLUM CANCER CENTRE
	National Interest Test Statement Mass spectrometry is an indispensable technology for characterising molecules in both the chemical and biological sciences, and rapid improvements in instrumentation continue to expand the range of molecules studied, and the quality and quantity of information gained. Of specific relevance to this application is the development of new instrumentation capable of facilitating ‘systems-omics’ which, integrated with workflows for sample preparation and computational systems biology for data analysis, can provide critical insights into biological systems providing Australian researchers and industry with a competitive edge in a broad range of basic and strategic research disciplines including in the agri-biosciences (e.g. enhanced nutritional quality of grains), medicinal agriculture (e.g. medicinal cannabis export industry) and biomedicine (e.g. biomarker identifications (e.g. in cachexia syndrome, cancer, neurodegeneration), antibiotics drug resistance).								

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LE200100174 Van Riessen, Dr Grant A	This Project aims to address the need for precise and scalable nanoscale fabrication by establishing a synchrotron-based X-Ray Nanolithography Facility. This Project expects to generate new knowledge in the areas of advanced manufacturing and nanotechnology using an innovative approach that combines coherent lithography and coherent imaging metrology. Expected outcomes of this project include an internationally unique, nationally accessible capability for manufacturing at the nanoscale and for industry-driven collaborative research. This should provide significant benefits across fields that aim to harness the unique properties of engineered nanomaterials to greatly enhance the technologies required to solve global challenges.	425,000.00	0.00	0.00	0.00	0.00	0.00	425,000.00	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION, MELBOURNE CENTRE FOR NANOFABRICATION, ANSTO
	National Interest Test Statement Lithography with short wavelength radiation in the range of extreme ultraviolet (EUV) to to soft X-rays (SX) is the leading technology candidate for addressing the needs of advanced and high-volume manufacturing of technology with features below the 10 nm length scale during the next decade. Increasing demand for more efficient and cost-effective electronic components is driving massive investment in efforts to overcome the technological challenges that currently limit economical production capability and lithography performance. We will establish a new X-ray Nanolithography Facility for academic and industry research to enable progress toward the ultimate lithography performance that can transform industries and enable new scientific discoveries. The facility will use coherent X-ray radiation from an undulator light source at the Australian Synchrotron to create the smallest structures ever produced with light, enabling breakthroughs in the fields of nanoelectronics, nanophotonics, nanomagnetism, and bio-nanomaterials.								
	La Trobe University	1,700,000.00	0.00	0.00	0.00	0.00	0.00	1,700,000.00	
Monash University									
LE200100040 Reeder, Prof Michael J	This project aims to expand Australia's capacity to do high-impact innovative climate, weather and oceanographic science. Science of this kind relies on massive data coupled to computationally highly intensive and complex analysis. Therefore, the project will purchase fast disk storage and install it at the National Computing Infrastructure. It is anticipated that the project will benefit the nation through better understanding of the climate system, including extremes; improvements in our capacity to make predictions; and through applications of the science to forecasting, the management of resources among other many other things.	580,000.00	0.00	0.00	0.00	0.00	0.00	580,000.00	
	National Interest Test Statement The project is firmly in the national interest as it will underpin Australian advances in the science of weather, climate and the ocean. Science of this kind relies on massive data, high-performance computing and complex analysis, and the project will provide the infrastructure to do such calculations. The infrastructure is critical to the research being done in the partner universities, the research program pursued by ARC Centre for Climate Extremes, and much of the weather, ocean and climate research in the wider Australian scientific community, including the Australian Bureau of Meteorology and CSIRO. Research done by these institutions will lead to a better understanding of the climate system, including extremes; improvements in our capacity to make predictions; and applications of the science to the management of emergencies, resources and the environment. Improvement in understanding, prediction and management will affect our quality of live, our economy and our environment.								

