

Summary of Discovery Projects Applications for Funding to Commence in 2006

Victoria

Monash University

DP0665836 Dr PC Andrews; Prof GB Deacon; Dr ML Cole; Dr K Ruhlandt-Senge

Approved Project Title **Advancing the Metal-Organic Chemistry of the Heavy Alkaline Earth Elements**

2006 : \$150,000

2007 : \$90,000

2008 : \$90,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Institution Monash University

Project Summary

The project will open up a new area in Australian metal based chemical research, deriving high value added products from the already existing exploitation of Australia's substantial alkaline earth metal mineral resources. Internationally recognised expertise in the design and manipulation of highly reactive chemical tools will contribute breakthrough science and innovation to the growing pharmaceutical, fine chemicals and smart materials industry, with the potential to provide nascent and established Australian companies a competitive edge in new product development. Students will be trained in the necessary skills to succeed in and expand such technically demanding area of metal based chemistry.

DP0665223 Dr U Bach

Approved Project Title **DNA Directed Nanofabrication - A novel, universal, highly parallel bottom-up assembly approach**

2006 : \$160,000

2007 : \$160,000

2008 : \$150,000

2009 : \$150,000

2010 : \$150,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

ARF Dr U Bach

Administering Institution Monash University

Project Summary

This proposal aims to provide a nanofabrication method that has the potential to strongly impact every aspect of science - from fundamental research to commercial applications by providing a universal, simple low-cost tool to build nanostructures to order. The basic properties of these structures will be studied prior to their integration into new applications. We will be providing a solution to a bottleneck that currently limits the scientific advancement and commercial exploitation of nanotechnology. Our proposal describes a 'Nanoassembly' technique, considered by the ARC as Frontier Technologies for Building and Transforming Australian Industries (ARC priority area 3).

DP0664368 Dr B Balachandran; Prof RW Faff; Prof MF Theobald

Approved Project Title **Asset Pricing, Signal Type and Overconfident Investors**

2006 : \$80,000

2007 : \$64,000

2008 : \$68,000

Primary RFCD 3503 BANKING, FINANCE AND INVESTMENT

Administering Institution Monash University

Project Summary

Recent bubbles in financial markets and other anxieties with regard to whether financial assets are correctly valued have led to a reduction in the confidence in financial markets. This study, by focussing upon potential biases in the price formation process, will provide strong insights into this important topic. In covering three major equity markets, the project will provide important guidance for the design of regulatory policies on corporate disclosure by both Governments and Stock Exchanges. Given the increased need for funded superannuation/pension schemes, an increase in the confidence in capital market processes will benefit the development of successful funded schemes.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664665 Dr M Burd; Dr A Dussutour

Approved Project Title Individual behaviour and collective order: the traffic dynamics of ants

2006 : \$92,000

2007 : \$77,000

2008 : \$75,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

APD Dr A Dussutour

Administering Institution Monash University

Project Summary

We are investigating the properties of traffic flow in ant colonies. Ants seem to meet their transportation needs without traffic congestion or complex centralised control. By discovering how ants accomplish this, we increase our understanding of social behaviour in the natural world, and also provide the basic research on which applied solutions to human traffic problems can be based.

DP0665353 A/Prof F Burstein; A/Prof JR Warren; Prof SM McKemmish; A/Prof J Fisher

Approved Project Title Smart Information Portals: Meeting knowledge and decision support needs of health care consumers for quality online information

2006 : \$60,000

2007 : \$62,000

2008 : \$64,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Institution Monash University

Project Summary

Smart information portals, tailored to the communities needs, will contribute to emerging national information infrastructure for consumer focused information provision. They will support government initiatives promoting the role of online access to reliable, quality information in achieving good health, patient empowerment, participation in informed decision making, self-management, and greater treatment compliance. Through the National Research Priority 3 goal of smart information use, the project addresses Priority 2 goals relating to ageing well; ageing productively; preventive health care; and strengthening the social and economic fabric to enable Australians to make choices that lead to healthy, productive and fulfilling lives.

DP0663560 Prof RA Cas; Prof KV Cashman; Prof S de Silva; Dr G Giordano; Dr O Roche; Prof Dr JG Viramonte

Approved Project Title The eruption, emplacement and characteristics of extremely large volume pyroclastic flow deposits (ignimbrites).

2006 : \$132,000

2007 : \$110,000

2008 : \$110,000

2009 : \$60,000

Primary RFCD 2601 GEOLOGY

Administering Institution Monash University

Project Summary

Pyroclastic flows are hot, turbulent, flows of volcanic gas, pumice, rock debris and fine ash often produced during major explosive volcanic eruptions. Most historic and researched events have been mostly small volume examples. In this research we propose to investigate the characteristics of 3 extremely large volume (>1,000 km³) pyroclastic flow deposits in the Andes of South America, to understand the eruption origins and the flow dynamics of such large volume and potentially far flowing (up to 200 km from the vent) pyroclastic flows. These are potentially more destructive than the Indian Ocean tsunami event, and eruptions of this magnitude could occur in Indonesia, PNG and New Zealand.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664451 Dr EL Christopher

Approved Project Title **Australia's Black Past: the shared history of transatlantic slave trading and convict transportation to Africa and Australia**

2006 : \$88,000

2007 : \$63,000

2008 : \$62,000

2009 : \$62,000

Primary RFCD 4301 HISTORICAL STUDIES

APD Dr EL Christopher

Administering Institution Monash University

Project Summary

Every nation needs an understanding of its past-the significance of this project is that it examines a part of Australia's history that is very little understood. European settlement of the continent was implemented at a time that ideas of race, and the relationship of skin colour to freedom, were altering significantly. These changes had a fundamental effect on the convict colony and the relationship of the early colonists with the aboriginal people. Only by gaining knowledge of how early racial interpretations were influenced by global events can Australia interpret her ever controversial racial history.

DP0663255 Prof IJ Clarke; A/Prof C Chen

Approved Project Title **Estrogen signalling in gonadotropes**

2006 : \$150,000

2007 : \$116,000

2008 : \$116,000

Primary RFCD 3206 MEDICAL PHYSIOLOGY

Administering Institution Monash University

Project Summary

Estrogen action is a normal prerequisite for cyclic function of reproduction in the female, but little is known about how this important hormone acts in the relevant cells of the pituitary gland (gonadotropes). In order to gain information on normal function, we will conduct studies on gonadotropes treated with estrogen in a range of paradigms. The information will be valuable in understanding normal reproduction, but will also form the basis of further studies to investigate the effects of drugs that affect estrogen action and environmental estrogens.

