

Summary of Linkage International Awards Round 3 Proposals

New South Wales

The University of New South Wales

LX0776343 Prof JW Storey; A/Prof MC Ashley; A/Prof MG Burton; Dr NR EPCHEIN

Approved **ARENA: Antarctic Research, a European Network for Astronomy**

Project Title

2007 : \$ 25,000

2008 : \$ 22,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

Collaborating Countries

France

Germany

Italy

Portugal

Spain

UK

Administering Organisation The University of New South Wales

Project Summary

With compelling evidence that the world's best astronomical observing sites for optical/infrared astronomy are located on the high plateau of Australia's Antarctic Territory, efforts are underway to establish the first major observing facilities there. The European Union has recently funded a network of 20 leading research institutes to coordinate the development of enabling technologies and astronomical programs in Antarctica, with a view to constructing a so-called 'Great Observatory'. Australia's participation in this network ensures continued technology exchange and builds our knowledge base in robotics, harsh-environment engineering and computational fluid dynamics, while creating important new astronomical opportunities.

LX0776121 Prof AB Yu; Prof J Bridgwater

Approved **Particle scale studies of powder mixing in bladed mixers**

Project Title

2007 : \$ 18,000

2008 : \$ 21,000

2009 : \$ 25,000

Primary RFCD 2906 CHEMICAL ENGINEERING

Collaborating Countries

UK

Administering Organisation The University of New South Wales

Project Summary

Powder handling and processing are widely used in both conventional and modern industries but rarely reach more than 60% of design capacity because of poor fundamental understanding. Such operations are important to Australia in view of the heavy dependence on raw materials processing (about 40% of the GNP). This project will tackle the core problems in powder mixing which is a key operation in many industries. Application of the research outcomes can lead to better process or product control, a decrease in energy consumption and an improvement in productivity, which is very helpful to maintaining Australia's leading position in resource, energy, process and allied industries.

The University of Sydney

LX0776612 Dr R Atkin; Prof GG Warr; Prof MW Rutland

Approved **Structure of Adsorbed Surfactant Layers at Ionic Liquid-Air Interfaces**

Project Title

2007 : \$ 15,800

2008 : \$ 15,800

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Collaborating Countries

Sweden

Administering Organisation The University of Sydney

Project Summary

The research conducted in the project will greatly enhance our understanding of the physical properties of ionic liquids, an important new class of designer solvents. Australian researchers will receive advanced training and experience using Sum Frequency Spectroscopy in the laboratory of OI Rutland, and in the use of Neutron Reflection. This project is especially timely with the imminent start-up of the new Australian research reactor, OPAL, and will help to seed an active program by Australian researchers at this facility.

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LX0776464 Prof PA Lay; Dr EA Carter; Dr CP Marshall; Prof HG Edwards
Approved **Biomolecular chemical survival strategies of terrestrial extremophiles and the**
Project Title **spectroscopic search for life on Mars**
2007 : \$ 15,000
2008 : \$ 14,000
2009 : \$ 10,000
Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Collaborating Countries

Taiwan
UK
USA

Administering Organisation The University of Sydney

Project Summary

This project is aimed to place Australian research at the forefront of developments in the search for extraterrestrial life, the evolution of life on earth, and the design of new probes for the identification of microorganisms. The research will link key centres in Australia and the UK with international space agencies (NASA and the European Space Agency) in the search for cutting edge techniques to be used in the search for extraterrestrial life forms and their links to paleo and extremophile life forms on Earth.

University of Technology, Sydney

LX0776187 Dr Y Guo; Dr AH Hearn; Dr VM Lopez Villafane; Dr JL Leon-Manriquez

Approved **China and Latin America: New Challenges and Opportunities for Australia**
Project Title
2007 : \$ 4,000
2008 : \$ 10,000
Primary RFCD 3601 POLITICAL SCIENCE

Collaborating Countries

Mexico

Administering Organisation University of Technology, Sydney

Project Summary

This project examines the growing international influence and strength of one of Australia's most strategically important neighbours, the People's Republic of China. Emerging commercial and diplomatic alliances between China and Latin America pose economic and political challenges for Australia and other resource exporters. This research consolidates Australia's reputation as a leader in the field of China Studies by clarifying the nature of these challenges over the next five to ten years. The project will produce academic seminars in Sydney, Guadalajara, and Monterrey; the exchange of Australian and Mexican scholars, and joint publications in a field of study that bears direct relevance to the national interests of both countries.

