

Summary of Discovery Projects Proposals for Funding to Commence in 2010

Victoria

Monash University

DP1094333 Prof DA Abramson; Prof K Burrage

Approved Project Title **A Grid based platform for multi-scaled biological simulation**

2010 : \$ 80,000

2011 : \$ 80,000

2012 : \$ 80,000

Primary RFCD 2803 COMPUTER SOFTWARE

Administering Organisation Monash University

Project Summary

Heart disease currently affects over 3.5 million Australians. In 2006 it claimed the lives of almost 46,000 Australians (34% of all deaths). We will develop enabling technology that underpins cardiac disease research, offering potential for new treatments and pharmaceutical therapies. Even a small improvement in this area can translate into significant national benefit. Further, the mathematical techniques and software tools we will develop, whilst focused on heart tissue, will have broader applicability, and may underpin advancements in other disciplines. Finally, we expect that the software solutions and infrastructure will have both commercial and strategic value in their own right.

DP1093675 Prof M Aguilar; Dr M Shehu-Xhilaga

Approved Project Title **The Design and Synthesis of Inhibitors of Human Immunodeficiency (HIV) Budding**

2010 : \$ 80,000

2011 : \$ 90,000

2012 : \$ 100,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

We have a very exciting and revolutionary approach to drug design by exploiting the exquisite potent action of peptides and at the same time overcome their shortcomings as drug candidates in that they are rapidly degraded in the body. We do this by slightly modifying their chemical structure but at the same time maintaining their biological activity. We will apply this new approach to a novel protein target to inhibit one of the main steps in the budding of Human Immunodeficiency (HIV) from infected cells. This unique combination of novel chemistry and drug design target makes this project highly innovative and with enormous potential to accelerate the identification of new drugs for HIV treatment.

DP1092474 Dr HL Anderson

Approved Project Title **Reform of the Personal Liability of Directors for Unpaid Employee Entitlements**

2010 : \$ 60,000

2011 : \$ 20,000

2012 : \$ 63,586

Primary RFCD 3901 LAW

Administering Organisation Monash University

Project Summary

The financing of business and the provision of labour services to the corporate sector are central to the nation's economic health. Loss of employment, employee entitlements and the fallout of business collapse impact on every aspect of social and economic life. The ability of employees to recover lost entitlements has emerged as an issue critical to a sustainable, efficient and equitable economy. Presently, the burden of compensating unpaid employee entitlements is carried by the taxpayer through the General Employment Entitlements and Redundancy Scheme. Director liability provisions which make placing failing companies into voluntary administration an attractive option could relieve that burden.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093134 Dr J Ang; Dr G Feng

Approved Project Title **Financial development, liberalisation and productivity growth**

2010 : \$ 75,000

2011 : \$ 75,000

2012 : \$ 75,000

2013 : \$ 75,000

Primary RFCD 3402 APPLIED ECONOMICS

APD Dr J Ang

Administering Organisation Monash University

Project Summary

The analysis performed in this project will provide some new insights into the role of financial policies in bolstering productivity growth. This issue deserves more attention from the policy circle given that a better understanding of the mechanisms by which finance affects growth performance allows policy makers to evaluate the costs and benefits associated with liberalising and deepening the financial systems, thus enabling the formulation of effective financial policies. This understanding is critical to achieve the Australian policy makers' objective of promoting financial stability and strengthening growth.

DP1094218 Prof J Armstrong

Approved Project Title **Multiple-input multiple-output orthogonal frequency division multiplexing (MIMO-OFDM) for optical wireless: a breakthrough solution to gaps in broadband delivery**

2010 : \$ 50,000

2011 : \$ 50,000

2012 : \$ 50,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation Monash University

Project Summary

Reliable, flexible broadband delivery is critical for Australian business and for the Australian community. This project will develop the technology on which a new generation of optical wireless communication systems will be based. By using optical rather than radio frequencies they will combine the data rates of optical with the mobility of wireless. They will fill many of the gaps in existing broadband delivery including providing a new flexible last-mile technology and an alternative form of local area network for indoor use. They will lead to new business opportunities within Australia and provide excellent research training in the field of OFDM, a field in which there is significant local R&D in Australian and multinational companies.

DP1094913 Prof GJ Barton; Dr JP Millie; Prof M Moriyama

Approved Project Title **Glocalisation and sub-national Islams in Indonesia: neo-traditionalism, local Islam and the commemoration of regional Islamic legacies.**

2010 : \$ 68,000

2011 : \$ 80,000

2012 : \$ 35,000

Primary RFCD 4402 RELIGION AND RELIGIOUS TRADITIONS

Administering Organisation Monash University

Project Summary

Australia is both directly and indirectly affected by dynamics within Indonesian Islamic society, but we have limited understanding of how Indonesian Islam maintains its local character, which is generally tolerant and peaceable, in the face of persistent globalizing forces that challenge the legitimacy of local traditions and tend to undermine healthy inter-communal relations by promoting confrontation and intolerance. This study will make a vital contribution to our understanding of the forces that are shaping the future character of Indonesian Islam and inform how we should best engage with Indonesia through government and social initiatives, including aid, education and media activities.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094744 A/Prof SR Batten

Approved Project Title **Advanced Materials constructed from 'Nanoballs' and Variable Length Ligands**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

Novel types of porous materials will be made using a revolutionary new way to connect metal ions. Remarkable nanometer sized molecules ('nanoballs') will be investigated for their unprecedented variety of useful properties. As well as advancing our understanding of the science of advanced materials, this project will have application in areas such as hydrogen and methane storage, trapping of greenhouse gases such as carbon dioxide, molecular sensing, catalysis, and information storage.