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LE200100045 Ramm, Dr Georg	This Project aims to generate urgently needed capabilities for cryo elctron microscopy through the newest generation direct electron detector, the Gatan K3 camera. This project expects to generate highest resolution molecular structures of biological and non-biological materials including pharmacological targets, nanomaterials, and other electron beam-sensitive materials. Expected outcomes are high impact discoveries, training opportunities, international collaborations, and publications addressing fundamental questions in biology and pharmaceutical science. This should provide significant benefits in wide ranging areas of nanotechnology, pharmacy, renewable energy, and agriculture.	623,000.00	0.00	0.00	0.00	0.00	0.00	623,000.00	THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH
	National Interest Test Statement Cryo electron microscopy is a cutting edge technique that allows researchers to see drugs in action at near atomic resolution and also to image fragile or fluid materials (eg cement, organic solar cells). This will allow Australian researchers to make fundamental discoveries and develop bespoke technological solutions that will drive innovation which will underpin and strengthen Australia's Biotechnology sector. A highly specialised workforce is required for this and the newest capability will generate national training opportunities in this new transformative imaging technology. There is direct impact on the development, patenting, of new Australian-made products encompassing new pharmaceuticals (biologicals, small drug inhibitors), nanotechnology, chemical and mechanical engineering and also supporting areas of drug delivery, new building materials, and renewable energy. In summary, this project will help to drive Australian innovation and new technology start-ups.								
LE200100132 Liu, Dr Amelia C	This project aims to establish a triple beam ion and electron microscope facility for the modification, preparation and characterisation of materials that have hitherto been too sensitive for high resolution analysis with charged particle beams. It is expected that materials will be studied artefact-free and at the nanoscale with twin ion beams and new detectors that allow novel imaging modes and extreme chemical sensitivity plus controlled atmosphere transfer to other instruments for correlative measurements. This unique facility should benefit research in many disciplines such as physics, chemistry, geology, pharmacy, materials, civil and chemical engineering by allowing first-ever observations of vital phenomena in diverse materials.	1,486,000.00	0.00	0.00	0.00	0.00	0.00	1,486,000.00	CSIRO
	National Interest Test Statement This project aims to provide a unique microscope for the examination of a range of materials that are too sensitive for study in conventional microscopes. Many important technological materials fall into this category, including pharmaceuticals, battery materials, solar cell devices, minerals, food products, plastics, flexible electronics, cement, glass and biomaterials. It is critical to be able to study the structure and chemistry of such materials at high resolution in order to understand their properties and engineer them for superior performance. The proposed Triple Beam Microscope will allow such materials to be studied artefact-free, and at the highest resolution and chemical sensitivity. This will unlock new information about a diverse range of important materials, providing Australian researchers and industry with new knowledge to design materials to solve our most pressing challenges in energy generation and storage, health, the environment, communications, transport, manufacturing and resources.								
LE200100156 Cook, Prof Perran L	This project aims to develop a new facility for the analysis of trace gases, including nitrous oxide, methane, hydrogen, carbon monoxide, and nitric oxide. This will provide two new capabilities for Australia: 1. It will further our ability to study how microbes cycle trace gases across the continuum from arid soils to the coastal ocean; 2. It will allow us to better understand microbial reactions that remove nitrogen pollution. This will allow us to better understand, monitor and manage microbial processes within soils, sediments, and waters that undertake key ecosystem services, including removal of nitrogen and pollutant gases.	471,000.00	0.00	0.00	0.00	0.00	0.00	471,000.00	

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	National Interest Test Statement								
	Nitrogen pollution and greenhouse gas emissions are having a significant impact on Australia's environments, ecosystems, and industries. This project will enhance our understanding of how soils, sediments, and waters remove nutrients and gases emitted by human activities. This will enable us to better monitor and manage soils, waters, and sediments, providing clear environmental benefits to Australia.								