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Victoria

Deakin University

LX0776181 Dr MR Barnett; Dr S Godet; Prof S Yue; Prof JJ Jonas

Approved Project Title **Mechanisms for Improved Ductility of Magnesium Alloys**

2007 : \$ 15,000

2008 : \$ 17,000

Primary RFCD 2913 METALLURGY

Collaborating Countries

Belgium

Canada

Administering Organisation Deakin University

Project Summary

The work will lead to more ductile magnesium alloys. These alloys will be more readily formed into automotive components. The lighter cars that will result will be cheaper to run and more environmentally friendly. The exchange of key researchers that will occur under this proposal will provide an exciting injection of expertise into the partner organisations from which students will greatly benefit. The work will also open up access to state-of-the-art equipment in the collaborating laboratories.

LX0776364 Prof X Wang; Dr PG Cookson; Dr T Kikutani; Prof X Gao

Approved Project Title **Advanced polymer fibres with multiple functionalities**

2007 : \$ 15,000

2008 : \$ 8,000

Primary RFCD 2914 MATERIALS ENGINEERING

Collaborating Countries

China

Japan

Administering Organisation Deakin University

Project Summary

This project will add value to the local polymer and fibre industries. Australia is a significant producer of synthetic polymers such as polypropylene and the largest producer of wool. There is also local production of nanoparticles such as zinc oxide. This project will add value to all these producers through innovative uses and applications of different types of material. Combining organic and inorganic particles in a polymer matrix has not been reported. This innovation will strengthen our position in research into advanced materials, which is a national research priority.

La Trobe University

LX0776098 Dr DA Dougan; Prof Dr K Turgay

Approved Project Title **Regulation of proteolysis by specialised adaptor proteins**

2007 : \$ 15,000

2008 : \$ 15,000

2009 : \$ 15,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Collaborating Countries

Germany

Administering Organisation La Trobe University

Project Summary

Training research scientists of the future forms an integral part of this research program and this collaboration will provide an excellent opportunity for young Australian scientists to be exposed to the very professional and competitive environment of basic research, as it exists in Germany. It will expose early career researchers to new ideas and emerging methodologies arming them with valuable skills, which they will transfer to Australia. The involvement of Prof. Turgay in the Deutsche Forschungsgemeinschaft (DFG) Priority Programme: Proteolysis in Prokaryotes also provides a unique opportunity for these young researchers to interact with several of the worlds leading scientists in the area of proteolysis, enhancing Australia's reputation at the forefront of science.

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RMIT University

LX0776094 Prof JY Tu; Prof M Ishii; Prof T Hibiki; Dr GH Yeoh
Approved Project Title **Experimental and Numerical Modelling of Gas-Liquid Flows**
2007 : \$ 10,000
2008 : \$ 14,900
2009 : \$ 6,000
Primary RFCD 2804 COMPUTATION THEORY AND MATHEMATICS

Collaborating Countries

USA

Administering Organisation RMIT University

Project Summary

Multiphase flow systems are encountered in many process industries such as chemical, petroleum, mining, energy, food and pharmaceutical, which are fundamental to the Australian economy. Commercially available computer codes for simulating such systems are currently widely used in many Australian industrial sectors. This research project will address the prevalent deficiency in many of these computer codes and develop new models capable of predicting a wide range of industrial bubbly flow problems. The resultant improved computer codes will provide industries with significant benefits - especially reduced times and costs in their design and production.

Swinburne University of Technology

LX0776490 Prof TY Chen; Prof H Lin
Approved Project Title **Integration of Metamorphic Testing and Model Checking**
2007 : \$ 7,000
2008 : \$ 7,000
2009 : \$ 7,000
Primary RFCD 2803 COMPUTER SOFTWARE

Collaborating Countries

China

Administering Organisation Swinburne University of Technology

Project Summary

This project proposes an innovative approach of integrating metamorphic testing and model checking. Its main outcome will be to deliver a comprehensive testing method that will help to reduce errors and costs in software development and consequently to improve the quality of software systems. Since software is pervasive and ubiquitous, our results will improve the nation's software productivity and quality. Thus, our results will help in raising our nation's competitive advantage towards the goal of becoming a leading nation in the software industry among Asia-Pacific countries. Furthermore, this collaboration will help young Australian researchers to link to the Chinese Academy of Sciences, a leading-edge international research institute.

