

## Successful Collaborative ARC LIEF Grants 2010

### LE100100095

Prof William L Griffin, Prof Suzanne Y O'Reilly, Dr Norman J Pearson, Prof Simon P Turner, Dr Bruce F Schaefer, Dr Elena Belousova, Dr Nathan R Daczko, Dr Tracy A Rushmer, Prof Joel A Baker, Prof Geoffrey L Clarke, Dr Masahiko Honda, Dr Paul F Carr

**Approved Project Title:** Frontiers in integrated laser-sampled trace-element and isotopic geoanalysis

**2010:** \$700,000

**Primary FoR:** 0403 - GEOLOGY

#### **Partner/Collaborating Organisation(s)**

Victoria University of Wellington  
The Australian National University,  
The University of Sydney,  
University of Wollongong

**Administering Organisation:** Macquarie University

#### **Project Summary**

Until around 2005 Australia was a leader in the coupling of laser-ablation microprobes (LAM) with inductively-coupled-plasma mass spectrometers (ICPMS) for geochemical research. However, international developments in femtosecond LAM, sector field instruments and novel instrument coupling possibilities have leap-frogged these achievements. The proposed innovative facility will allow us to regain the leading edge in this field, help maintain the high profile of Australian geoscience internationally, and to attract high-quality researchers and industry-related research funding. The research is relevant to the Deep Earth Resources National Priority and will include projects of direct relevance to mineral exploration and process technology.

### LE100100030

Dr Julie M Cairney, Prof Paul R Munroe, Prof Simon P Ringer, Prof Michael Ferry, Prof Yiu-Wing Mai, Dr Xiaozhou Liao, Prof David R McKenzie, Prof Stuart R Wenham, Prof Andrew S Dzurak, A/Prof Marion A Stevens-Kalceff, Prof Geoffrey M Spinks, Prof Shi Xue Dou, Dr Nagarajan Valanoor, Dr Zongwen Liu, Dr Gwénaëlle Proust, Prof David J Young, A/Prof Filip C Braet, Prof Tailoi Chan-Ling, Prof Dr Thomas Maschmeyer, Prof Hak-Kim Chan, Dr Daniela Traini, Prof Michael V Swain, A/Prof Andrew T Harris, Prof John W Crawford, Prof Daniel T Potts

**Approved Project Title:** Advanced focused ion beam (FIB) / scanning electron microscopes (SEM) for nanometre scale characterisation and fabrication

**2010:** \$1,200,000

**Primary FoR:** 0912 - MATERIALS ENGINEERING

#### **Partner/Collaborating Organisation(s)**

The University of New South Wales,  
University of Wollongong

**Administering Organisation:** The University of Sydney

#### **Project Summary**

These instruments are designed to provide fundamental insights into physical and biological systems through characterisation and fabrication of structures at nanometre length scales. These versatile platforms will support a wide range of projects covering three national research priority areas. These range from the characterisation of light alloys for improving and building Australia's Aluminium, Magnesium and Titanium alloy industries, to the study of aerosol particles for improved pulmonary drug delivery for asthma patients, the development of advanced solar cells and the study of the integrated behaviour of the soil-microbe system for sustainable agriculture.

### **LE100100135**

Prof Cameron J Kepert, Prof Jules M Guss, Dr Robyn L Malby, Dr Mika Jormakka, Dr Marcus L Cole, Prof Nicholas E Dixon, Prof Gordon Kearley

**Approved Project Title:** Federated single crystal X-ray structural analysis facility

**2010:** \$700,000

**Primary FoR:** 0306 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

#### **Partner/Collaborating Organisation(s)**

Australian Nuclear Science and Technology Organisation  
The University of Newcastle,  
The University of New South Wales,  
University of Wollongong

**Administering Organisation:** The University of Sydney

#### **Project Summary**

X-ray crystallography is the most widely applied method for the determination of three-dimensional molecular structures. These structures range in size from small systems such as materials and pharmaceuticals through to large biological structures such as proteins. This application will provide a multidisciplinary facility covering the structural characterisation needs of chemistry, pharmacy, biology, and medicine. This will position local universities for key scientific breakthroughs that benefit the Australian community by providing improved healthcare technologies, and processes. Furthermore, access to this world-class facility will provide state-of-the-art training for undergraduate, postgraduate and postdoctoral researchers.