LE200100168 Majumder, Prof Mainak	The project aims to develop Australia’s first fully integrated small-scale and agile prototyping facility for printing. This facility will provide critical infrastructure to deposit a wide range of advanced materials with unprecedented precision & process flexibility allowing realistic form, configuration and device-ready formats with minimal usage of functional ink. Using this unique facility, researchers will be able to assess integration of novel functional materials in a wide range of devices and applications, including critical components of affordable healthcare diagnostic devices, advanced security features in banknotes, integrated RFID tracking systems, high performance solar cells and separation membranes.	550,000.00	0.00	0.00	0.00	0.00	0.00	550,000.00	CSIRO, SWANSEA UNIVERSITY, UK, IONIC INDUSTRIES LTD
	National Interest Test Statement								
	The anticipated goal of the project is to develop Australia's first small-scale and agile facility for printing and integration of advanced materials in prototype devices. This printing platform will enable the Australian researchers assess advanced materials in many different applications, even when available in minimum quantity, with significantly greater ease than ever before. The outcomes of the research can lead to novel methods for fabrication of critical components in high performance batteries, disease detection devices, energy-efficient separation membranes, and communication devices. We aim to manage this unique facility as an open-access platform technology for use by the research community across Australia, with the intention of shortening the time and resource requirements for translating of research outcomes. Because the facility can demonstrate potential routes to large-scale manufacturing, it will aim to rejuvenate the declining printing industry through creation of new products and trained workforce in the cutting-edge technology of functional printing.								
LE200100186 Voelcker, Prof Nicolas H	This project aims to breach the gap between meso, micro and nanoscale manufacturing by means of a novel 3D printing technique with nanometric resolution. This project expects to generate new knowledge in the technologies to fabricate complex structures with freedom of design from the meso to the nanoscale, currently not possible in Australia, by using the innovative integration of this technique within a well establish nanofabrication facility. Expected outcomes of this project include new discoveries in fields such as nanotechnology, photonics, robotics, metamaterials, biosurface engineering or biotechnology. This should provide significant benefits, such as placing Australia in the leadership of nanotechnology and additive manufacturing.	233,000.00	0.00	0.00	0.00	0.00	0.00	233,000.00	MELBOURNE CENTRE FOR NANOFABRICATION
	National Interest Test Statement								
	The 3D nanoscale printing tool (GT2) will enable addressing two practical challenges of the Science and Research Priority of Advanced Manufacturing: i) Cross-cutting technologies that will de-risk scale up, and add value to Australian manufactured products and ii) Specialised, high value-add areas such as high performance materials, composites, allows and polymers. The applications enabled by this novel technology will also result in benefits to other fields and will help place Australia at the forefront of advanced manufacturing capabilities, optics and photonics, biomaterials and microsystems engineering. It will also reinforce Australia’s current standing as a world leader in nanotechnology, advance manufacturing and biotechnology, as home to a thriving network of some 400 companies whose core business is in biotechnology, as well as 600 medical device companies. Furthermore, the training of postdocs and PhD students in this area will develop the next generation of Australian innovators in Advanced Manufacturing.								
	Monash University	3,943,000.00	0.00	0.00	0.00	0.00	0.00	3,943,000.00	

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RMIT University									
LE200100071 Mitchell, Prof Arnan D	This project will create a Photonic Chip Integration Facility responding to newly emerging global trends towards low loss waveguides and wider coverage of the optical spectrum. The tool will grow ultrahigh quality silicon nitride and oxide thin films in a manner that is compatible with electronics and other delicate materials, balancing flexibility for materials exploration with reliability and repeatability required for photonic chip systems research. The proposed facility will support Australian researchers from diverse disciplines spanning broadband networks, sensing, quantum technology, materials science, and beyond while providing a clear path for translating discoveries out of the lab towards scale up industrial manufacture	535,000.00	0.00	0.00	0.00	0.00	0.00	535,000.00	
	National Interest Test Statement The Photonic Integration Facility will be the only facility of its kind in Australia, enabling rapid research into novel photonic chip technologies and systems that can use these platforms. The dedicated nature of this facility will ensure accessibility and reliability and its compatibility with scale-up mass manufacture at semiconductor foundries will enable breakthrough fundamental science and provide a clear pathway for commercial translation. Our approach will enable fundamental researchers to rapidly create prototypes giving Australian industries the confidence to partner in developing these technologies for their applications. Potential areas of application include high speed communications, sensing spectroscopy, precision measurement and quantum computing. Australian manufacturers who can benefit from this facility include Finisar (for optical communications modules); Agilent (spectroscopy solutions) ; Baraja (LIDAR sensing systems); Optiscan (medical imaging); BAE Systems, L3 Micro and Advanced Navigation (Radar and positioning systems for defence and automotive applications).								