The University of Melbourne

LX0776170 A/Prof TJ Lithgow; Dr S Buchanan; A/Prof C Jacobs-Wagner; A/Prof K Tokatlidis
Approved Project Title **Structure and function of novel transporters in alphaproteobacteria.**
2007 : \$ 12,000
2008 : \$ 17,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Collaborating Countries

Greece

USA

Administering Organisation The University of Melbourne

Project Summary

First, detailed knowledge of a set of membrane transporters and the way their activity might be inhibited, will have implications for the treatment of human disease. Second, excellent outcomes are provided for the training of postgraduate students and research staff. This project entails cutting edge technology, and the transfer of technical capabilities not currently available in Australia. Third, our studies on non-pathogenic species of alpha-proteobacteria provides for a timely advance in our knowledge of their biology: other species of alpha-proteobacteria were amongst the first organisms trialled for biological weapons by the USA and the former Soviet Union, and those pathogenic species are rated as Class 3 organisms.

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LX0776280 Dr TD Mulhern; Prof TE Smithgall; Dr HC Cheng

Approved Project Title **New inhibitors of HIV based on cellular enzymes**

2007 : \$ 6,500

2008 : \$ 6,500

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Collaborating Countries

USA

Administering Organisation The University of Melbourne

Project Summary

Over 39 million people are infected with HIV worldwide. However, none of the most highly affected countries have yet reached the peak in AIDS-related illness and death, thus the global impact of HIV/AIDS will get significantly worse, before it gets better.

In Australia, HIV is again on the rise. Ironically, improved treatments that have extended life expectancy will cause the number of HIV infected Australians to rise for many years to come. Therefore many Australians will suffer from the combined impact of the AIDS illness itself, opportunistic infections, the side-effects of treatment and natural aging. We aim to develop new drugs to combat this disease to help people everywhere lead happier, healthier and more productive lives.

LX0776388 Dr MA Perugini; Dr CA Hutton; A/Prof JA Gerrard; Prof GB Jameson

Approved Project Title **Inhibitors of meso-diaminopimelic acid (meso-DAP) and lysine biosynthesis: targeting dihydrodipicolinate synthase**

2007 : \$ 15,000

2008 : \$ 18,000

2009 : \$ 18,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Collaborating Countries

NZ

Administering Organisation The University of Melbourne

Project Summary

With antibiotic resistance on the rise, there is an urgent need to develop new antibiotics with novel modes of action. This project aims to generate new drug candidates that target dihydrodipicolinate synthase (DHDPS) - the first enzyme in the synthesis of the bacterial cell wall - using a triple-pronged approach. This novel approach will allow for the development of new drugs to treat a range of pathogenic bacteria, including "Golden Staph".

LX0776126 Dr GL Robins; Prof PE Pattison; Prof E Lazega; Prof JF Padgett; Prof A Lomi; Prof TA Snijders

Approved Project Title **Modeling cross-level interactions in complex networked social systems**

2007 : \$ 10,000

2008 : \$ 17,000

2009 : \$ 10,000

Primary RFCD 3801 PSYCHOLOGY

Collaborating Countries

France

Italy

Netherlands

USA

Administering Organisation The University of Melbourne

Project Summary

The advances of this collaboration will add significantly to Australian and international capacity in the modelling of complex social systems. The outcomes will be directly translated, through these and other collaborations, into practical scientific outcomes in several significant policy areas. There is widespread demand for these modelling techniques in empirical settings. Potential applications from ongoing national collaborations include: Hepatitis C spread through sexual and needle sharing networks; labour market dynamics; mental health and social support in rural communities; defence applications; and environmental governance. A major emphasis is the training of postgraduates in the application of complex modelling techniques.

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Queensland

Queensland University of Technology

LX0776352 Prof LD English; Prof K Lee; A/Prof RA Nason; Dr E Hamilton; Prof Dr FW Hesse; Dr G Carmona; Prof RB Lesh; A/Prof MJ Jacobson

Approved Project Title **International Research Network on Learning Environments of the Future**

2007 : \$ 8,000

2008 : \$ 8,000

Primary RFCD 3301 EDUCATION STUDIES

Collaborating Countries

Germany

Singapore

USA

Administering Organisation Queensland University of Technology

Project Summary

This project represents a unique opportunity to participate in a productive, multidisciplinary international network that is developing powerful learning environments of the future- where distributed, electronically mediated, collaborative communities will become the norm. Special opportunities will be provided for doctoral students and postdocs to work with renowned researchers at the Knowledge Media Research Centre (Germany) and the Learning Sciences Laboratory (Singapore). The development of an undergraduate virtual international learning community will also lay groundwork for future collaborations among the participating countries. The project will chart research directions that will influence future educational settings worldwide.