DP1097198 A/Prof SR Batten; Prof GB Deacon

Approved Project Title **Small Cyano Anions: A Gateway to New Materials**

2010 : \$ 100,000

2011 : \$ 100,000

2012 : \$ 100,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

This project will produce new building blocks for a range of new advanced materials. These anions are produced easily through efficient and cost effective syntheses. From these building blocks new magnetic materials will be produced. Porous materials capable of absorbing gases such as carbon dioxide (pollution control), or hydrogen or methane (energy storage) will be targeted. New single molecule magnets will be synthesised which have potential for use in information storage. New liquids with novel magnetic, neutron capture or luminescent properties will be produced.

DP1095693 Prof J Beardall

Approved Project Title **Toxic cyanobacterial blooms in a carbon dioxide (CO₂)-rich world: assessing the impacts of global climate change**

2010 : \$ 100,000

2011 : \$ 95,000

2012 : \$ 95,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation Monash University

Project Summary

Cyanobacterial blooms in Australia cost the country over \$150 million every year because of their impacts on water quality and animal and human health. The frequency, distribution and intensity of these blooms are all expected to increase worldwide as global climate change impacts increase over the next century. This project will provide much needed information of the severity of impacts on cyanobacteria commonly causing blooms in Australian aquatic ecosystems. This information will be important to authorities responsible for managing our precious water resources.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095420 Dr TC Beddoe; Dr AW Paton

Approved Project Title Evolution of AB5 toxins

2010 : \$ 130,000

2011 : \$ 130,000

2012 : \$ 130,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation Monash University

Project Summary

The proposed research program, using the combination of structural biology and cellular biology will provide insight into the evolution of AB5 toxins. This study will not only improve our fundamental understanding how pathogens evolve to invade hosts but could lead to the rational design of antimicrobials. The knowledge gained will increase Australia's international research profile.

DP1094577 Dr P Biegler; Dr JM Kennett; A/Prof JG Oakley; Dr PT Vargas

Approved Project Title Implicit persuasion in pharmaceutical marketing: ethical implications for regulators and consumers

2010 : \$ 190,000

2011 : \$ 122,000

2012 : \$ 137,000

Primary RFCD 4401 PHILOSOPHY

APD Dr P Biegler

Administering Organisation Monash University

Project Summary

The rapid ageing of Australia's population has seen increasing consumption of pharmaceuticals and high rates of hospitalisation to treat adverse effects. Pharmaceutical advertising promotes medication use, yet increasing evidence suggests commercials can alter attitudes outside of awareness. Determining the extent and ethical acceptability of subconscious persuasion in drug marketing will lead to more appropriate regulation of advertising content and enhance the autonomy of consumer medication choice. The study outcomes will address Australia's priority research goals Ageing Well, Ageing Productively and Preventative Healthcare, and further this country's international reputation in Applied Ethics.

DP1092988 Dr N Birbilis; Prof DD Macdonald; Dr IS Cole; Prof GT Burstein

Approved Project Title Engineering the kinetic stability of alloys for advanced stainless material development

2010 : \$ 70,000

2011 : \$ 70,000

2012 : \$ 70,000

2013 : \$ 70,000

2014 : \$ 70,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

ARF Dr N Birbilis

Administering Organisation Monash University

Project Summary

A framework for understanding and designing metals and alloys with kinetic stability in mind will allow for discovery and breakthrough science to underpin technological innovation. This work has potential benefits for multiple industry sectors, with the ultimate intent of developing advanced materials for use in transport, construction, energy generation and medicine; all sectors of which can improve our quality of life, whilst also addressing the multi-billion dollars of loss attributed to metallic corrosion each year. Such work will also benefit Australia through the development of a strategic international capability in a highly interdisciplinary field.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094851 A/Prof HM Blackburn; Prof SJ Sherwin

Approved Project Title **Computing transient inflow receptivity with application to high-lift airfoils**

2010 : \$ 70,000

2011 : \$ 120,000

2012 : \$ 110,000

Primary RFCD 2902 AEROSPACE ENGINEERING

Administering Organisation Monash University

Project Summary

Applications of the research will lead to more efficient wind and gas turbines, thereby reducing greenhouse gas emissions in power generation and air transport. The project will provide high-level research training for a Research Fellow and a PhD student in an emerging area that links fundamental fluid mechanics, optimal control and optimal engineering design. Also the project will foster international collaboration with partner researchers and organizations in the United Kingdom.