	RMIT University	535,000.00	0.00	0.00	0.00	0.00	0.00	535,000.00	
Swinburne University of Technology									
LE200100074 Farmer, Prof Jane C	The Data Cooperative (Co-Op) Platform for Social Impact and Wellbeing aims to make data-driven research and decision-making in the social sciences more effective and efficient by developing infrastructure to support data integration and harmonisation of diverse data resources. Social research relies on a vast array of data types and sources, both open and confidential, making data analysis complex and time-consuming. This project will drive innovation across a range of critical social issues that require integrated data for research and social innovation including healthcare, better outcomes for disadvantaged and vulnerable groups, resilient urban, rural and regional communities, and increasing our capacity to respond to climate change.	580,000.00	0.00	0.00	0.00	0.00	0.00	580,000.00	
	National Interest Test Statement The Data Cooperative (Co-Op) Platform for Social Impact and Wellbeing contributes to Australia's national interest by building research and community data analysis and decision-making tools based on data from Australian research, government and community organisations. The platform will help to address critical social, environmental and economic issues facing the nation including models for healthcare, better outcomes for disadvantaged and vulnerable groups, effective technologies for resilient urban, rural and regional infrastructure and enhancing Australia's capacity to respond to climate change impacts. The infrastructure developed will provide more efficient ways to curate, analyse, store and apply public, research and community data from Australian organisations thereby increasing the return on investment for the community, and providing access to quality evidence for use across Australian research, policy, industry and civil society sectors.								
	Swinburne University of Technology	580,000.00	0.00	0.00	0.00	0.00	0.00	580,000.00	

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		2019-20	2020-21	2021-22	2022-23*	2023-24*	2024-25*		
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)	(Column 9)	(Column 10)	(Column 11)
The University of Melbourne									
LE200100051 Smith, A/Prof Trevor A	The Ultrafast Laser Spectroscopy Facility will provide a comprehensive range of new spectroscopic techniques that cover all energies (from the ultraviolet to infrared regions of the spectrum) and timescales relevant to the absorption, emission and transformation of light in advanced photo-active materials. Expected outcomes and benefits are more efficient light harvesting, lighting and optical sensing processes; control over light-induced activity in new materials, and enhanced chemical reactivity. This will provide a platform to enhance capacity in materials characterisation, and will increase institutional and cross-disciplinary collaborations involving Universities, defence organisations and industry.	755,000.00	0.00	0.00	0.00	0.00	0.00	755,000.00	SHANDONG UNIVERSITY, CHINA
	National Interest Test Statement Processes that involve the absorption or emission of light occur on ultrashort timescales and are crucial to how light energy can be collected (e.g. for solar energy conversion or sensors) or emitted for lighting applications (such as light emitting diodes). Creating new ways to harness and manipulate light in advanced light-active materials is required in the development of new and more efficient products for the collection, detection and emission of light. The proposed new instrumentation and techniques to study these materials are intended to improve Australia's competitiveness and environmental sustainability, and increase researcher training and opportunities for job creation. The project also aims to significantly broaden the technical support to large scale projects including Centres of Excellence, CSIRO, renewable energy and defence agencies, and through these to facilitate new intellectual property in nationally important objectives including improved currency security, chemical screening and photocatalysis for enhanced synthesis of high-value chemical products.								
LE200100053 Ellis, Prof Amanda V	This proposal aims to establish an Australian facility for next generation high resolution inductively coupled plasma time-of-flight mass spectrometry (icpTOF-MS), coupled with high speed laser ablation (LA) imaging. The facility, being the first in Australia, will allow for the entire elemental/isotopic make-up of individual particles and cells in suspension, or within a solid sample, to be performed simultaneously. This is particularly significant when materials are rare, or not readily available. Expected outcomes include the generation of new knowledge and training in the industrial, biological, defence and environmental research sectors and the significant enhancement of Australia’s leadership in nanotechnology and elemental imaging.	482,055.00	0.00	0.00	0.00	0.00	0.00	482,055.00	DST GROUP, THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH
	National Interest Test Statement This proposal aims to contribute to Australia's national interest directly by building a national high resolution imaging facility capable of mapping the location of elements and isotopes in materials, which is essential to understanding the function of biological and environmental systems. Impact will be felt in areas of significant importance to Australian society through the detection and remediation of heavy metal pollution, drug delivery, brain and immune function processes and protection of Australian Defence Force personnel from chemical agents. The facility aims to provide a step-change and accelerate discovery for key problems facing Australia and place Australian industry in a market leading position, in sectors such as the environment, defence, medicine, bio-nanotechnology, advanced materials and manufacturing. It will provide a world-class training environment for future Australian research leaders who will move into Australian industry and tertiary institutions to ensure Australia will drive innovations critical for our future commercial success.								