LX0776580 Dr M Foth; Prof WH Dutton; Prof WJ Taylor; Dr VM Gonzalez

Approved Project Title **Opportunities of Media and Communication Technology to Support Social Networks of Urban Residents in Mexico, South Africa, UK and Australia**

2007 : \$ 9,000

2008 : \$ 9,300

Primary RFCD 4001 JOURNALISM, COMMUNICATION AND MEDIA

Collaborating Countries

Mexico

South Africa

UK

USA

Administering Organisation Queensland University of Technology

Project Summary

This project will build advanced knowledge of how urban neighbourhood communities can be assisted to grow in healthy ways by the use of new media and Information and Communications Technologies (ICTs). By careful attention to cultural and social assets in the community, innovations will be engendered which enhance economic and social development. This will lead to greater social inclusion, fair access to and smart use of information and services, urban sustainability and healthier local economies. Understanding the opportunities afforded by digital augmentation of social networks will help Australians negotiate the complex web of daily choices, access a greater social safety net and participate in the socio-cultural and socio-economic life of their neighbourhood and city.

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The University of Queensland

LX0776107 A/Prof PV Bernhardt; Dr M Martinez Lopez

Approved Project Title **Mechanistic Studies on Biologically Active Iron Chelators**

2007 : \$ 7,000

2008 : \$ 5,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Collaborating Countries

Spain

Administering Organisation The University of Queensland

Project Summary

The need for orally effective drugs as alternatives to invasive treatment regimens such as subcutaneous infusion is an ongoing concern in health care. This is particularly true in people suffering iron overload. In many cases this condition is present at birth and thus the administration of vital iron chelation therapy via the oral route is a much preferred option. We have unearthed a novel series of candidates for iron chelation therapy (the pyridine-2-carboxaldehyde isonicotinoyl hydrazone [PCIH] analogues) which show oral activity. These chelators undergo some interesting iron catalysed oxidation chemistry and it is vital that the mechanism of this reaction be elucidated to determine whether it will be of biological significance upon administration of these compounds as iron chelators.

LX0776106 A/Prof PJ Halley; Prof L Averous; Dr DJ Martin; A/Prof BR Bhandari; Dr PJ Torley; A/Prof E Pollet

Approved Project Title **Functional Renewable Plastics: Developing Novel Polysaccharide, Protein and Natural Polyester Based Polymer Nanocomposites**

2007 : \$ 12,500

2008 : \$ 10,000

2009 : \$ 9,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Collaborating Countries

France

Administering Organisation The University of Queensland

Project Summary

Biopolymer based plastics (eg starch and proteins from plants; polylactic acid from wastes) are made from renewable sources and are readily biodegradable, making them good substitutes for synthetic plastics for uses like packaging and agricultural film.

Some biopolymer plastics properties (eg water migration barrier, strength) are not as high as synthetic plastics. Creating nano-biocomposites (biopolymer plastics mixed with low levels of nano particles) will improve the properties of biopolymer plastics, giving novel materials that can be substituted for synthetic plastics in a wider range of applications.

These products will reduce our environmental impact, and also create economic benefits from novel, high-value nano-biocomposites.

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LX0776049 Dr H Huang; Prof L Zhang; Dr Y Wang; A/Prof L Zhou; Dr J Shimizu

Approved Project Title **Effect of Chemo-Mechanical Grinding on Surface Integrity of Single Crystal Silicon Substrates**

2007 : \$ 20,000

2008 : \$ 17,000

2009 : \$ 13,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Collaborating Countries

Japan

Administering Organisation The University of Queensland

Project Summary

Silicon substrates or wafers are extensively used in electronic and optic/photonics industries. A long-time standing problem in silicon wafer machining is the surface and subsurface damage induced by machining. This may significantly affect the mechanical, optical and electronic characteristics of wafer-based components. The issue becomes increasingly more critical as the application of silicon wafers is extending further as structural components. The research outcomes will contribute an improved understanding of Chemo Mechanical Grinding process and help to develop innovative technologies for silicon industries.

LX0776077 Prof B Martinac; Prof R Kraemer

Approved Project Title **Gating, specificity and regulation of the YggB channel protein from Corynebacterium glutamicum.**

2007 : \$ 9,000

2008 : \$ 8,000

2009 : \$ 8,000

Primary RFCD 2703 MICROBIOLOGY

Collaborating Countries

Germany

Administering Organisation The University of Queensland

Project Summary

The proposed research will greatly contribute to our understanding of the functioning of a bacterial membrane channel/transporter, which has played a significant role in biotechnology of commercially important amino acids. A direct national benefit will result from establishing collaboration with a leading German laboratory providing expertise in protein biochemistry and molecular microbiology not available in Australia. The acquired knowledge will present an original contribution which will have a strong impact on a very competitive field of molecular microbiology and biotechnology.