DP0664022 Dr TJ Cole; A/Prof MJ Morris

Approved Project Title **Regulation of Stress Hormone Receptors in the Brain**

2006 : \$76,000

2007 : \$66,000

2008 : \$66,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution Monash University

Project Summary

Our research will provide information on how the brain controls our response to stress and will allow the development of targeted strategies to reduce the possibility during chronic stress of the development of conditions such as anxiety and depression. This will improve mental health outcomes in Australia and add to Australia's economic and social stability.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666524 Dr TP Denham

Approved Project Title **Unearthing the roots of agriculture: multi-disciplinary investigations of Pleistocene and Holocene plant exploitation in Eastern Highlands Province, Papua New Guinea**

2006 : \$140,000

2007 : \$145,000

2008 : \$145,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

APD Dr TP Denham

Administering Institution Monash University

Project Summary

The Project will foster greater communication, public understanding and research links between Australia and Papua New Guinea. The Project will also provide archaeological training for students at Australian universities and students and practitioners in Papua New Guinea. The research seeks to understand the development of societies and subsistence practices, particularly plant exploitation and agriculture, in New Guinea from the Pleistocene to the present. The research will chart long-term human-environment relations in New Guinea, which are central to understanding the sustainability of food production and the maintenance of biodiversity in the Australasian region.

DP0663573 Dr JS Forsythe; A/Prof DI Finkelstein; Dr W Shen; Prof MK Horne

Approved Project Title **Manipulating nano-fibres to control nerve regeneration**

2006 : \$90,000

2007 : \$70,000

2008 : \$70,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Institution Monash University

Project Summary

Diseases of the brain and mind are the most common diseases in the western world; being even more prevalent than cardiac or malignant disease. With Australia's aging demographic, diseases of the brain and mind will continue to impact on our productivity in the workplace, our quality of life, and the ability of the medicare and private health care systems to keep up with the ever-increasing demand for older Australians.

The research proposed here will enable us to find solutions to this serious problem by building on Australia's strong track record in nanotechnology and biotechnology research, and help towards new and effective treatments.

DP0663834 A/Prof RH Grzebieta; Dr M Bambach; Dr AS McIntosh; Dr G Rechnitzer; Mr R Judd

Approved Project Title **Protecting Occupants in Vehicle Rollover Crashes**

2006 : \$160,000

2007 : \$120,000

2008 : \$130,000

Primary RFCD 2904 AUTOMOTIVE ENGINEERING

Administering Institution Monash University

Project Summary

This project addresses a public health issue involving rollover crashes. It will help prevent 340 deaths, 6000 injuries and save \$3.6 billion annually in Australia and many fold this number internationally. A dynamic rollover crashworthiness test protocol, that ensures efficient and economical vehicle rollover protection systems are designed and manufactured, will be provided to consumer and regulatory bodies to consider and implement. In addition, much needed Occupational Health & Safety information regarding vehicle rollover crashworthiness, which provide a safe work place environment for professional drivers and employees using vehicles, will be supplied to industry fleet managers, defence and emergency services.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663276 Dr T Handfield; Dr SJ Barker

Approved Project Title **Probability and necessity in the physical sciences**

2006 : \$55,755

2007 : \$55,755

2008 : \$55,755

2009 : \$55,755

Primary RFCD 4401 PHILOSOPHY

APD Dr T Handfield

Administering Institution Monash University

Project Summary

This is a philosophical study of concepts that are vital to the conduct of science: namely, dispositional concepts such as force in physics, solubility in chemistry, biological fitness, and psychological traits. By offering a radical and novel interpretation of such concepts, this project has the potential to influence the future development of Australian science. Moreover, dispositions are crucial to understanding our distinctively human perspective on the world. The abilities to predict, reason, communicate meanings, and to act intentionally all involve dispositional states. This project addresses the fundamental nature of such states, and will thus be of significance to anyone who hopes to understand these distinctively human phenomena.

DP0664729 A/Prof MP Hedger; Prof PJ Hertzog

Approved Project Title **Investigation of Macrophage Function in an Immunologically Privileged Site**

2006 : \$94,000

2007 : \$85,000

2008 : \$85,000

Primary RFCD 2706 PHYSIOLOGY

Administering Institution Monash University

Project Summary

The unique phenotype of the testicular macrophage demands understanding, and this project has the potential to open up an entirely new direction of research. The basic information so generated could facilitate development of strategies to alter either host or donor tissue macrophage functions in order to prevent rejection responses in humans, and be used in the development of new anti-inflammatory drugs. Such technologies will have application in development of novel therapeutics for transplantation and the treatment of chronic inflammatory diseases.

DP0666176 A/Prof DG Holmes

Approved Project Title **Optimal Control of Modular Multilevel Power Electronic Converter Systems for Electrical Distribution Networks**

2006 : \$130,000

2007 : \$100,000

2008 : \$95,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Institution Monash University

Project Summary

This project will improve the national capability to use multilevel power electronic converter systems to help operate and maintain more efficient electrical distribution networks. The outcomes of the project will also contribute to the implementation into electrical distribution systems of renewable and distributed energy generation systems, and hence will help to reduce greenhouse gas emissions. In addition, it is anticipated that the control strategies to be investigated could lead to subsequent commercial developments with local industries. Finally, the project will foster and develop international links in power electronics between Monash University, and leading-edge international research groups in the area around the world.

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DP0663904 Dr SP Jackson

Approved Project Title **Examination of the Calcium Signalling Dynamics Linked to Integrin Adhesion Utilising a Novel Micro-imaging System**

2006 : \$120,000

2007 : \$87,000

2008 : \$87,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution Monash University

Project Summary

This study aims at increasing our understanding of the fundamental cell processes that allow cells to adhere to surfaces. The proposed study will lead to a greater understanding of the calcium signalling mechanisms that are fundamental to diverse biological phenomena such as, tissue regeneration and repair, blood clotting, cancer metastasis, and neuronal cell function. From a preventative health perspective, the investigation of platelet calcium signalling will greatly accelerate the development of new pharmaceuticals to tackle acute and chronic cardiovascular diseases, such as stroke, heart attack and atherosclerosis.

DP0665138 Dr TA Jacobsen

Approved Project Title **Sexual contracts in Burma and Cambodia: Intersections of Desire, Duty and Debt**

2006 : \$80,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 3703 ANTHROPOLOGY

APD Dr TA Jacobsen

Administering Institution Monash University

Project Summary

Prostitution, sex trafficking, and violence against women are global concerns. A better understanding of the underlying context that permits women and children to be abused in this manner in other cultures will allow Australia to assist in addressing these problems - in our own multicultural society and abroad - in a culturally appropriate manner that will prove far more effective than current approaches. Australia has long been regarded as a leader in the Asia-Pacific region, especially regarding crime prevention and protecting the rights of marginalised groups. The research outcomes of this project have practical applications that can only enhance our reputation.