DP1092491 Dr GJ Boas; Prof W Schabas; Prof MP Scharf

Approved Project Title **International Criminal Justice: Law, Policy and its Relevance to Australia's security**

2010 : \$ 40,000

2011 : \$ 60,000

2012 : \$ 76,000

Primary RFCD 3901 LAW

Administering Organisation Monash University

Project Summary

International Criminal Justice (ICJ) is a discipline of increasing importance in global and national responses to atrocity and violence, in particular war crimes and terrorism. Australia's security, as well as its standing in the international community is directly affected by the way it understands and applies ICJ. This project will benefit the Australian community by analysing and developing an understanding of the law and policy issues affecting how we treat war crimes and terrorism and by engaging not just with the academic and practitioner community in Australia and internationally, but with government representatives from the Attorney-General's, Foreign Affairs and Defence Departments.

DP1095102 Prof SP Bottomley; Dr GL Devlin

Approved Project Title **Analysing the detrimental effects of polyglutamine expansion**

2010 : \$ 110,000

2011 : \$ 90,000

2012 : \$ 100,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation Monash University

Project Summary

The proposed research program, will provide significant fundamental insight into the processes that control protein aggregation and its link with disease. Investigating processes central to protein aggregation is important as it will deepen our understanding of how proteins inappropriately change shape and our understanding of disease processes. Such knowledge will increase Australia's international research standing, as well as having the potential to generate novel therapies, that prevent neurodegeneration.

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DP1093344 Prof RD Brooks; Prof RW Faff; Dr S Treepongkaruna; Dr EW Wu

Approved Project Title **Financial crises, volatility and sovereign ratings: Do ratings really matter when they are needed most?**

2010 : \$ 80,000
2011 : \$ 70,000
2012 : \$ 72,000

Primary RFCD 3503 BANKING, FINANCE AND INVESTMENT

Administering Organisation Monash University

Project Summary

The stability of Australian financial markets during the Asian financial crisis is a major economic success story. Subsequently, an important policy objective has been in enhancing the capacity of the financial infrastructure in regional financial markets to reduce their exposure to such crises. Recent financial market turmoil dramatically underscores the need to better understand the full myriad of factors that feed into this challenging concern. One critical area of debate is whether or not rating agencies play a calming role. This project will deliver insights that aid development of the financial infrastructure to cope better with such crises and retain investor confidence.

DP1092592 Prof B Caine; Prof PA Nestor; Dr CP James; Prof CJ Mews; Prof DT Garrioch; Prof FW Kent; Dr DG Barnes; Dr C Monagle

Approved Project Title **Continuities and change in the history of European women's letter-writing**

2010 : \$ 100,000
2011 : \$ 55,000
2012 : \$ 65,944

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Monash University

Project Summary

This project will enhance Australia's strong international reputation for cutting-edge work in European history. At a time when questions about communication, self-representation and personal life are of such very great interest, both academically and more generally, this project offers the possibility of bringing academic scholarship closer to issues that are of general interest to the wider community. There is also considerable national benefit in the innovative approach that this project proposes, which offers a new model for collaborative research in the humanities.

DP1093266 Dr M Casey

Approved Project Title **Performing Indigenous Sovereignty: Aboriginal Australian commercial performances 1800-1949**

2010 : \$ 55,000
2011 : \$ 50,000
2012 : \$ 50,000

Primary RFCD 4101 PERFORMING ARTS

Administering Organisation Monash University

Project Summary

This project strengthens our understanding of Australia's place in the world and enhances our capacity to interpret ourselves by substantially enriching knowledge about Australian race relations in the nineteenth century. This new knowledge about Indigenous participation within the material and cultural economies of Australia adds significant new dimensions to Australian cultural history. This also contributes to Australia's internationally recognised leadership in cross-cultural performance studies, informing pedagogy and scholarship. This project has the added benefit of contributing to the mental health and well being of Indigenous people by reclaiming positive elements of their cultural history since colonisation.

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DP1096457 Dr PL Cook; A/Prof MR Cardenas; Prof RN Glud

Approved Project Title **Interactions between denitrification and carbon mineralisation in permeable sediments: A new approach using state of the art instruments and modelling**

2010 : \$ 90,000

2011 : \$ 50,000

2012 : \$ 40,000

Primary RFCD 2603 GEOCHEMISTRY

Administering Organisation Monash University

Project Summary

Excessive nutrient release from manmade sources may lead to algal blooms in aquatic environments. Nitrogen is a nutrient of particular concern in coastal waters because it controls algal growth. Aquatic environments are able to cleanse themselves of excess nitrogen by a process known as denitrification which happens in the sediments. Amazingly, we have no understanding of how denitrification works in sands despite the fact that most of the coastline is covered in sand. The results from this project will provide critical information needed to predict and reduce algal blooms in coastal waters.

