

Summary of Linkage International Awards Round 2 Proposals

New South Wales

University of Wollongong

LX0776043 Prof RA Lewis; Dr R Mendis; A/Prof RE Vickers; Prof HL Hartnagel; Dr C Sydlo

Approved Project Title **Advanced materials and structures for terahertz science and technology**

2007 : \$ 6,500

2008 : \$ 10,000

2009 : \$ 10,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Collaborating Countries

Germany

Administering Organisation University of Wollongong

Project Summary

Anthrax, explosives, water, cancer all have characteristic signatures in the terahertz (THz) part of the electromagnetic spectrum. Security, defence, agriculture, medicine are some of the fields where THz science and technology are booming. THz developments offer enhanced national security, prosperity and quality of life. The lack of strong sources of THz radiation is the main factor hampering wider application of THz methods. In this project two university research teams come together to develop more efficient THz emitters. The Darmstadt team will prepare novel materials and structures and the Wollongong team will evaluate them and provide feedback for the next iteration.

LX0776036 Prof GG Wallace; Prof D Diamond

Approved Project Title **Active polymer surfaces for control of fluid movement**

2007 : \$ 25,200

2008 : \$ 25,200

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Collaborating Countries

Ireland

Administering Organisation University of Wollongong

Project Summary

The realisation of a diverse array of remote or portable chemical/biological monitoring systems depends on the development of low power fluid management protocols. The use of appropriate conducting polymer surfaces should enable this to occur. We envisage the integration of these fluid management platforms into portable, remote autonomous monitoring systems for environmental industrial and biomedical applications.

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Victoria

Monash University

LX0776009 A/Prof M Rosa; Prof C Galletti; A/Prof P Fattori; Dr M Gamberini; Dr R Breveglieri; Dr D Reser; Dr KJ Burman

Approved Project Title **Understanding how the brain uses sensory information to guide reaching and grasping movements**

2007 : \$ 15,000

2008 : \$ 13,000

Primary RFCD 2706 PHYSIOLOGY

Collaborating Countries

Italy

Administering Organisation Monash University

Project Summary

Reaching, grasping and manipulating objects are crucial aspects of our daily lives, which are performed so effortlessly that they tend to be taken for granted. We know however that these functions take a relatively long time to mature (think of a baby learning how to get an object), and that they can be impaired by brain lesions involving a region called the posterior parietal cortex. We also know that this region has multiple subdivisions, but how exactly these interact in allowing the sensory information to guide arm and hand muscles is unknown. Discovering how this happens in terms of cellular interaction can have profound implications for the creation of new technologies such as artificial limbs and autonomous robots, and result in health benefits.

RMIT University

LX0775910 A/Prof DG McCulloch; Dr AS Holland; Dr TS Perova

Approved Project Title **Microanalysis of novel carbon thin films**

2007 : \$ 9,800

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Collaborating Countries

Ireland

Administering Organisation RMIT University

Project Summary

Carbon coatings are technologically important and have many applications in automotive and biomedical industries worldwide. An example automotive application is as a coating for high performance fuel injectors. Carbon coatings have significant unrealised potential for applications in hostile environments such as those encountered in high performance engineering components and in the human body. Electrical devices can be fabricated with these films suitable for use in compact electrical devices requiring high current density. This project will add to the techniques used for the analysis of carbon coatings being developed in Australia.

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Queensland

The University of Queensland

LX0775968 Dr ZY Dong; Prof DJ Hill; Dr J Ma

Approved Project Title **Power system composite load modeling**

2007 : \$ 12,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Collaborating Countries

China

Administering Organisation The University of Queensland

Project Summary

Load modelling remains an open problem (and probably the most important unsolved problem) for the power industry world wide and is a priority for the research community in Australia. Without reliable load models it is impossible to perform accurate power system security assessment, which may lead to power system blackouts causing billions of dollars and hinder national security. This project aims at developing a composite load model and tackles all the up-to-date most challenging problems using existing resources and expertise. It will provide one of the most valuable tools for the Australian power industry.

LX0775963 A/Prof MJ Drinkwater; Dr E Evstigneeva; Dr MD Gregg; Prof PA Thomas

Approved Project Title **The fossil record of galaxy formation**

2007 : \$ 6,700

2008 : \$ 17,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

Collaborating Countries

UK

USA

Administering Organisation The University of Queensland

Project Summary

This Australian-led team recently used the Anglo-Australian Telescope to discover large numbers of a new type of very small galaxy in the centres of two galaxy clusters. This project will maintain Australian leadership in this new area of astrophysics research, whilst using the best international expertise and facilities.

LX0775865 Dr P Meredith; Dr SP Nighswander-Rempel; Prof B Wilson

Approved Project Title **Raman spectroscopy and imaging of natural and synthetic melanins**

2007 : \$ 10,700

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Collaborating Countries

Canada

Administering Organisation The University of Queensland

Project Summary

The national benefit of this research lies in three main areas. First, this research could lead to a non-invasive diagnostic for melanoma. Second, it could reveal stronger connections between melanin and melanoma development than previously believed and thus inspire possible methods of treatment or prevention of melanoma. Given Australia's high incidence of melanoma, these could have an enormous impact on our health care system. Third, it will increase our understanding of the melanin pigment and further establish Australia as a leader in this field. Given the links between melanin and Parkinson's Disease and immune response, this understanding could have greater impact on health care than simply melanoma.