DP0664277 Dr CP James

Approved Project Title **Dynastic Marriage, Courtly Politics and the State in Renaissance Italy**

2006 : \$43,000

2007 : \$30,000

2008 : \$50,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution Monash University

Project Summary

The search for an understanding of the processes by which political ideas and cultural assumptions about masculinity and femininity change, and new genres of written expression emerge, is directly relevant to contemporary Australia. To study these themes in a period at once remote from one's own and yet, as the Italian Renaissance is, perennially fascinating to the public imagination, is to make an important contribution to our understanding of the historical roots of significant on-going debates.

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DP0663042 Prof DE Jesson; Dr PF Barker

Approved Project Title **Imaging Light and Gases with Low Energy Electrons**

2006 : \$150,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Institution Monash University

Project Summary

The imaging of light and atoms trapped in the potential minima of optical lattices will be a world first, positioning Australia at the forefront of the merging fields of electron microscopy and atom optics, leading to important international recognition and publicity. This project, relevant to the frontier technologies of photonics, atom optics and quantum information processing, will also develop a skills base in surface electron microscopy and laser science by providing high level training for post-graduate and honours students. In addition, the utilisation of optical lattices as micro-environmental cells in electron microscopy will be an important development for in situ studies of the gas phase including chemical reactions.

DP0665057 Prof C Jones

Approved Project Title **Modern Low Oxidation State/Low Coordination Main Group Chemistry: A New Domain for Australian Science**

2006 : \$330,000

2007 : \$200,000

2008 : \$230,000

2009 : \$240,000

2010 : \$240,000

Primary RFCD 2502 INORGANIC CHEMISTRY

APF Prof C Jones

Administering Institution Monash University

Project Summary

The proposed research will benefit Australia by creating a knowledge base in an internationally important area of chemistry. This will be aided by the return to Australia of an international leader in the field. Through an integrated and interdisciplinary approach, the exploitation of technologies arising from the research program will be explored. In addition to the academic community, these technologies will benefit hi-tech industries including pharmaceutical and fine chemicals concerns which will gain from the use of the proposed group 13 heterocycles in organic synthesis. Moreover, industries reliant on polymer supports in catalytic process or opto-electronic polymers will profit from the various polymers derived from phosphalkynes.

DP0663228 Prof R Jones; Dr G Clark; Dr DR Jones; Dr G Glinka

Approved Project Title **A Multi-Scale Approach To Reliability And Durability Of Engineering Structures And Sensors**

2006 : \$110,000

2007 : \$90,000

2008 : \$90,000

Primary RFCD 2902 AEROSPACE ENGINEERING

Administering Institution Monash University

Project Summary

The Longford explosion is an example where a major failure was due to a very small defect. It is estimated to have cost Australia in excess of \$1.5 Billion. The acquisition costs of aircraft mean that keeping a fleet operational for a year can produce savings of ~\$100,000,000. The automotive industry is designing lighter vehicles. GM Australia has realised that ensuring the durability of these new designs is essential. By our participation in the GM PACE program we ensure that the developments are available to the broader Australian Industry. Indeed, to design durable MEM's structures would give Australia a commercial edge.

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DP0665523 Dr NC Karmakar; Dr GF Swiegers

Approved Project Title **Chipless RFID for Barcode Replacement**

2006 : \$198,000
2007 : \$96,000
2008 : \$98,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Institution Monash University

Project Summary

This project will investigate inexpensive radio-frequency transponders that enjoy all of the advantages of, and, indeed, operate in a manner somewhat similar to barcodes. Transponders of this type may potentially replace barcode technology, thereby allowing automated identification of individual items at multiple points in supply- and distribution chains. The resulting efficiencies in a host of logistic and other applications will generate a significant economic benefit for Australia. Additionally, the development of state-of-the-art transponders based on fundamental microwave- and antenna engineering prospectively gives Australia a cutting-edge advantage as a leading player in the fast-growing RFID market.

DP0663242 Prof MJ Kartomi

Approved Project Title **From Muslim devotions to global niveau: the art of body percussion music as expression of cultural memory in Aceh and the diasporas**

2006 : \$69,000
2007 : \$65,000
2008 : \$68,000

Primary RFCD 4101 PERFORMING ARTS

Administering Institution Monash University

Project Summary

After Aceh's tsunami tragedy, Australia/ns pledged large amounts of money and effort to collaborate in rebuilding the devastated province. Results of this project can help us approach reconstruction in a more culturally sensitive way. Challenging stereotypes of Acehnese as fanatical and potentially hostile, the project can help explain Aceh's strong commitment to Islam, pride in its great cultural achievements, and the continuing war. Improved bilateral and people-to-people relations between Australians and Acehnese/Indonesians can facilitate a more confident and sympathetic interpretation of the needs of our national security. In addition, material results of the project will augment two National Collections.

DP0663473 Prof JE Kenway

Approved Project Title **Moving Ideas: Mobile Policies, Researchers and Connections in the Social Sciences and Humanities - Australia in the global context**

2006 : \$77,000
2007 : \$70,000
2008 : \$80,000
2009 : \$90,000

Primary RFCD 3301 EDUCATION STUDIES

Administering Institution Monash University

Project Summary

Leading Australian researchers who study culture, politics, society and human behaviour are increasingly on the move across national borders, taking their ideas in new directions and making new international connections. This is now seen less as a national brain drain and more as a chance for Australia to benefit from what researchers learn and the new relationships they develop as they travel. But what exactly are these benefits and what can Australia do to make sure that what looks like a loss becomes a gain? This research answers these questions.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666100 Dr S Khatab

Approved Project Title **The Theological and Ideological Bases of al-Qa'ida's Political Tactics**

2006 : \$81,180

2007 : \$75,160

2008 : \$75,160

Primary RFCD 3601 POLITICAL SCIENCE

APD Dr S Khatab

Administering Institution Monash University

Project Summary

This research moves beyond the conventional view of Islam and generates new understandings of the many complexities of political Islam, and the role of violence and terrorism; explores the theological and ideological foundations of al-Qa'ida's political tactics; the long-term objectives beyond al-Qa'ida's terrorist activity. It conceptualizes Islamic activism within time and space and, by implication, facilitates the formulation of relevant policy responses. As a result, this project contributes to security and counter terrorism works and falls squarely within the National Research Priority, Safeguarding Australia (Terrorism and Transnational Crime).

DP0664926 Prof ML King; Dr X ZHANG

Approved Project Title **New Procedures for Multiple Testing of Econometric Models**

2006 : \$85,000

2007 : \$80,000

2008 : \$85,000

Primary RFCD 3404 ECONOMETRICS

Administering Institution Monash University

Project Summary

In discipline areas ranging from biological and medicine sciences to economics and commerce, very important decisions are made on the basis of statistical or econometric models. There is usually a high degree of uncertainty about the exact form the model should take and the data available to help decide on the best form of the model is often limited. The new procedures developed in this project will help statisticians and econometricians make better decisions about the best form of their models. Our approach gives a new method of validating an estimated model before it is put to use to make critical decisions.