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(Columns 1 and 2)	(Column 3)	2019-20 (Column 4)	2020-21 (Column 5)	2021-22 (Column 6)	2022-23* (Column 7)	2023-24* (Column 8)	2024-25* (Column 9)	(Column 10)	(Column 11)
LE200100098 Simpson, Dr David A	Quantum technology is set to play a significant role in the next generation of sensors, computers and communication systems. Diamond is a critical part of this technology revolution as it allows for room temperature quantum-based applications. This projects aims to establish a world leading facility to engineer quantum-grade diamond for precision sensing, secure communications and desktop quantum computing applications. Direct outcomes from the facility include: ultrasensitive magnetometers for magnetoencephalography, atomic microscopes for biomolecular imaging and novel sensing probes to interface with biology. The facility will seed the emerging diamond quantum industry in Australia and train the next generation of quantum engineers.	600,000.00	0.00	0.00	0.00	0.00	0.00	600,000.00	
	National Interest Test Statement Global investment in quantum technology over the past 5 year is upward of US$13 Billion. This emerging industry will permeate a number of key sectors including defence, finance, medicine and communications. Diamond materials will feature heavily in this emerging industry given their ability to operate under ambient conditions. This proposal aims to provide Australia with the most advanced diamond fabrication, processing and characterisation facility in the world. The national facility for quantum diamond would service the large diamond community in Australia and would provide government and defence departments with a competitive advantage in areas such as quantum metrology and secure quantum communications. The investment into this facility will complement the significant programs of quantum research around Australia and will help maintain our international lead in this emerging area. The research training provided by the facility will provide a critical mass to support future quantum technology enterprises.								
LE200100163 Caruso, Prof Frank	The recent convergence of nanoscience and biology heralds a new era for the development of new biotechnologies. Advances in this field are critically dependent on being able to explore and understand the interactions of nanomaterials with cells in their live, dynamic state. This proposal aims to establish a Live Cell Super Resolution Imaging Facility, which will enable dynamic nanomaterial–cell interactions to be interrogated. This facility will underpin leading research programs at The University of Melbourne, Monash University, RMIT, the Peter MacCallum Cancer Centre and the Bionics Institute, promoting synergies across the physical and biological sciences for generating new knowledge and advancing bio-nanoscience and technology.	700,000.00	0.00	0.00	0.00	0.00	0.00	700,000.00	PETER MACCALLUM CANCER CENTRE, BIONICS INSTITUTE
	National Interest Test Statement The establishment of a Live Cell Super Resolution Imaging Facility will provide cutting-edge infrastructure to investigate the complex interactions between nanomaterials and biological systems. Nanomaterials have become an integral part of everyday life, underpinning new communication technologies, functional foods, smart textiles and advances in agriculture. The continual advance of nanotechnology, and particularly transformative new applications in the biosciences, creates a need to explore and understand the interactions between nanomaterials and cellular systems in their dynamic state. This facility will address this need by enabling live cell–nanomaterial interactions to be examined. It will also foster interdisciplinary collaboration between leading physical and life scientists, generating new knowledge, which is essential to transform imaginative engineering solutions into technological platforms with biological significance. Such knowledge is critical for the development of new materials for applications in various sectors, potentially leading to social and economic benefits to Australia.								