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LX0775868 Dr GW Wardell-Johnson; Prof PW Rundel; Prof DE Hibbs; Prof JJ Armesto; Dr ND Burrows

Approved Project Title **Biodiversity in high rainfall mediterranean-climate ecosystems: Integrating fields of ecological enquiry to achieve improved conservation outcomes**

2007 : \$ 12,000

2008 : \$ 10,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Collaborating Countries

Chile

USA

Administering Organisation The University of Queensland

Project Summary

This project targets research priority 'An Environmentally Sustainable Australia' through the management and protection of Australia's terrestrial biodiversity, and by increasing understanding of the impact of climate change and variability at the local to regional level. By linking disparate data sets across similar climatic regions, and through direct links to management agencies, this project will enable development of a landscape conservation culture for improved conservation outcomes, and more direct information use through science-based adaptive management. Efficient use of existing data and the 'promotion of an innovation culture and economy' by linking global perspectives to local conservation needs, are hallmarks of this project.

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Western Australia

Curtin University of Technology

LX0776015 A/Prof R De Marco; Prof E Bakker; Prof E Pretsch

Approved Project Title **The role of water uptake in novel all solid-state polymeric ion sensors**

2007 : \$ 12,000

2008 : \$ 12,000

2009 : \$ 12,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Collaborating Countries

Switzerland

USA

Administering Organisation Curtin University of Technology

Project Summary

This research will enable the development of robust all solid-state polymeric ion sensors based on unplasticized copolymers. Significantly, the physical and chemical robustness of these copolymer ion sensors will allow their widespread use in new and exciting analytical applications, e.g., in-situ analysis of environmental samples in submersible instruments, clinical analysis of whole blood, in-vivo use of miniaturized electrodes in biological media, especially single cells and minute samples in biology and forensic science, etc. Extensive use of neutron characterization techniques aligns strongly this project with the new OPAL reactor to be commissioned in 2007.

The University of Western Australia

LX0775977 Dr G Parish; A/Prof BD Nener; Prof UK Mishra; Prof J Speck

Approved Project Title **A comprehensive approach to development and understanding of III-nitride-based high performance electronic devices**

2007 : \$ 7,100

2008 : \$ 12,000

2009 : \$ 9,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Collaborating Countries

USA

Administering Organisation The University of Western Australia

Project Summary

This project forms part of a long-term, international research program into the development of high-power, high-frequency electronics for high performance radar and communications systems. The advanced fabrication technologies and designs being investigated in this project fall well within the designated priority goal of Frontier Technologies. III-nitride (GaN, AlN, InN and alloys) technology is also of high interest to defence organisations, as radar and satellite-communications links, which operate at frequencies ranging from hundreds of MHz to tens of GHz, often have high power-amplification requirements. The project therefore also falls within the priority goal of Transformational Defence Technologies.

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LX0775862 Prof ME Tobar; Prof C Salomon; Prof D Cros; Prof V Giordano; Prof A Clairon

Approved Project Title **Precise frequency generation for testing fundamental physics and developing new devices**

2007 : \$ 25,000

2008 : \$ 25,000

2009 : \$ 25,000

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Collaborating Countries

France

Administering Organisation The University of Western Australia

Project Summary

Precision microwave oscillators developed in Australia and France have applications in telecommunications, advanced radar, optical to microwave links, frequency and time standards, tests of fundamental physics etc. This project will aid in the transfer of new knowledge between France and Australia and strengthen Australian 'know how' and expertise, essential for the timely development of technology, which includes devices for the European Space Agency's Atomic Clock Ensemble in Space mission, which is due for launch in 2010. This project highlights the importance of Australian Science in a high profile international mission.

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Australian Capital Territory

The Australian National University

LX0776027 A/Prof Y Chen; Prof W Duan

Approved Project Title **Boron nitride nanotubes for tunable conductivity**

2007 : \$ 15,000

2008 : \$ 15,000

2009 : \$ 15,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Collaborating Countries

China

Administering Organisation The Australian National University

Project Summary

The proposed research in nanotubes falls into the national research priority areas of advanced materials and breakthrough science. This ANU research group has a leading role in Boron Nitride (BN) nanotube research internationally. The proposed collaborative research will enhance this position and further improve the nation's research profile in nanotechnology. New intellectual properties will be generated if the project is successful, which will benefit the commercialization activity of BN nanotubes at ANU. New PhD and undergraduate students will be trained by the proposed cutting edge research project.

LX0776006 Dr RB Cribb; Dr JT LINDBLAD

Approved Project Title **Economics, politics and culture in early post-independence Indonesia**

2007 : \$ 10,000

2008 : \$ 12,000

2009 : \$ 15,000

Primary RFCD 4301 HISTORICAL STUDIES

Collaborating Countries

Indonesia

Netherlands

Administering Organisation The Australian National University

Project Summary

Recent events in East Timor have highlighted the problems faced by new states after the initial honeymoon following independence is over. By examining the experience of Indonesia in the 1950s from the longer perspective of the 21st century, this project aims to better understand the significance of apparently simple but highly significant decisions made in the first years after decolonization and comparable major regime changes.

LX0775994 Prof DE McClelland; Prof N Mavalvala; Dr SE Whitcomb

Approved Project Title **The standard quantum limit and beyond collaboration**

2007 : \$ 12,000

Primary RFCD 2404 OPTICAL PHYSICS

Collaborating Countries

USA

Administering Organisation The Australian National University

Project Summary

Achievement of a limit never before reached in measuring the position of a macroscopic object will produce a new world record for Australia, breaking that limit is akin to breaking the 4 minute mile - a feat previously thought impossible. Not only will this create national pride in our ability to innovate, but the optical technology developed with the opening of the new field of sub-quantum interferometry has the potential to generate tangible benefits for Australian industry. This proposal will produce scientists highly trained in technologies related to emerging industries such as photonics.