DP1093217 Prof WD Cook; Prof Y Yagci; A/Prof CI Vallo

Approved Project Title **High efficiency photoinitiators for novel photopolymerization processes**

2010 : \$ 120,000

2011 : \$ 90,000

2012 : \$ 90,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation Monash University

Project Summary

The radiation curing industry is worth several billion dollars world-wide with an Australian market of ca. \$100 million and an even greater market in the Asian region. One of the main factors controlling the expansion of this industry is the development of new photoinitiator systems with improved performance. This project aims to combine the skills of three leading scientists in the photocuring field to develop more efficient, environmentally-friendly systems by controlling the initiation and polymerization mechanisms in (meth)acrylate, cyclic ether, cyanate and vinyl ethers. This should benefit local manufacturers exporting into the printing, adhesive, dental, lithography, composite industries and to the photopolymer industry generally.

DP1093373 A/Prof BM Cooke; Prof IA Smith; Prof TF McElwain; Dr M Narla

Approved Project Title **Structural and functional alteration of red blood cells by Babesia parasites**

2010 : \$ 130,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 3005 VETERINARY SCIENCES

Administering Organisation Monash University

Project Summary

Cattle Tick Fever caused by Babesia parasites causes significant economic loss to the Australian livestock industry. New approaches to prevent this disease are urgently needed but this requires greater knowledge of how the parasites cause disease in cattle. By identifying novel proteins involved in the disease process we will be able to make better vaccines and drugs and save the Australian livestock industry millions of dollars each year.

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DP1097152 Dr F Coulibaly
Approved Project Title **Microcrystallography of spheroids: crystalline armours of insect viruses**
2010 : \$ 105,000
2011 : \$ 105,000
2012 : \$ 105,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY
Administering Organisation Monash University

Project Summary

The proposed project will provide fundamental insights into the organisation of ultra-stable armours protecting insect viruses. This will open novel avenues for the development of highly efficient and specific bioinsecticides as well as innovative tools such as natural microparticles for improved vaccines.

The techniques used in this project are at the frontier of imaging techniques and will establish a national expertise in X-ray micro-crystallography. This will contribute to the optimal use of the \$8-million microfocus beamline of the newly built Australian Synchrotron enabling breakthroughs such as the structures of membrane receptors for hormone and neurotransmitter with major implications for drug development.

DP1096002 Prof PD Currie; Dr C Boisvert
Approved Project Title **The development and evolution of the pelvic girdle in basal gnathostomes**
2010 : \$ 95,000
2011 : \$ 95,000
2012 : \$ 95,000
Primary RFCD 2702 GENETICS
Administering Organisation Monash University

Project Summary

Comparing the development of muscles, cartilage and bone in representatives of all three major groups of fish will provide information as to how structures evolved but also how the adult morphology is distributed in phylogeny. Because so little is known about the genetic mechanisms underlying the formation of the pelvic girdle in fish, it is important to start studying a model animal such as the zebrafish. The pathways uncovered have the potential to describe mechanisms common to all jawed vertebrates, not only common to fish. Understanding the mechanisms that generate major morphological transition in the vertebrate lineage necessarily informs us about our own evolution

DP1092526 Dr MD Daffern; Dr SD Thomas
Approved Project Title **Youth and violence: Occurrence, epidemiology and function**
2010 : \$ 50,000
2011 : \$ 75,000
2012 : \$ 45,000
Primary RFCD 3801 PSYCHOLOGY
Administering Organisation Monash University

Project Summary

The expected national benefits that will arise from this project will include significant advances to policy and practice in the field, which will impact on service users and service providers at both individual and community levels. The project will foster research excellence and develop inter agency collaborations, thus advancing Australia's research and clinical leadership in the field. Taken altogether, this project has a strong potential to lead to further collaborations focussing on research priorities of national and international significance and to contribute to resources leading to better outcomes for young people.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092496 Dr D Delbourgo; Prof D Benois; Prof O Venjakob

Approved Project Title **The arithmetic of supersingular elliptic curves**

2010 : \$ 50,000

2011 : \$ 50,000

2012 : \$ 50,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation Monash University

Project Summary

The proposed research will have substantial benefits both in the area of pure mathematics, and to the standing of number theory within Australia generally. If successful, the investigators envisage: - fundamental advances in the study of both elliptic curves and modular forms; - key progress in our understanding of the final Millenium Prize Problem in Mathematics; - academic software to compute special values of L-functions; - applications to computational mathematics, particularly elliptic curve cryptosystems; - a huge boost to the development of number theory Australia-wide.

DP1095697 Prof M Dolan; Prof JR Ogloff; Dr R Fullam

Approved Project Title **Understanding the nature and characteristics of youth violence in Australia**

2010 : \$ 100,000

2011 : \$ 120,000

2012 : \$ 120,000

2013 : \$ 100,000

Primary RFCD 3904 LAW ENFORCEMENT

Administering Organisation Monash University

Project Summary

This study addresses the important problem of violence in Australian youth and the need for early intervention/prevention to limit further reoccurrences and escalation of violence across the life span and its associated economic and health costs. For the first time we will have specific access to Australian data on violent offending patterns and risk in adolescents for use in service planning rather than attempting to apply findings from North America and Europe to our unique population. Work in this field will help improve the characterisation and identification of at-risk individuals and should ultimately improve our ability to direct treatment interventions to the most needy and most high risk groups.