LE200100181 McFadden, Prof Geoffrey I	This project aims to establish complementary scanning electron microscope (SEM) facilities at The University of Melbourne and LaTrobe University to advance research into crops, disease, neurosciences and coral reefs. SEMs are rapidly evolving instruments that permit high resolution imaging of visible size samples such as parts of plants and animals. The potential innovations, applications and benefits to society are far reaching, with the facility expected to impact the development of drought and salinity tolerance in crops, production of fibres by plants, resilience of Great Barrier Reef corals to warming, advances in medicinal agriculture, control of important diseases of livestock and humans, and sensory processing and ocular disease.	1,050,000.00	0.00	0.00	0.00	0.00	0.00	1,050,000.00	

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		2019-20	2020-21	2021-22	2022-23*	2023-24*	2024-25*		
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)	(Column 9)	(Column 10)	(Column 11)
	National Interest Test Statement								
	The facility will improve Australia's ability to develop drought and salinity tolerance in crops, produce useful fibres from plants, increase the resilience of Great Barrier Reef corals to warming, foster a medicinal agriculture industry, improve knowledge of neuroscience, vision, and how and why animals are coloured, and help control important diseases of livestock and humans.								
	The University of Melbourne	3,587,055.00	0.00	0.00	0.00	0.00	0.00	3,587,055.00	
	Victoria	10,820,055.00	0.00	0.00	0.00	0.00	0.00	10,820,055.00	

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(Columns 1 and 2)	(Column 3)	2019-20 (Column 4)	2020-21 (Column 5)	2021-22 (Column 6)	2022-23* (Column 7)	2023-24* (Column 8)	2024-25* (Column 9)	(Column 10)	(Column 11)
Western Australia									
Curtin University									
LE200100035 Evans, Prof Noreen J	This Application aims to provide a mass spectrometer for Australian researchers collaborating on NASA, Japanese Aerospace Exploration Agency and China National Space Administration extra-terrestrial sample return missions as they characterise unique samples of dust and rock collected from asteroids, the Moon and meteorites. The Application will also support government geoscience agencies who will generate nationally significant isotopic datasets to improve mineral exploration success, and scientists monitoring Earth's environment. Expected outcomes will ensure that Australia remains at the forefront of cosmochemistry, minerals research and environmental studies, which will provide significant benefits to our economy and society.	610,000.00	0.00	0.00	0.00	0.00	0.00	610,000.00	GEOLOGICAL SURVEY OF WESTERN AUSTRALIA , COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
	National Interest Test Statement The new facility will offer an unprecedented platform for research into the processes that shaped the Earth and other planetary bodies. The formation of the Australian Space Agency and the new Space Science and Technology Centre at Curtin in 2018 signify that space science in Australia is a new and important national priority. The growth in this area deserves to be underpinned by the best instrumentation in the world. Cross-disciplinary in nature, the new facility will also lead to an improved understanding of the evolution of Earth's surface and environment, and the formation and distribution of mineral and petroleum resources. Predicted outcomes to aid the Australian mineral and resources industry include enhanced exploration targeting and reducing exploration risk. The proposed facility is critical to meeting the demands of Australian students, early career and senior researchers in Earth and Planetary sciences, will help underpin current and future ARC projects, and support broad nationally collaborative programs (e.g, AuScope, MinEx CRC, Geoscience Mapping).								
LE200100078 James, Dr Clancy W	The project will construct a particle detector array for the Murchison Widefield Array radio telescope. The array will identify cosmic ray interactions in the Earth's atmosphere, and trigger radio observations. The outcome will be a new capability to study the origin of the highest-energy particles in nature, cosmic rays, and discover new physical processes at energies unreachable by the Large Hadron Collider. The anticipated benefits are the establishment of the Murchison Widefield Array as a world-leading instrument for astroparticle physics; to lay the foundations for future research with the Square Kilometre Array; and to provide answers to long-standing scientific questions of public interest.	250,000.00	0.00	0.00	0.00	0.00	0.00	250,000.00	KARLSRUHE SHOWER CORE AND ARRAY DETECTOR - GRANDE, THE UNIVERSITY OF MANCHESTER, UK, COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
	National Interest Test Statement Multi-messenger astronomy is the study of astronomical objects using not just light, radio waves, or x-rays; but with gravitational waves and high-energy particles. The year 2017 heralded the birth of multi-messenger astronomy with two famous discoveries: the detection of gravitational waves from the merger of a binary neutron star; and the detection of neutrinos from a blazar, a kind of supermassive black hole. The future of astrophysics lies in uniting traditional astronomy with these new disciplines. This project will do so by enabling a radio telescope to study the highest energy particles in nature, cosmic rays. This will cement Australia as a world leader in this emerging field, maximize the return on existing investment in radio astronomy, and pave the way for future projects with the Square Kilometre Array. Particle physics and astronomy have also been at the forefront of technological discoveries in the 20th century, for example producing the World Wide Web and enabling WiFi. By uniting these disciplines, this project will maximize the possibility of future breakthroughs.								