DP0666023 A/Prof SY Kneebone

Approved Project Title **The Asylum Seeker in the Legal System: A Comparative and Theoretical Study**

2006 : \$55,000

2007 : \$20,000

Primary RFCD 3903 JUSTICE AND LEGAL STUDIES

Administering Institution Monash University

Project Summary

Issues about asylum seekers and the legal system in Australia will be brought more prominently before an international audience of lawyers and political scientists. This should generate further collaborative work between scholars in Australia and overseas. The nation will benefit from the publication of a more fully developed theory about the 'rule of law' which tackles fundamental questions of political morality, and the importance of judicial decision-making. It will clarify the important issues, and stimulate discussion of further and better solutions to the issue.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666131 Dr CA Kull; Dr H Rangan

Approved Project Title **Australian transplants: the political ecology of Acacia exchanges across the Indian Ocean**

2006 : \$50,000

2007 : \$50,000

2008 : \$60,000

Primary RFCD 3704 HUMAN GEOGRAPHY

Administering Institution Monash University

Project Summary

The case studies and conclusions arising out of this project will help environmental practitioners and policymakers make informed decisions about exotic plant introductions, balancing needs to 'safeguard' Australia on the one hand with interests in 'improving' Australia on the other. The project's innovative focus on the comings and goings of a single plant genus also makes a significant contribution to Australian environmental studies, by generating richer public discussion of the question of native versus introduced plants. Finally, it will produce new knowledge about our iconic wattles (made accessible through a book), increase international collaboration across the Indian Ocean, and train two postgraduate students.

DP0663447 Dr JC Lattanzio; Dr PR Wood; Prof DL Lambert; Prof S Woosley; Prof EK Zinner

Approved Project Title **Nucleosynthesis today and tomorrow**

2006 : \$95,000

2007 : \$80,000

2008 : \$85,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

Administering Institution Monash University

Project Summary

Australia is a recognised world leader in understanding the interiors of stars and how they make the elements seen all around us, from Carbon to Gold and beyond. This project combines Australian theoreticians with the world's largest telescopes and computers, as well as the latest laboratory instruments and techniques, to further our understanding of where all the elements originated.

DP0666300 Dr M Leblanc; A/Prof I Cartwright; Prof F Stagnitti; Prof JP Cull; Dr PJ Van Oevelen; Dr C Leduc; Dr GE Favreau

Approved Project Title **Effective Management of Water Resources in Semi-arid Regions Using Remote Sensing**

2006 : \$80,000

2007 : \$60,000

2008 : \$60,000

Primary RFCD 2910 GEOMATIC ENGINEERING

Administering Institution Monash University

Project Summary

Due to the vast expense and difficulties to access many areas from the ground, there is currently no effective system for assessing and managing water resources over many large semi-arid regions of the world. Through the study of two complementary Basins - The Murray and Lake Chad Basins - we propose a new approach based on satellite imagery to provide regular and detailed information on the state of our water resources in these areas. These innovative techniques will yield new information on critical water issues: water availability, salinity, groundwater/surface water interactions, climate and land use change impact. This project provides the basis for sustainable water use in regional Australia.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664664 Prof RA Lewis; A/Prof MJ Morgan; A/Prof SB Hooper

Approved Project Title **Phase Contrast X-ray Imaging of the Lung**

2006 : \$120,000

2007 : \$100,000

2008 : \$100,000

Primary RFCD 2706 PHYSIOLOGY

Administering Institution Monash University

Project Summary

Lung diseases are a major cause of death in adults, children and newborn infants. Currently, the diagnosis of lung disease is based on clinical symptoms, which usually do not manifest until the disease is well advanced. This project will develop a novel X-ray imaging technique, known as phase contrast imaging, to study the lung, and to potentially detect changes in lung tissue before symptoms arise. This may lead to improved strategies for managing newborn infants, as well as improving the management of lung diseases in adults.

DP0664192 A/Prof J Liu; Prof BH Toh; Prof C McLean

Approved Project Title **Characterisation of a novel neural-specific ATPase in cholesterol transport**

2006 : \$110,000

2007 : \$73,000

2008 : \$73,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution Monash University

Project Summary

Ageing is determined by both genetic and metabolic factors. To a large part, the detailed mechanisms of ageing remain to be unexplored. Genetically, the timing of cell ageing entails the loss of telomeres (tips of chromosomes). However, the buildup of metabolic wastes resets the timing prematurely. Metabolic products accumulate from excess production or a shortfall of removal activity, which occurs in the various parts of ageing cells in tissues such as brain. Traffic jams of cholesterol transport in the secretory pathway induce early ageing of the nerve cells. We investigate a novel mechanism controlling cholesterol transport in nerve cell ageing.

DP0664065 A/Prof RC Mac Nally; Prof S Lake; Dr AC Taylor

Approved Project Title **Aquatic biodiversity: consequences of massive modification of agricultural landscapes**

2006 : \$150,000

2007 : \$108,000

2008 : \$108,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Institution Monash University

Project Summary

Agricultural landscapes have undergone great change. Significant shifts in land-use may sustain agricultural productivity, but nationally we risk the loss of our natural wealth - native plants and animals. This project develops a new vision for assessing conservation values of rural landscapes that will help land managers to plan for present and future land-use of both terrestrial and aquatic organisms. It will help managers to understand the biodiversity value of different landscapes, the types of species that may persist or be at risk of loss, and the landscape components that influence these outcomes. This knowledge will enhance our national capacity to jointly integrate nature conservation and agricultural productivity

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DP0664121 Dr G Martin; Dr DC Harris

Approved Project Title **New Statistical Procedures for Analysing Dependence in Non-Gaussian Time Series Data**

2006 : \$75,000

2007 : \$70,000

2008 : \$75,000

Primary RFCD 3404 ECONOMETRICS

Administering Institution Monash University

Project Summary

In the economic, finance and business spheres, statistical data is often discrete, binary, strictly positive, or characterized by an uneven distribution of values above and below the average. Prominent examples are the high frequency financial data that have become accessible with the computerization of financial markets, including the number of trades in successive time intervals, the direction of price changes, the time between trades and the return on a financial asset over short periods. This project develops a range of new statistical tools that will enable both researchers and practitioners to analyze the dynamic behaviour in such data and thereby validate and implement a range of financial models.

DP0662816 Dr LL Martin; Dr AI Mechler

Approved Project Title **In-situ Scanning Probe Microscopy of biological redox processes: nanoscale structure and morphology**

2006 : \$90,000

2007 : \$75,000

2008 : \$75,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Institution Monash University

Project Summary

The science behind this project underpins the development of nanobiotechnology. Immediate applications foreseen, are the development of biosensors and diagnostic devices based on our intimate knowledge of the nature of the protein attachment to a surface. Use of synthetic membranes to create biomimetic surfaces will impact significantly on our understanding of the role and contribution membranes have on protein structure, function hence disease.