DP1092897 Dr DK Dowling

Approved Project Title **Sexual conflict in the mitochondrion**

2010 : \$ 163,200

2011 : \$ 150,000

2012 : \$ 150,000

2013 : \$ 150,000

2014 : \$ 150,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

ARF Dr DK Dowling

Administering Organisation Monash University

Project Summary

Australia boasts an international reputation for scientific excellence, and this holds true for the field of evolutionary biology. This groundbreaking project will resolve an outstanding evolutionary conundrum, and integrate two major sets of theory to have witnessed recent paradigm shifts - sexual selection and mitochondrial evolutionary theory. By doing so, the project will push the field in new directions, promoting cutting-edge Australian science abroad. This project promises educational benefits, by training postgraduate and honours students that are highly competitive in the international academic market. Finally, the project may yield novel insights into the genetics of male infertility, which affects five percent of Australian men.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092616 Dr SE Edwards; Dr AN Cutter-Mackenzie

Approved Project Title **Examining play-based approaches to teaching and learning in early childhood education and care**

2010 : \$ 40,000
2011 : \$ 20,000

Primary RFCD 3303 PROFESSIONAL DEVELOPMENT OF TEACHERS

Administering Organisation Monash University

Project Summary

Children's learning in pre-school settings is important to their current and later educational success. This project offers a significant opportunity to examine how teachers teach, and children learn, through different approaches to play. It is anticipated that the conceptually-sustaining approach to play will support children's learning outcomes more so than other forms of play. Knowing about this approach to play will help teachers better understand the relationship between teaching, play and learning, instead of focussing only on play and learning. This will also help the field interpret the forthcoming Australian Early Years' Learning Framework, which advocates for the role of play in early childhood education.

DP1092721 Prof PB Fitzgerald

Approved Project Title **Studying the effects of repetitive transcranial magnetic stimulation with near Infrared spectroscopy**

2010 : \$ 89,000
2011 : \$ 87,000
2012 : \$ 99,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation Monash University

Project Summary

Repetitive transcranial magnetic stimulation (rTMS) is increasingly being used as a tool in studying human and animal brain function and in the treatment of brain disorders but there are fundamental gaps in our understanding of its basic mechanisms of action and hence our capacity to optimise protocols. This research will use near infrared spectroscopy to study the range of potential ways of altering brain activity with rTMS. It will substantially enhance the applicability of the technique ultimately improving our knowledge of human and animal brain function and outcomes for patients with depression and other disorders. It will help reinforce Australia as a leading country in the development of brain stimulation techniques.

DP1093848 Dr JS Forsythe; Prof CC Bernard; Prof S Ramakrishna

Approved Project Title **Nerve regeneration using light responsive hydrogels and stem cells**

2010 : \$ 115,000
2011 : \$ 115,000
2012 : \$ 110,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation Monash University

Project Summary

Diseases of the brain and mind are already the single largest burden of disease in the western world, being greater than cardiac or malignant disease. With Australia's ageing demographic, diseases of the brain and mind will continue to outstrip all other medical causes of loss of productive working life and quality of life. This proposal will confront this serious issue using nanostructured intelligent materials, moving towards the realization of effective stem cell therapies.

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DP1095129 Dr WP Gates; Dr W Daoud; Dr A Bouazza; Dr AF Patti; Prof TW Turney; A/Prof JD Cashion; Prof RK Rowe

Approved Project Title **Advanced Nanocomposites for Enhanced Containment of Hyper-Saline Leachate**

2010 : \$ 145,000

2011 : \$ 140,000

2012 : \$ 150,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

Administering Organisation Monash University

Project Summary

This research project seeks to apply nanotechnology approaches to develop tailored materials that are green and cost-effective, which minimise groundwater contamination by hyper-saline industrial leachates and process waters. Australian industries will benefit from lower costs associated with storage, processing and reclamation of process waters, as well as from reduced environmental fines levied by the Environmental Protection Agency due to significantly reduced barrier failure and groundwater contaminations. Australian businesses involved in manufacture, design and construction of environmental barrier systems will have access to new materials and improved technology.

DP1092815 A/Prof RC Gerster

Approved Project Title **Hiroshima and Here: A Cultural History of Australian Responses to Nuclear War and Weaponry**

2010 : \$ 48,000

2011 : \$ 25,000

2012 : \$ 32,972

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Monash University

Project Summary

This project comes at an historical moment when Australia is more enmeshed in nuclearism than ever. As the nation considers the political, economic and moral implications of being a major world supplier of uranium during a period of extreme regional and global instability, and as it contemplates its own possible nuclear-powered future, this is exceptionally timely research. In providing a ground-breaking model of national cultural response to one of the great international issues of our age, it will help foster academic activity and public interest in a developing field whose importance can only increase.