### **LE100100128**

Prof Rose Amal, Dr Kondo-Francois Aguey-Zinsou, Prof Cameron J Kepert, Prof Hua Kun Liu, Dr Cordelia Selomulya, Dr Jason A Scott, Dr Wey Yang Teoh, Dr May T Lim, Dr Christoph H Arns, A/Prof Sammy L Chan, Reader Huanting Wang

**Approved Project Title:** High performance analytical tools to strengthen clean energy research

**2010:** \$300,000

**Primary FoR:** 0303 - MACROMOLECULAR AND MATERIALS CHEMISTRY

#### **Partner/Collaborating Organisation(s)**

Monash University,  
The University of Sydney,  
University of Wollongong

**Administering Organisation:** The University of New South Wales

#### **Project Summary**

High performance analytical tools are vital to the success of emerging research fields of national priority. By filling a gap in materials routine characterisation capabilities, the equipment requested will lead to major advances in fundamental and applied research aimed at carbon abatement and clean energy technologies. This includes technologies for clean energy generation by solar means and from decarbonised fossil fuels, efficient energy storage systems, advanced fuel cells for electricity generation, and hydrogen as the universal energy vector. Advancement of these technologies will bring solutions to the grand challenges facing Australia and in turn benefit industry and society.

## **LE100100116**

Dr Sean S Li, Prof Martin A Green, Dr Rongkun Zheng, Dr Maxim Avdeev, Prof Qipeng Guo, Prof Janusz Nowotny, Prof Charles C Sorrell, Dr Leigh R Sheppard, Dr Run Y Yang, Dr Dehong Yu, Prof Yong Zhao, Prof Chao Zhang, Dr Zai P Guo, A/Prof Andrew J Ruys, Prof Veena Sahajwalla

**Approved Project Title:** Facilities of thermophysical characterisations at nanometre scale for development of advanced materials, energy technologies and biomedical components

**2010:** \$350,000

**Primary FoR:** 1007 - NANOTECHNOLOGY

### **Partner/Collaborating Organisation(s)**

Australian Nuclear Science and Technology Organisation  
Deakin University,  
The University of Sydney,  
University of Western Sydney,  
University of Wollongong

**Administering Organisation:** The University of New South Wales

### **Project Summary**

Australia's energy, mining, metallurgical, defence, pharmaceutical and biomedical industries are spearheading the advancement of technologies in the global competitive market. They are the engines of Australian economic strength. Future progress of these industries will be largely driven by advances in materials. The installation of the proposed facilities will add a new dimension to high-level research performance and significantly enhance the capability for characterisation of various forms of materials and biomedical components in Australia. The continual development of advanced materials and energy technology will potentially provide a sustainable means for meeting the increasing global challenge for the industries.

## **LE100100098**

Prof Gang-Ding Peng, Prof John Canning, Prof Aibing B Yu, Prof Rose Amal, Prof Nasser Khalili, Dr Brant C Gibson, A/Prof Xiaosong Gan, Dr John L Holdsworth, A/Prof Stephen F Collins, A/Prof Jiangtao Xi, Dr Jayantha A Epaarachchi, Dr Jeffrey R Reimers, A/Prof Javid Atai, Dr Tony Khoury, Dr Andrew M Michie, Dr Mattias L Aslund, Dr Kevin Cook, A/Prof Jun Wang, Dr Jason A Scott, Prof Chee Y Kwok, A/Prof Rodica Ramer, Dr D Sen, A/Prof Jie Bao, Prof Maxwell J Crossley, Prof Graham E Town, Prof Gregory W Baxter

**Approved Project Title:** Advanced facility for next generation sustainable energy, biomedical & nano-imaging optical fibre technologies

**2010:** \$600,000

**Primary FoR:** 1007 - NANOTECHNOLOGY

### **Partner/Collaborating Organisation(s)**

Macquarie University,  
Swinburne University of Technology,  
The University of Melbourne,  
The University of Newcastle,  
The University of Sydney,  
University of Southern Queensland,  
University of Wollongong,  
Victoria University

**Administering Organisation:** The University of New South Wales

### **Project Summary**

Remote optical fibre technologies are the way forward for effective and safe monitoring of many industries, and will play a big part in the sustainability of Australia's core oil, gas and alternative energy sectors. They are equally important to health industry applications, particularly in medical and imaging technologies. This facility brings together world-class Australian expertise—from across nine universities—in advanced structured optical fibres, complex fibre diagnostic systems, nanoscale imaging, and environment monitoring, to design and implement the next generation of technologies that will reduce the impact of climate change through reduced energy consumption and vastly improved health diagnostics.