LX0776233 Prof AK Whittaker; Dr I Blakey; Prof SM Howdle; Dr KJ Thurecht

Approved Project Title **Development of Novel Detergents for Green Solvent Systems and Their Self-Assembly into Nanostructures**

2007 : \$ 14,000

2008 : \$ 10,000

2009 : \$ 11,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Collaborating Countries

UK

Administering Organisation The University of Queensland

Project Summary

Successful outcomes from this collaborative project will lead to the development of new commercially viable green solvent systems for the chemical industry, e.g. dry cleaning. This has the potential to impact the community on the economic and environmental level, by significantly reducing the costs of current green solvent systems, resulting in greater likelihood of conventional toxic solvents being replaced. The project will also expand the training of junior and early career scientists by allowing them to work in overseas laboratories.

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South Australia

The University of Adelaide

LX0776452 Prof AG Williams; Dr A Kizilersu; A/Prof DB Leinweber; Dr LJ von Smekal; Prof R Alkofer; Prof MR Pennington; Dr CD Roberts; A/Prof AP Szczepaniak; Prof PC Tandy; Prof AW Thomas

Approved Project Title **Advances in Nonperturbative Studies of Subatomic Physics**

2007 : \$ 31,000

2008 : \$ 31,000

2009 : \$ 31,000

Primary RFCD 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

Collaborating Countries

Austria

UK

USA

Administering Organisation The University of Adelaide

Project Summary

Fundamental research into physics always leads to unpredictable technological breakthroughs. Fundamental physics research has led to the development of transistors, world wide web, carbon dating, cancer treatments, Magnetic Resonance Imaging (MRI) scans, satellites and many applications too numerous to mention. The collaboration will allow Australia access to technologies, research infrastructure, expertise and intellectual knowledge that wouldn't be available otherwise. This will enable Australian institutions to pursue breakthrough science, to develop frontier technologies and to have a great impact in the international scientific community. It will also provide advance training in simulation and high-performance computing to postgraduates and research associates.

Western Australia

Curtin University of Technology

LX0776536 Dr S Piana; Prof JD Gale; Dr A Laio; Prof P Carloni; Prof U Rothlisberger

Approved Project Title **Simulation of ligand binding-induced conformational changes in biological systems**

2007 : \$ 9,000

2008 : \$ 4,000

Primary RFCD 2506 THEORETICAL AND COMPUTATIONAL CHEMISTRY

Collaborating Countries

Italy

Switzerland

Administering Organisation Curtin University of Technology

Project Summary

This project is focused on the development of a methodology that will allow using molecular dynamics simulations to study fundamental biochemical reactions. The benefits to the Australian community are two fold: i) the software developed will be made available to the whole scientific community through peer-reviewed publication. Australian researchers will have the possibility to exploit the software in advance through collaborations with our research group. ii) During this collaboration Australian PhD students will have the opportunity to spend a few months overseas to learn about the most advanced computational techniques and interact with top researchers in the computational chemistry field.

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Tasmania

University of Tasmania

LX0776246 A/Prof MS Barrett; Prof GF Welch

Approved Project Title **Mapping the novice-expert continuum in composing and performing**

2007 : \$ 5,000

2008 : \$ 5,000

2009 : \$ 3,000

Primary RFCD 4101 PERFORMING ARTS

Collaborating Countries

UK

Administering Organisation University of Tasmania

Project Summary

The project explores those strategies that develop human potential across the novice-expert continuum; foster expert thought and practice; and encourage and manage innovation. Benefits include the generation of new knowledge that will impact on music learning theory and practice internationally.

LX0776226 A/Prof MG Haward; Prof SB Kaye; Prof DR Rothwell; A/Prof RG Rayfuse; Dr JA Jabour; Dr DL VanderZwaag

Approved Project Title **The Future of Oceans Governance in Polar Areas**

2007 : \$ 1,000

2008 : \$ 16,000

Primary RFCD 3601 POLITICAL SCIENCE

Collaborating Countries

Canada

Administering Organisation University of Tasmania

Project Summary

Australia has a compelling national interest in maintaining its sovereignty and security in the Antarctic. Australian government goals include maintaining the Antarctic Treaty System (ATS); enhancing Australia's influence within the system; protecting the Antarctic environment; understanding the role of Antarctica in the global climate system; and undertaking scientific work of practical, economic and national significance. This project directly addresses national research priorities through analysis of oceans governance issues that centre on Australian interests. This project will also contribute to national benefit by focusing on issues central to the International Polar Year.