DP1092523 Prof JD Goldsworthy; Dr DA Smith; Dr PC Emerton; Dr SJ Barker; Mr RE Ekins

Approved Project Title **A Principled Theory of Legal Interpretation**

2010 : \$ 75,000

2011 : \$ 73,000

2012 : \$ 68,000

Primary RFCD 4401 PHILOSOPHY

Administering Organisation Monash University

Project Summary

Law's practical operation depends upon the meanings of statements of law: judges, lawyers and parliamentarians all must frequently grapple with issues of legal interpretation. The development of a principled theory of legal interpretation - which will be the result of this project - is therefore crucial to the practice of law-makers and legal officials. It is also important to the broader community, whose interests are often affected by interpretive decisions made by legal officials. By bringing together a team of Australian and New Zealander philosophers of law with a leading international philosopher of language, this interdisciplinary project will also raise the international profile of Australian legal philosophy.

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DP1095833 Dr X Gou
Approved Project Title **Hierarchically Structured Graphene-Based Nanoassemblies**
2010 : \$ 100,000
2011 : \$ 100,000
2012 : \$ 100,000
Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING
APD Dr X Gou
Administering Organisation Monash University

Project Summary

Developing high-efficiency, low-cost and environmentally friendly electrochemical energy conversion and storage devices is essential to many consumer electronics. The development of high-performance graphene-based electrode materials in this project will have significant impacts on the Australian economy. This project is expected to help place Australia at the forefront of advanced energy materials and nanotechnology, and enhance the international competitiveness and export power of Australian industry in the high-technology areas. It will also help address the rapidly growing environmental concerns and the increasing global demand for energy.

DP1095691 Prof A Harris; Dr DS Mortimer; Prof A McGuire
Approved Project Title **Bargaining and the price of new pharmaceuticals in Australia: An empirical analysis**
2010 : \$ 45,000
2011 : \$ 45,000
2012 : \$ 25,000
Primary RFCD 3402 APPLIED ECONOMICS
Administering Organisation Monash University

Project Summary

The proposed research will consider whether there is a trade-off between price and access and will identify features of the regulatory framework that contribute to delays in securing access to drugs for diseases with no alternative therapy. It will provide decision makers with the necessary information to negotiate the lowest achievable price for drugs, freeing up resources for use elsewhere in the health sector or slowing the growth in healthcare expenditure.

DP1096830 Dr KP Helmerson; Dr LD Turner; Dr JV Porto
Approved Project Title **Many-body physics with atomic Bose gases**
2010 : \$ 156,000
2011 : \$ 156,000
2012 : \$ 156,000
Primary RFCD 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS;
PLASMA PHYSICS
Administering Organisation Monash University

Project Summary

Interdisciplinary research in science is promising new and revolutionary developments that may ultimately impact our daily lives. One such area, where the blurring of the boundaries between two disciplines could result in significant advancement of understanding and development of novel technologies, is the overlap of condensed matter or solid-state physics with atomic physics. This proposal seeks to put Australian science at the forefront of this new and exciting area of research. As a result, Australia will have a significant international presence, researchers will receive the cutting edge training necessary to be competitive with other countries and Australia will be poised to exploit the potentially beneficial developments.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1097081 Dr KP Helmersen
Approved Project Title **Optical manipulation of single molecules in nanocontainers and nanotubes**
2010 : \$ 110,000
2011 : \$ 110,000
2012 : \$ 110,000
Primary RFCD 2499 OTHER PHYSICAL SCIENCES
Administering Organisation Monash University

Project Summary

Modern medicine has benefited greatly from technological advances in instrumentation. The ability to probe and manipulate new aspects of biological function often provides unique information that can be used as the basis of new medical treatments. Recent advances in optical instrumentation and biochemical labelling has enabled the study of biological function at the single molecule level. This project proposes to develop new techniques in single molecule manipulation, to perform studies not easily addressable using current techniques. The proposed research will form the basis of an enabling technology for Australian researchers to make breakthroughs in biomedical research, potentially leading to improvements in healthcare.

DP1092534 Dr V Higgins; Prof CR Cocklin; Dr C Potter
Approved Project Title **Sustainable farming in Australia: Market instruments for improved land management**
2010 : \$ 70,000
2011 : \$ 80,000
2012 : \$ 80,000
Primary RFCD 3009 LAND, PARKS AND AGRICULTURE MANAGEMENT
Administering Organisation Monash University

Project Summary

Sustainable farming has become a national priority. As climate change and global economic pressures increase the problems facing rural areas, Australian governments have attempted to combine more sustainable land management with a competitive agricultural sector. Several policy instruments using market incentives have been proposed to manage the competing demands of farm viability and environmental sustainability. This project will examine the responses of beef, dairy and grain farmers to these initiatives and their potential for addressing pressing environmental issues. The research will make a vital contribution to the design of policies for the future of farming, resilient rural communities and an environmentally sustainable Australia.