## **LE100100059**

Prof Iain M Suthers, Dr Matthew D Taylor, Prof Robert C Brooks, Prof Richard T Kingsford, Prof David J Booth, A/Prof Robert G Harcourt, A/Prof William Gladstone, A/Prof Andy R Davis

**Approved Project Title:** Dual frequency identification SONAR (DIDSON) facility for sampling benthic and pelagic fish populations

**2010:** \$100,000

**Primary FoR:** 0602 - ECOLOGY

### **Partner/Collaborating Organisation(s)**

Macquarie University,  
The University of Newcastle,  
University of Technology, Sydney,  
University of Wollongong

**Administering Organisation:** The University of New South Wales

### **Project Summary**

Many Australians enjoy marine and freshwater resources, and we are exploiting fisheries and waterways in particular at an increasing rate. Effective management of fisheries requires understanding the abundance and behaviour of fish. This facility will provide novel acoustic video technology for researchers to count fishes and sharks near weirs, under wharves or logs, and within seagrass beds. The dual frequency identification sonar (DIDSON) will also allow accurate and standardised study of fish movements in response to floods, algal blooms or re-stocking events without disturbing the fish or their habitats. This will enhance our understanding of the top-down control by fish of aquatic ecosystems that are directly adjacent to human activity.

## **LE100100064**

Dr Yuri Amelin, Dr Victoria C Bennett, Dr Richard A Armstrong, Prof Ian Metcalfe, Dr Claudine H Stirling, Dr Michael K Gagan, Dr Marc D Norman, Prof Trevor R Ireland, Dr Anthony I Kemp, Prof Allan R Chivas, Prof Richard G Roberts, Prof Colin V Murray-Wallace, Dr D C "Bear" McPhail, Prof Mark E Barley, Prof Ian H Campbell, A/Prof Paul W Hoskin, Dr Tezer M Esat, Prof Raymond A Cas, Dr Kurt M Knesel, A/Prof Massimo Gasparon, Dr Anthony Dosseto

**Approved Project Title:** A facility for sensitive and precise isotopic dating of the earth's and extraterrestrial rocks

**2010:** \$450,000

**Primary FoR:** 0403 - GEOLOGY

### **Partner/Collaborating Organisation(s)**

Australian Nuclear Science and Technology Organisation,  
Australian Scientific Instruments,  
University of Auckland  
James Cook University,  
The University of Queensland,  
The University of Western Australia,  
University of Wollongong

**Administering Organisation:** The Australian National University

### **Project Summary**

SPIDE2R will be a new generation mass spectrometer for very precise and sensitive dating and forensics applications in earth and planetary sciences, hydrology, climate studies, and nuclear and archaeological fingerprinting. The unprecedented sensitivity of this unique instrument will provide enhanced capabilities for solving long-standing problems requiring precise geological time resolution, as well as opening new areas of research. It will be the instrument of choice for analysing small, rare samples such as those returned by space missions. The Australian-built high sensitivity source and ion detection systems can be retrofitted onto other mass spectrometers, opening a new area of commercialisation.

## **LE100100195**

Prof Ying I Chen, A/Prof Matthew R Barnett, Prof Peter D Hodgson, Prof Xungai Wang, Dr Takuya Tsuzuki, Dr Cui'e Wen, Dr Alexey M Glushenkov, A/Prof Lingxue Kong, Prof Charles C Sorrell, Dr Yuebin Zhang, Prof Vicki Chen, Dr Dominic J Phelan, Dr Ken Walder, Dr Germanas Peleckis, Dr Simon E Moulton, Prof John H Beynon, Prof Dr Xiaolin Wang, Prof David M Cahill, Dr Pavel Cizek, Prof Neil W Barnett, Dr Nicole Stanford, Prof Qipeng Guo, Dr Robert G O'Donnell

**Approved Project Title:** Field-emission gun transmission electron microscope for the research in nanomaterials, metal alloys and biological sciences

**2010:** \$1,000,000

**Primary FoR:** 0912 - MATERIALS ENGINEERING

### **Partner/Collaborating Organisation(s)**

Commonwealth Scientific and Industrial Research Organisation (CSIRO)  
Swinburne University of Technology,  
The University of New South Wales,  
University of Wollongong

**Administering Organisation:** Deakin University

### **Project Summary**

The proposed facility is required by a large range of world-leading research programs in light metals, nanomaterials, fibres and biomaterials. These research programs are strongly supported by automobile, textile, mineral and advanced materials industries that have important roles in the current national economy and local communities. The facility will improve significantly our current research ability and help the creation of new research areas in nanotechnology and energy materials beneficial to clean energy, environmental protections and health care. It is also important equipment for new research student training.