DP0664676 Prof BM McSherry; Prof JR Ogloff; Dr J Crichton; Prof T Hadjistavropoulos; Dr LD Thomson

Approved Project Title **Confidentiality in Therapeutic Relationships: Developing Guidelines for Mental Health Professionals**

2006 : \$59,000

2007 : \$100,000

2008 : \$63,000

Primary RFCD 3901 LAW

Administering Institution Monash University

Project Summary

The outcome of this project will be a document on ethical standards that will contribute to a conceptual framework for resolving ethical, legal and professional issues that need to be addressed with regard to confidentiality in therapeutic relationships. By assisting with the establishment of guidelines necessary to promote clarity and confidence, the project will make a substantial contribution to the effective implementation of a way of working which improves the delivery and quality of mental health care for patients and goes some way to ensuring greater safety for the public.

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DP0663290 Dr Al Mechler

Approved Project Title **Advanced high resolution atomic force microscopy of biomolecules in physiological environments**

2006 : \$100,000

2007 : \$60,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution Monash University

Project Summary

The proposed research is intended to explain high resolution bioimaging problems addressed only phenomenologically before. A correct physical model would help the scientific community to optimise imaging of dynamic biological systems, extending our knowledge about the way living organisms function. With dynamic bioimaging, the mechanism of certain diseases such as Alzheimer's - where biomolecule fiber formation plays a key role - can also be addressed, thus the project has even therapeutical relevance. Furthermore, adequate description of liquid phase imaging can help engineers in the design of better hardware and software solutions, for the benefit of the bio-nanotechnological industry.

DP0663923 Prof CA Mitchell

Approved Project Title **The role of PtdIns(4,5)P₂ in cellular responses in *Saccharomyces cerevisiae*.**

2006 : \$110,000

2007 : \$75,000

2008 : \$75,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution Monash University

Project Summary

This grant application falls under the criteria of frontier technologies in genomics/phenomics and complex systems. We are characterizing a highly conserved network of signaling molecules regulated by complex large families of enzymes that regulate the bending of membranes, and cellular events including cell division in plants, yeast and mammalian cells. We have developed cutting edge novel technologies to localize signaling on specific intracellular membranes and visualise the role cellular lipids play in forming tubules in cells. This project will result in the presentation of Australian research at international forums and support the training of PhD students.

DP0663258 A/Prof LN Moresi; Prof HB Muhlhaus

Approved Project Title **Plate kinematics to plate dynamics: understanding plate boundary processes at the global scale**

2006 : \$150,000

2007 : \$150,000

2008 : \$150,000

Primary RFCD 2602 GEOPHYSICS

Administering Institution Monash University

Project Summary

This proposal aims to create geodynamic models which can be used a basis for a new, smart resource exploration and extraction industry which uses simulation to help characterize regions where traditional geophysical imaging alone is not able to penetrate. It provides essential scientific underpinnings for The Australian Computational Earth System Simulator Major National Research Facility (ACcESS).

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0665667 A/Prof V Mui; Prof T Cason

Approved Project Title **Social Interactions, Group Dynamics, and the Political Economy of Sovereign Transgression: A Laboratory Investigation**

2006 : \$49,372

2007 : \$48,844

Primary RFCD 3499 OTHER ECONOMICS

Administering Institution Monash University

Project Summary

Sovereign transgression—for example, confiscation of citizens' wealth by the state—can have a significant negative effect on economic performance. This project will study the under-explored issues of how social interactions and group dynamics can affect the incidence of sovereign transgression and citizen resistance in a controlled laboratory environment. The substantive and methodological innovations can increase the Australian knowledge base. The project will facilitate collaboration between Australian researchers and international experts. It will also expose Australian undergraduate students to experimental economics, and provide graduate students with hands-on training in using the laboratory method to study economic behaviour.

DP0666456 Dr MM Murshed

Approved Project Title **Pattern-Based Video Coding Techniques for Real-Time Low Bit-Rate and Low Complexity Encoding Applications**

2006 : \$118,000

2007 : \$25,000

2008 : \$25,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Institution Monash University

Project Summary

This project will benefit the National Research Priority on Frontier Technology with applications in video surveillance, smart home design, and patient monitoring. It will enable Australia to lead the world in setting up coding standards and thus impact directly on the manufacturing initiatives of the multimedia communication and entertainment industries. Telecommunication industries will be the immediate beneficiary by enabling quality live video transmissions at low bit rates in a cost-effective manner. This project will improve the ability of large organisations to operate virtually across huge distances in Australia with the aid of reliable multimedia communications using distributed devices of limited power and processing capacity.

DP0664188 A/Prof PA Nestor

Approved Project Title **Portrait of a Lady: Victorian Women's Novels and the Construction of Female Subjectivity**

2006 : \$65,670

2007 : \$20,000

2008 : \$35,457

Primary RFCD 4202 LITERATURE STUDIES

Administering Institution Monash University

Project Summary

This country enjoys an excellent reputation in the areas of feminism and Victorian Studies. This project will help keep Australia at the forefront of international scholarship in these fields by making a significant original contribution and by achieving the high level of visibility provided by a monograph with a major international publisher. More generally, 19th century England was a crucible for modern conceptions of the self, and by examining the contribution of women writers to theories of identity and self-construction, the project will help us to learn more about ourselves.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663310 Dr SP O'Hanlon; Prof AE Dingle

Approved Project Title **De-industrialising and reinventing the inner city: A tale of two cities, Melbourne and Geelong, c1970-2000**

2006 : \$79,000
2007 : \$30,000
2008 : \$102,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution Monash University

Project Summary

As a major study of the recent past, this project illuminates many aspects of Australia's contemporary urban experience. It investigates a number of current urban issues, previously the preserve of geographers, planners and economists and opens them to historical inquiry and insight. Utilising a number of previously untapped sources, the project expands our knowledge of the history of our cities, and of the history of urban youth cultures.

The project enhances the international reputation of Australian scholars for producing innovative studies of the urban past. By training a PhD student in urban history, the project transmits this reputation to a new generation of scholars.

DP0666019 Prof BJ Oldfield; Dr MJ McKinley; Dr GF Egan

Approved Project Title **The cortical location of hunger and thirst: a multifunctional study in sheep**

2006 : \$100,000
2007 : \$61,000
2008 : \$61,000

Primary RFCD 3207 NEUROSCIENCES

Administering Institution Monash University

Project Summary

The escalating problems associated with obesity are immense. These effects contribute to a global epidemic that now eclipses both infectious diseases and (ironically) undernutrition in its proportions. The effects of disorders of thirst are less apparent but potentially devastating albeit on a smaller scale. The elderly and psychotic in the community have impaired thirst mechanisms which impacts on their life in a dramatic way particularly during prolonged hot weather. The aims of these experiments are to understand the basic brain mechanisms that underpin these drives. This understanding will have far reaching repercussions for the community both in terms of promoting good health and in preventative health care.