DP1095015 Dr G Hirst; Prof D Van Knippenberg
Approved Project Title **Do director board appointments predict whether CEO pay is in line with company performance?**
2010 : \$ 50,000
2011 : \$ 35,000
2012 : \$ 30,000
Primary RFCD 3801 PSYCHOLOGY
Administering Organisation Monash University

Project Summary

Increasing pay differences between CEOs and the average working Australian have resulted in a less equitable and economically divided society. This issue has reached a critical point as taxpayer money is now needed to fund stimulus packages and finance companies facing insolvency while CEO pay on average has remained unchanged or increased. This inequity has the potential to cause social and political instability. This research will provide much needed knowledge of how to address this issue including pay benchmarks, knowledge derived from international practice, corporate governance indices as well as understanding of how widespread pay norms have developed.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095058 Dr El Izgorodina; Prof DR MacFarlane; Prof MS Gordon

Approved Project Title **Fully ab initio, large-scale calculations of thermodynamic and transport properties of ionic materials**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 120,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation Monash University

Project Summary

Advanced batteries, fuel cells, and photonic device technologies are beginning to use ionic materials as electrolytes due to their superb stability and technologically valuable properties. As a broad class these materials have only been known for just over a decade and there is still more unknown than known about their structure and properties. The project will develop new advanced computational methods as a basis for understanding their properties and thereby allowing us to design-in desired features. Ultimately these advances will have support the development of energy efficient CO2 replacement technologies.

DP1092972 Prof JB Jacobs

Approved Project Title **A History of Taiwan**

2010 : \$ 25,000

2011 : \$ 25,000

2012 : \$ 36,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Monash University

Project Summary

Taiwan, a middle-sized Asian nation with a population about twenty per cent greater than Australia, is one of four stable democracies in Asia along with India, Japan and South Korea. As such, it shares democratic values with Australia. We also have strong trade and investment relationships with Taiwan. China's claim that Taiwan belongs to China has made our relationship with Taiwan difficult, though in fact we have a strong 'officially unofficial' relationship with the island. This history will substantially strengthen our understanding of this key Asia-Pacific partner both in government and among Australia's citizens.

DP1093078 Prof MJ Kartomi

Approved Project Title **Female body percussion music as a contribution to cultural identity in western Aceh before and after the conflict and tsunami**

2010 : \$ 97,000

2011 : \$ 100,000

2012 : \$ 100,000

Primary RFCD 4101 PERFORMING ARTS

Administering Organisation Monash University

Project Summary

This project contributes to the national priority of understanding our region and the world for the safeguarding of Australia. An intimate awareness of the intercultural contexts in which Australians work is essential to Australia's leadership role in the Asia-Pacific region. The deep understanding of Aceh's culture that this research will bring will assist Australia's ongoing engagement with Aceh after our post-tsunami aid involvement ends, and help us assess the success of Australia's billion dollar reconstruction efforts. Knowing how the female performing arts therapeutically aided the survivors of the conflict and tsunami will assist future disaster relief projects funded by Australia.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093778 Prof JE Kenway; Dr AS Koh; Prof D Epstein; Prof FA Rizvi; Prof C McCarthy

Approved Project Title **Elite independent schools in globalising circumstances: a multi-sited global ethnography**

2010 : \$ 140,000
2011 : \$ 188,000
2012 : \$ 192,000
2013 : \$ 110,000
2014 : \$ 80,182

Primary RFCD 3301 EDUCATION STUDIES

APF Prof JE Kenway

Administering Organisation Monash University

Project Summary

This is a study of elite independent schools in Australia, New Zealand, Singapore, Hong Kong, Malaysia, India, Barbados, South Africa, the USA and England. Because such schools are often seen as the gold standard for school education, and because their alumni are often highly influential in economic, political and professional circles, understanding what they do and the ideals they stand for is important nationally and globally. This study will identify the impact of increased global connections on such schools and will enhance understanding of how many national and international leaders are formed through their education and with what possible implications.

DP1093325 Dr S Khatab

Approved Project Title **The ideological war within al-Qa'ida: The Jihadis' religio-political and intellectual revisions and ideas on counterterrorism, extremism and radicalisation**

2010 : \$ 80,000
2011 : \$ 73,000
2012 : \$ 64,000
2013 : \$ 64,000
2014 : \$ 65,000

Primary RFCD 3601 POLITICAL SCIENCE

ARF Dr S Khatab

Administering Organisation Monash University

Project Summary

This research focuses on new directions in jihadist thought and practice. It generates a better grasp of the current ideological war within al-Qa'ida and explores its theo-political ideas which influenced al-Qa'ida's backbone Jihadi groups to renounce violence, abandon al-Qa'ida, and critically stressed wide disagreements with al-Qa'ida's ideological ideas. Utilising this thought as ideological tool to counterterrorism and radicalisation, this project contributes to national security and counterterrorism works and raises Australian understanding of Islam's place in the world, which is of importance given the large and growing Muslim community in Australia and the commitment to make Australia a tolerant, multicultural society.