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LE200100122 Mamo, Prof John C	The equipment proposal aims to establish West Australia's only super-rapid-speed, high throughput confocal microscopy facility. The technology will provide researchers in biotechnology, medicine, environmental biology and agriculture with contemporary state-of-art opportunities to analyse living cells and/or large-area tissue specimens in three-dimensions with the highest possible speed and high-resolution. West Australia hosts 1 twelve-year old historic rapid-acquisition confocal microscope that is heavily subscribed, no longer manufactured and prone to regular, prolonged, costly breakdowns. Accessing high-speed confocal systems in other states is not a viable option putting WA-based researchers at a significant disadvantage. **National Interest Test Statement** Rapid acquisition confocal microscopy systems are required for live cell imaging studies, a capability central to life-science researchers. The application is linked to two Australian Government Scientific priorities of 'Food Production' and of 'Health'. The 'rapid-fluorescent-image-capture' enables consideration of large surface areas without compromising tissue viability, thus permitting a comprehensive and integrated consideration of biological processes in live tissues and cells. The technology is central to research that protects Australia's cereal and grain food production chain; and for bio-discoveries for chronic health diseases (a Commonwealth National Health Priority). Western Australian Life Science researchers wish to continue to make substantive contributions to research of national interest, but to do so require quality assured technology platforms. Please note, the indicated Chief Investigators are a sampling of 63 WA-based LEADING RESEARCHERS undertaking national and international collaboration requiring access to said platform technologies for study of biological systems.	620,000.00	0.00	0.00	0.00	0.00	0.00	620,000.00	TELETHON KIDS INSTITUTE, HARRY PERKINS INSTITUTE OF MEDICAL RESEARCH INC
	Curtin University	1,480,000.00	0.00	0.00	0.00	0.00	0.00	1,480,000.00	
The University of Western Australia									
LE200100008 Ju, Prof Li	The project aims to create a facility for developing techniques for imaging the deep earth and the surface motion in ambient seismic waves created by wind, waves and human activity. The techniques will enable sources of seismic vibrations to be identified and suppressed, and will allow mapping techniques to be developed for monitoring and discovery of resources such as ground water. Gravitational wave researchers will benefit from the ability to suppress seismic vibrations, while geophysicists will benefit from new techniques and training. **National Interest Test Statement** Australian physicists won international awards for their contribution to the discovery of gravitational waves announced in 2016. This proposal relates to the next generation of detectors for gravitational wave astronomy including one proposed for Australia. This project will use Australian developed tilt sensors in a seismic imaging array designed to image and suppress seismic vibrations. It will also develop new techniques for resource exploration. It will provide a resource for training as well as commercial opportunities.	700,000.00	0.00	0.00	0.00	0.00	0.00	700,000.00	UNIVERSITY OF TEXAS, DALLAS, COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
LE200100096 Staveley-Smith, Prof Lister G	This project will provide a next-generation radio astronomy receiver to be used on the Parkes radio telescope. This facility will provide a major increase in performance, particularly in sensitivity and survey speed. The science goals are to better understand the ionized and neutral components of the cosmic web, and their evolution, through observations of Fast Radio Bursts and neutral hydrogen. Advances in the understanding of pulsars, molecules, radio galaxies and cosmic rays will also be achieved with this facility. The technology is based on cryogenic cooling of a large phased array feed. This receiver is a major advance over existing receivers on the Parkes and Australian SKA Pathfinder (ASKAP) telescopes.	575,000.00	575,000.00	0.00	0.00	0.00	0.00	1,150,000.00	CSIRO, XINJIANG ASTRONOMICAL OBSERVATORY, CHINESE ACADEMY OF SCIENCES, NATIONAL ASTRONOMICAL OBSERVATORIES: CHINESE ACADEMY OF SCIENCES

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(Columns 1 and 2)	(Column 3)	2019-20 (Column 4)	2020-21 (Column 5)	2021-22 (Column 6)	2022-23* (Column 7)	2023-24* (Column 8)	2024-25* (Column 9)	(Column 10)	(Column 11)
	National Interest Test Statement This facility provides world-class infrastructure for Australian radio astronomers and their collaborators to conduct leading research in astronomy and astrophysics. It will lead to new discoveries, increased demand for the Parkes telescope, including from international institutes. The new discoveries will be shared with the Australian public, and the implications for our understanding of the Universe will be disseminated via media releases. The technology will likely generate revenue and prestige for Australian industry with the sale of similar instruments to overseas observatories. The techniques required to process the data from the facility will provide excellent training for a future generation of data scientists and analysts.								