DP0663930 Dr GR Oppy

Approved Project Title **A History of Australasian Philosophy**

2006 : \$160,000
2007 : \$85,000
2008 : \$100,000
2009 : \$140,000

Primary RFCD 4401 PHILOSOPHY

Administering Institution Monash University

Project Summary

This project will significantly advance our understanding of the history and present state of philosophy in Australia. In addition, the project will showcase the diverse and innovative contributions made by Australia's philosophers, thus bringing the current flourishing of Australian philosophy to the attention of the academic and wider community, both here and overseas. This, in turn, will strengthen Australia's standing as a leading player in the philosophical world, and as an attractive destination for graduate students and distinguished visiting academics alike.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0667101 Mr SJ Pas

Approved Project Title **Understanding, Control, and Optimisation of Free Volume Mediated Transport in Technologically Important Materials.**

2006 : \$74,340

2007 : \$74,340

2008 : \$74,340

Primary RFCD 2914 MATERIALS ENGINEERING

APD Mr SJ Pas

Administering Institution Monash University

Project Summary

The understanding gained by this work will enable Australian scientists to outpace their competitors in rational materials design for transport of atoms and molecules in materials while reducing the costly trial and error stage of research. Specific examples studied and new materials investigated have important technological significance from use in flat panel TV screens, to solid state electrolytes for application in a wide range of electrochemical devices. The understanding gained by this work can be applied to a wide range of important materials e.g. separation membranes, nanofilters and catalysts which help address a number of National Research Priorities.

DP0663511 A/Prof E Pereloma; A/Prof CH Davies; Prof JJ Jonas; Prof O Ivasishin

Approved Project Title **Intelligent Materials Processing: Microstructure And Texture Control In Bcc Metals**

2006 : \$120,000

2007 : \$95,000

2008 : \$90,000

Primary RFCD 2913 METALLURGY

Administering Institution Monash University

Project Summary

In Australia, steel companies are continuing to search for cost effective steel compositions and processing routes. Concurrently, applications for Ti alloys in chemical, medical and aerospace industries are continuing to widen. As an outcome of this project, the basis for the optimisation of processing routes in order to achieve enhanced product properties at lower cost will be established. In the course of this work, a new model for the prediction of microstructure and texture evolution during recrystallisation will be developed and new process routes will be designed.

DP0665200 Dr AJ Pirola-Merlo

Approved Project Title **Determinants of Researcher Productivity and Impact Over Career Lifespan**

2006 : \$76,923

2007 : \$30,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution Monash University

Project Summary

As Australia's population is ageing at one of the fastest rates among OECD countries, it is imperative to understand the relationship between age and worker productivity. This project will develop our understanding of how age relates to productivity not only in terms of quantity but also quality of innovations produced. It will also identify personal and contextual influences on productivity. This will help identify ways of supporting productivity and participation among older workers. Additionally, this project will provide a sophisticated framework for developing cultures and work environments that are supportive of innovation, by modelling the dynamic interplay between individuals and their environments across several years.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664069 A/Prof CJ Porter; Dr MJ Scanlon

Approved Project Title **Drug binding to human fatty acid binding proteins: a mechanism of cellular transport for poorly water soluble drugs**

2006 : \$110,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Institution Monash University

Project Summary

Considerable recent effort has been directed towards the development of Australia as a focal point for biotechnology and drug discovery. The principle operational focus of this effort has been the identification of potent and active new chemical entities. In order for these new molecules to be most useful in the community, however, they must be active after oral administration. This project will examine the fundamental mechanisms by which drugs are absorbed across the cells lining the intestine and will provide insight critical to the design and development of new drugs that are both potent and orally active.

DP0663320 Dr T Prosic

Approved Project Title **The King of Terrors: Death and its Meaning in the Israelite/Early Jewish Culture**

2006 : \$20,000

Primary RFCD 3703 ANTHROPOLOGY

Administering Institution Monash University

Project Summary

The study will deepen our understanding of Judeo-Christian traditions and advance our knowledge of ancient cultures. It will also be important for debates about interethnic relations and tolerance in Australia by elucidating the underlying culturally conditioned attitudes towards death and the influence they have on the conduct of different ethnic communities. The undertaking of this important research will continue to establish Australia's growing reputation as the internationally important location for innovative cultural and religious studies.

DP0665270 Dr MM Rahim; Prof G Shanks; Dr RB Johnston

Approved Project Title **Organisational Motivation as a Predictor of Benefits from the Adoption of Information Technology**

2006 : \$85,000

2007 : \$82,000

2008 : \$79,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Institution Monash University

Project Summary

IOS are becoming increasingly important for organisations to remain competitive in a global marketplace. By using organisational motivations to better understand how to design and structure the processes for IOS implementation and set more realistic expectation, Australian organisations will be able to develop more effective, evidence-based methods for IOS implementation. The theory being tested is an original contribution in a growing area of information technology research. The data and rigorously tested research protocols developed will enhance Australia's research standing, contribute to university teaching and researcher training, and improve the effectiveness and efficiency of the Australian information technology industry.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666122 Prof MJ Reeder

Approved Project Title **Coupled Atmosphere-Bushfire Modelling with Application to Canberra 2003**

2006 : \$115,000

2007 : \$97,000

2008 : \$97,000

Primary RFCD 3006 FORESTRY SCIENCES

Administering Institution Monash University

Project Summary

Large bushfires are by far the largest contributor to property losses in Australia. Prescribed fire is an important land management tool for farmers, foresters and park managers among others. There is a need to develop practical and accurate tools for predicting the behaviour and spread of both prescribed and uncontrolled fires. Australian bushfire research and land management would benefit greatly from the application of modern, advanced computational methods. The time is ripe for the huge advances in computer technology and numerical modelling to be applied directly to fire problems, benefiting public safety and the safety of fire-fighting volunteers.

DP0666253 Dr PW Richardson; Dr HM Watt; Prof J Eccles

Approved Project Title **Motivations for choosing teaching as a career and development in the profession: A multicohort longitudinal study of beginning teachers**

2006 : \$20,000

2007 : \$55,000

2008 : \$55,000

2009 : \$55,000

Primary RFCD 3301 EDUCATION STUDIES

Administering Institution Monash University

Project Summary

Schooling contributes significantly to the preparation of young people for citizenship so it is essential for the social infrastructure of the country that State Governments, employing authorities, teacher educators, the Federal Government and recruitment bodies better understanding the different motivational profiles of those entering teacher education now and why people are not retained in the profession, suffer burnout or become disgruntled less effective teachers. It is also critical that we better understand the link between motivations, self-efficacies and the support networks and strategies needed to sustain teachers in the profession, particularly in difficult to staff regions, districts and schools.