## **LE100100079**

Prof Richard A Fotheringham, Prof Joanne E Tompkins, Prof David J Carter, Prof Thomas A O'Regan, Prof Jane L Hunter, Prof Kerry M Mallan, Prof Annette J Patterson, A/Prof Cheryl M Taylor, Em/Prof Elizabeth A Webby, Prof Dennis J Haskell, A/Prof Van G Ikin, Prof Philip Mead, Dr Kate Douglas, Ms Kerry M Kilner, Prof Leigh Dale, Prof Wenche Ommundsen, Mr Martin Borchert, Prof Gillian L Whitlock, Prof Paul R Eggert, Dr Toni M Johnson-Woods, Prof Robert W Dixon, Mr Ross H Coleman, Dr Elizabeth N McMahon, Em/Prof Bruce H Bennett, Mr John F Arnold, A/Prof Tracey A Bunda, Dr Ernie Blackmore, Ms Roslyn M Follett

**Approved Project Title:** eResearch Infrastructure for Humanities Scholars: Facilitating literary and narrative studies; children's and popular fictions and film/TV studies

**2010:** \$520,000

**Primary FoR:** 2005 - LITERARY STUDIES

### **Partner/Collaborating Organisation(s)**

James Cook University,  
Monash University,  
Queensland University of Technology,  
The Flinders University of South Australia,  
The University of New South Wales,  
The University of Sydney,  
The University of Western Australia,  
University of Wollongong

**Administering Organisation:** The University of Queensland

### **Project Summary**

AustLit provides enhanced information about Australian narrative cultures to all researchers and information seekers throughout Australia and internationally. It serves the needs of students, teachers and academic researchers at all levels studying in the broad area of Australian literary and narrative cultures. The proposed developments in 2010 will further enhance AustLit's value to many Australian communities with interests in Australian literary, audio-visual and critical narratives. Its multi-dimensional approach to research support and facilitation ensures that it is connected to most current activity in the field and thereby continues to accrue benefits to the whole community as it develops.

## **LE100100141**

Dr Dennis Mather, Dr John Tibby, Dr Simon G Haberle, Dr Michael K Gagan, Prof Patrick De Deckker, Prof Peter A Gell, Dr Mark T Warne, Dr Paul Hesse, Dr Kirstie A Fryirs, A/Prof Ian D Goodwin, A/Prof Jonathan D Woodhead, Dr Patrick J Baker, Dr Russell N Drysdale, Dr Scott D Mooney, A/Prof Massimo Gasparon, A/Prof Jian-xin Zhao, Prof John M Pandolfi, Dr Dan A Penny, Prof David M Bowman, Prof Charles G Skilbeck, Dr Grzegorz D Skrzypek, Prof Allan R Chivas, Dr Helen V McGregor, Dr Katherine Szabo, Prof Martin C Thoms, Prof John R Dodson

**Approved Project Title:** High-resolution ITRAX XRF core scanning facility for global change research

**2010:** \$420,000

**Primary FoR:** 0406 - PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

### **Partner/Collaborating Organisation(s)**

Australian Nuclear Science and Technology Organisation  
Deakin University,  
Macquarie University,  
Monash University,  
The Australian National University,  
The University of Adelaide,  
The University of Melbourne,  
The University of Newcastle,  
The University of New England,  
The University of New South Wales,  
The University of Queensland,  
The University of Sydney,  
The University of Western Australia,  
University of Ballarat,  
University of Tasmania,  
University of Technology, Sydney,  
University of Wollongong

**Administering Organisation:** Australian Institute of Nuclear Science and Engineering

### **Project Summary**

This facility will enable researchers to obtain high-resolution geochemical profiles in the study of environmental change and climate variability. It will provide archive data on the variation of density and chemical element composition along sediment and soil cores, rock cores, wood samples, speleothems and corals. These archives contain important information such as human activity, climate variability, water quality changes, pollution histories, recent geomorphological change, land-use change, introduction of invasive species and the occurrence of bushfires. A better understanding of the occurrence and timing of these major environmental issues is of national and regional importance.