LE200100123 Smith, Prof Benjamin W	All five Western Australian Universities, the WA State Library and the WA Museum will collaborate to establish a world-class archival quality Digitisation Centre. There is no existing facility of this kind in WA. During this 12 month project all digitisation equipment will be acquired, installed and used to digitise a diverse range of cultural objects so as to ensure its ability to address the full spectrum of research needs. The Digitisation Centre will form a major piece of national research infrastructure with a prominent international profile and significance. The Centre will have the capacity to digitise all significant Humanities, Arts and Social Sciences (HASS) research collections held by participating institutions within a decade.	1,100,000.00	0.00	0.00	0.00	0.00	0.00	1,100,000.00	WESTERN AUSTRALIAN MUSEUM, STATE LIBRARY OF WESTERN AUSTRALIA
	National Interest Test Statement The Western Australian Universities, the State Library of Western Australia and the Western Australian Museum, hold extensive Humanities, Arts and Social Sciences (HASS) collections that are of national and international significance. At present these are not available online and are mostly accessible only to the small number of local researchers able to visit these collections. Many items are too fragile to be handled or transported. This project will establish a dedicated Centre to digitise these collections. Digitisation will not only preserve the collections in digital format to guarantee that they remain a resource for future generations, but it will also make these collections accessible, for the first time, to people across Australia and beyond.								
LE200100162 Atkin, Prof Rob	This project aims to address an urgent need for Australian researchers to undertake previously impossible real time studies of nanoscale dynamics concerning colloids and surfaces with unprecedented structural and temporal resolution using Video Rate Atomic Force Microscopy. This will lead to a step changes in understating, and rapid progress, in colloids and surfaces projects spanning chemistry, biology, biochemistry, medicine, engineering, sensors and materials science. The new information the delivered will enable colloids and surfaces to be refined with precision for function, build on domestic expertise in allied methods, and place Australian researchers at the forefront of the study of molecular scale process.	444,000.00	0.00	0.00	0.00	0.00	0.00	444,000.00	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
	National Interest Test Statement This facility will provide access to a state-of-the-art high resolution Video Rate Atomic Force Microscope (AFM), which will allow physical, chemical and biological processes to be followed with atomic resolution in real time. It will generate new knowledge in a diverse range of fields spanning chemistry, biology and materials science and place Australian researchers at the forefront of nanoscale video research, build on local expertise in allied methods, and enable science to be harnessed at the nanoscale, enabling the devlopment of new high performance materials, electrochemical devices, medicines, biochemical processes and sensors. Technology transfer will be facilitated through existing local and international industry and research partnerships, and the project will train early career researchers and graduate students in cutting edge experimental techniques.								
	The University of Western Australia	2,819,000.00	575,000.00	0.00	0.00	0.00	0.00	3,394,000.00	
	Western Australia	4,299,000.00	575,000.00	0.00	0.00	0.00	0.00	4,874,000.00	
		29,652,752.00	**1,020,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30,672,752.00**	

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