DP0666539 Dr J Rossjohn; Prof J McCluskey

Approved Project Title **A Structural Investigation Into Events Within The Immunological Synapse**

2006 : \$360,000

2007 : \$343,000

2008 : \$343,000

2009 : \$343,000

2010 : \$343,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

APF Dr J Rossjohn

Administering Institution Monash University

Project Summary

The proposed research program, using laboratory-based and synchrotron-based radiation, will provide significant fundamental insight into the processes that control infection. Investigating processes central to immunity is important, as it will further our understanding of these critically-important events. Such knowledge will increase Australia's international research standing, as well as having the potential to generate novel therapies, such as immunosuppressants.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0665430 Ms S Sadedin

Approved Project Title **Simulation studies of gene flow and genetic diversity in heterogeneous landscapes**

2006 : \$92,000

2007 : \$85,000

2008 : \$85,000

Primary RFCD 2702 GENETICS

APD Ms S Sadedin

Administering Institution Monash University

Project Summary

Conserving genetic diversity is essential for sustaining healthy animal and plant populations. The project findings will aid in development of efficient strategies to minimise genetic diversity loss and facilitate its recovery, thereby assisting in restoration of endangered species, conserving natural ecosystems, and sustainable resource use. Genetic engineering offers the potential for enormous social and economic benefits, but raises strong public concerns about genetic pollution. The project will improve our understanding of this risk, helping Australians to benefit from the opportunities offered by the genetic revolution without fearing their impact on natural systems.

DP0664309 A/Prof JG Sanjayan; Prof VB Rangan

Approved Project Title **Investigation of Geopolymer based Concretes for the Construction of High Fire Risk Infrastructures**

2006 : \$100,000

2007 : \$85,000

2008 : \$85,000

Primary RFCD 2908 CIVIL ENGINEERING

Administering Institution Monash University

Project Summary

Geopolymer concretes are emerging new materials promising superior fire resistance and durability and potentially cheaper than the widely used high strength concretes, which also consume high levels of Portland cements. Production of 1 ton of Portland cement releases 1 ton of green house gases. Further, the 6.5 million tons/year of cement currently produced in Australia is insufficient to meet the industry demand. This project investigates the use of fly ash to make geopolymer concrete, without using any Portland cement, to find usage for part of the 11 million tons/year of fly ash produced as a waste from coal power stations in Australia.

DP0662989 Prof PJ Scammells; Prof CH Schiesser

Approved Project Title **Synthesis of Novel Dual Acting, Selenium Containing Antioxidants**

2006 : \$80,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Institution Monash University

Project Summary

Ischemic heart disease and chronic inflammation afflict a large segment of the Australian population, especially the ageing. These states are associated with free-radicals and other reactive oxygen species and can be controlled to some extent by the application of adenosine therapy. This project will combine the activity of adenosine agonists and enhancers with selenium-containing antioxidants, used to quench reactive oxygen species, to provide a powerful new class of pharmaceutical products designed to enhance the quality of life of Australians afflicted by diseases propagated by free-radicals.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0667150 Prof H Schmidt; Dr PM Schmidt; Dr BK Kemp-Harper; Dr K Beuerlein; Dr J Stasch

Approved Project Title **A redox sensor and triple receptor function for guanylyl cyclase**

2006 : \$120,000

2007 : \$89,000

2008 : \$89,000

Primary RFCD 3205 PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

Administering Institution Monash University

Project Summary

Nitric oxide (NO) protects from blood vessel spasms and clot formation. Conversely, insufficient NO occurs in cardiovascular disease. Life-saving drugs like glycerol trinitrate supply more NO to blood vessels, however these drugs are limited in their action when their target protein (NOGC) is decreased or defective, eg. in hypertension or arteriosclerosis. We have elucidated the reason for this defect and simultaneously discovered an entirely novel group of drugs which activate NOGC without NO. Impressively, these drugs are most effective in diseased blood vessels. The aim is the development of novel blood pressure lowering/anti-anginal drugs with higher effectiveness and less side-effects because they work in an entirely new way.

DP0665456 Prof G Shanks; Dr L Churilov; Dr RJ Price

Approved Project Title **The Impact of Information about Data Quality on Decision Making**

2006 : \$85,000

2007 : \$83,000

2008 : \$81,000

Primary RFCD 2801 INFORMATION SYSTEMS

APD Dr RJ Price

Administering Institution Monash University

Project Summary

Data quality problems are widespread in practice and have significant economic impacts. The development of theoretically sound data quality tags and understanding how they impact decision outcomes and processes will lead to improved data quality management within Australian organisations and more efficient and effective decision making. These issues constitute an important area of information technology research. Outcomes from the project will enhance Australia's research standing and contribute to university teaching and researcher training.

DP0665736 Dr GJ Sheard; Ms J Carberry; Dr K Ryan

Approved Project Title **Supersonic flow past micro-scale particles: Industrial applications**

2006 : \$85,000

2007 : \$95,000

2008 : \$90,000

2009 : \$85,000

Primary RFCD 2405 CLASSICAL PHYSICS

APD Dr K Ryan

Administering Institution Monash University

Project Summary

Droplet based materials processing has developed significantly over the last decade, with applications in a wide range of industries where high-strength, light-weight materials are critical. Our research will allow for continued progress of this method, by developing accurate models to predict the cooling rate throughout the process and hence the physical properties of the finished product. Development of this knowledge will allow for higher precision products to be produced and allow for new techniques to be developed. This information will allow for material processing in Australia to be maintained at world class levels, and for Australian industry to continue to lead the way in the production of technologically advanced materials.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666366 A/Prof B Shirinzadeh; Prof JA Smith

Approved Project Title Haptic exploration and manipulation of micro/nano scale environment

2006 : \$120,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2903 MANUFACTURING ENGINEERING

Administering Institution Monash University

Project Summary

The proposed research is novel and innovative in character and it has potential benefits in many frontier areas utilising micro/nano manipulation systems. These include micromanufacturing and instrumentation, microbiology, microsurgery and nanotechnology. The outcomes of this project will add to the growth of world-class Australian engineering science, and consolidate Australia's position in innovative technologies and international R&D. This highly challenging project will provide training for postdoctorate researchers, postgraduate and honours students. These researchers will gain expertise in many areas including micro/nano manipulation, sensing and control, system design and analysis, virtual reality and experimental techniques.

DP0665710 A/Prof P Silvapulle; Prof MJ Silvapulle; Prof HM Anderson

Approved Project Title New approaches for testing in nonlinear models

2006 : \$70,000

2007 : \$42,000

2008 : \$60,000

Primary RFCD 3404 ECONOMETRICS

Administering Institution Monash University

Project Summary

The outcome of this project is a new econometric methodology that will be particularly useful for developing our understanding of Australian (and global) financial markets. Specific benefits are that (i) our value-at-risk models will enhance national and international awareness of issues relating to financial risk management; (ii) our exchange rate pass through model will aid the development of Australian trade and pricing policies and (iii) our duration models for trade in Australian stocks will lead to a better understanding of the microstructure of the Australian stock market.

DP0665112 Dr R Singh; Prof R Newman; Prof B Murty; Prof V Desai

Approved Project Title Corrosion Resistance of Nanocrystalline Materials

2006 : \$110,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution Monash University

Project Summary

Novel structure and the associated unique properties of nanostructured materials confer potentials for their exciting industrial applications, such as drug delivery to specified locations for cancer treatment, exceptionally high sensitivity sensors, miniaturisation in computers/electronic/communication industry, nano electro-mechanical systems, catalytic applications and exceptionally high strength materials. In most of the applications, the nanomaterials have to demonstrate acceptable corrosion resistance in the operation environment. However, corrosion resistance of nanostructured materials has not been investigated. The proposal will investigate the mechanistic aspect of localized corrosion and cracking of nanostructured materials.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0665636 Prof T Sridhar; Dr RP Jagadeeshan; Prof M Pasquali; Prof ES Shaqfeh

Approved Project Title **Understanding the Behavior of Single-Walled Carbon Nanotubes in Liquids**

2006 : \$100,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution Monash University

Project Summary

The imminent manufacture of Single Walled Carbon Nanotubes (SWNTs) at prices comparable to those of high-performance polymers such as Kevlar, will open up potential applications of SWNTs as high-performance fibres and coatings. A major challenge is the development of scalable processes for producing large objects made of SWNTs. This project, in collaboration with researchers at Rice and Stanford Universities, aims to understand the principles that underlie the successful liquid state processing of SWNTs. The novel strategies that arise will cement Australia's position as a leading country for research in nanotechnology, and place it at the forefront of this field, with great potential for economic advantage.

DP0666472 Dr DR Stegman; Prof TH Torsvik; Prof MA Richards

Approved Project Title **Planetary Pulsations: Exploring Links between Superplumes, Supercontinents, and Superchrons with 3-D Spherical Mantle Convection Models**

2006 : \$125,000

2007 : \$90,000

2008 : \$90,000

Primary RFCD 2602 GEOPHYSICS

APD Dr DR Stegman

Administering Institution Monash University

Project Summary

This project advances the tools and knowledge base regarding historic motions of tectonic plates (including the Australian continent). This furthers understanding of the current and past state of stress in the Earth's surface, ultimately improving ways of characterizing earthquake hazard and mineral exploration. This project also benefits researchers interpreting the climate record as two processes which effected the ancient climate are investigated: major outbursts of greenhouse gases during periods of major volcanism and the reorientation of the planet with respect to its spin axis. The results are obtained with these computer simulations highlight Australia's emerging strength in supercomputing on the international scene.

DP0665938 Dr DR Turner; Dr SR Batten

Approved Project Title **Heterobimetallic Coordination Complexes Containing Rare Earth and d-Block Ions**

2006 : \$100,000

2007 : \$86,000

2008 : \$86,000

Primary RFCD 2502 INORGANIC CHEMISTRY

APD Dr DR Turner

Administering Institution Monash University

Project Summary

Rare earth compounds have major industrial applications such as MRI contrast agents and as catalysts within the rubber and petroleum industries. The fundamental knowledge ensuing from this project has the potential to produce new and advanced magnetic materials. Nanotechnological industries are being developed in Australia and this research will provide materials with the capacity to act as optical or electrical switches, magnetic storage devices or molecular sensors. This pioneering work will ensure that Australia remains at the forefront of chemical research within the rapidly advancing field of magnetochemistry.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663860 Dr JC Whisstock; Dr RN Pike; A/Prof PI Bird

Approved Project Title **Structural and functional studies on prokaryote serpins**

2006 : \$120,000
2007 : \$87,000
2008 : \$87,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution Monash University

Project Summary

Proteins are the machines of life, many of which undergo complex movements to achieve function. The basic research described in this proposal will result in major outcomes in understanding how proteins fold, undergo complex changes in conformation, and misfold to dysfunctional states. As a result, the study will contribute fundamental knowledge that will underpin research in the fields of structural biology, protein design and protein folding. Through providing insight into protein misfolding, the work will contribute to our understanding of degenerative misfolding pathologies that affect the ageing population and thus targets the 'ageing well ageing productively' priority goal.

DP0664012 Dr BR Wood; Dr D McNaughton; Prof Y Ozaki; A/Prof BD Tait; Dr EG Robertson

Approved Project Title **Raman and synchrotron spectroscopy of nano-scale drug interactions and molecular processes in single living cells**

2006 : \$105,000
2007 : \$95,000
2008 : \$90,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Institution Monash University

Project Summary

The need for potent low-cost drugs is ever increasing, yet effective ways to screen for new drugs remain elusive. A spectroscopic approach to screening drugs in living cells would seem a logical alternative to chemically based and morphological methods that are the status quo. In this context we are developing methodology to analyse molecular target sites in single living cells for two of the most devastating diseases to afflict human kind, namely malaria and cancer. New ways of rapidly screening drugs in living cells prior to clinical trials will save an enormous amount of time, money and ultimately lives.

DP0666549 Dr LY Yeo

Approved Project Title **Characterisation and Stability of Thin Electrowetting Films**

2006 : \$120,000
2007 : \$30,000
2008 : \$30,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution Monash University

Project Summary

Electrowetting is of importance to numerous industrial, biomedical and daily life settings such as microfluidic biopharmaceutical applications, coating technology, electronic displays, optical focusing devices, miniaturised chemical analysis systems for homeland security, etc. The work, aimed at generating an understanding of the complex hydrodynamic and physicochemical processes involved, is fundamental research having generic benefits to researchers in interfacial science, electrokinetics and microfluidics. The results will also be beneficial to industrial workers in providing engineering protocols for the development of these devices by identifying optimal conditions for fluid manipulation without prone-to-wear mechanical components.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666660 Dr LY Yeo; Dr AJ Ruys

Approved Project Title Feasibility Studies of Using AC Electro spraying for Biomaterials Synthesis

2006 : \$100,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution Monash University

Project Summary

The proposed interdisciplinary research is anticipated to benefit workers in academia and industry as well as clinicians and patients. Given the demand for point-of-care drug delivery, micro/nano-encapsulation and biomaterials synthesis, the research will be beneficial to the pharmaceutical industry and spin-off/start-up microfluidic businesses interested in commercially developing these devices. It is intended that the work will improve quality of life by advancing biomaterials technology and by making medical treatment more readily accessible, portable and more efficient. For patients, the proposed drug delivery device can help prevent sudden initial bursts of dose during administration, which could potentially have fatal consequences.