DP1093100 A/Prof CA Kull; Dr H Rangan; Dr DJ Murphy

Approved Project Title **The enigma of arrival: Movements of the mimosa bush and the baobab across the Indian Ocean into pre-British Australia**

2010 : \$ 132,000
2011 : \$ 140,000
2012 : \$ 180,000

Primary RFCD 3704 HUMAN GEOGRAPHY

Administering Organisation Monash University

Project Summary

This project will provide new insights into northern Australia's historical place in Indian Ocean networks of trade, cultural, and biological exchanges. By seeking to solve the enigmas of arrival of the mimosa bush and baobab our project will create new knowledge about the pre-British environmental history of Australia. Its integrative approach will generate significant public interest and richer discussion on the question of native versus introduced plants, helping environmental practitioners make informed decisions about alien plants and develop a more balanced perspective on biodiversity management. Finally, it will increase international collaboration across the Indian Ocean and train two postgraduate students.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093337 Prof SJ Langford; Prof PA Gale; Prof B Kersting

Approved Project Title **Exploring Aspects of Supramolecular Chemistry as a Paradigm for Advanced Functional Materials**

2010 : \$ 150,000

2011 : \$ 120,000

2012 : \$ 120,000

Primary RFCD 2599 OTHER CHEMICAL SCIENCES

Administering Organisation Monash University

Project Summary

This research proposal aims to provide an intellectual grounding in the use of molecular recognition for the assembly of complex arrays for new materials research. The development of molecular systems and supramolecular arrays that are capable of solar energy conversion (e.g. photovoltaics and artificial photosynthesis) or that have potential applications in catalysis will provide advances in the development of these industries within Australia. Such developments may also lead to breakthroughs in areas such as optoelectronics and cleaner energy production.

DP1095368 Prof JC Lattanzio; Prof PR Wood; Prof WD Arnett

Approved Project Title **The next generation of stellar models: incorporating the results of multidimensional hydrodynamics**

2010 : \$ 139,000

2011 : \$ 120,000

2012 : \$ 130,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

Administering Organisation Monash University

Project Summary

This project involves the use of computer codes designed for massively-parallel computing, thousands of computers tied together into one cluster, to tackle difficult hydrodynamic problems that occur in stars. We will train PhD students in this area of cutting-edge computation, with applications in areas such as meteorology, aero-space and defence. The skills gained by the participants in this project will be useful over a wide range of areas in the modern economy of the nation.

DP1096782 Prof AJ Lowery

Approved Project Title **Next-Generation Optical Orthogonal frequency-division multiplexing (OFDM) for long-haul telecommunications: building on recent research and commercialisation success**

2010 : \$ 125,000

2011 : \$ 140,000

2012 : \$ 180,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation Monash University

Project Summary

The provision of Broadband Internet services to the home also requires extremely-fast 'backbone' connections between cities to carry the additional traffic demands.

In a previous project funded by the ARC, Monash researchers developed Optical-Orthogonal Frequency Division Multiplexing (OFDM) technology to increase the information-carrying capacity of optical fibers simply by plugging in new circuit boards at exchanges. This is now being commercialised by a new Australian company, to considerable international acclaim. This project aims to provide the next generation of this technology, which will support even faster internet and will ensure the long-term future of Australian telecommunications manufacturing.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093891 Dr D Lyras; Prof JI Rood; Prof T Riley; Dr JG Songer

Approved Project Title **The role of virulence factors of Clostridium difficile in food animals.**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 3005 VETERINARY SCIENCES

Administering Organisation Monash University

Project Summary

Disease caused by the bacterium Clostridium difficile are a significant food production animal and public health problem in many countries. Specific animal and human public health resources have been allocated in many countries in efforts to mitigate the growing epidemics. The study proposed in this application presents a significant opportunity to learn about the virulence factors of animal strains of this bacterium about which very little is known. This project will lead to rationally designed preventative and treatment strategies that apply to both animals and humans, thereby impeding epidemics caused by C. difficile in Australia.

DP1095335 Prof PJ Marriott

Approved Project Title **Integrated Multidimensional Gas Chromatography - Spectroscopic Detection Methodology for Chemical Marker Discovery**

2010 : \$ 100,000

2011 : \$ 90,000

2012 : \$ 110,000

Primary RFCD 2504 ANALYTICAL CHEMISTRY

Administering Organisation Monash University

Project Summary

Chemical species are pervasive in our modern society and are found in personal care products, foods, additives, petroleum products, illicit drugs, pharmaceuticals and pollutants. Each sample must be analysed to determine its accurate composition, and as a safeguard. This requires chemical methods of analysis. Classical chemical methods may fail when samples become too complex, or they may lead to imprecise identification. This Frontier Technologies proposal has broad national and international relevance through development of new methods for authentication of chemical identity and the subsequent superior ability to characterise numerous sample compositions.

DP1093920 Dr A Martin; Prof ME Morris; Miss NS Brenez

Approved Project Title **Between Film and Art: An International Study of Intermedial Cinema**

2010 : \$ 77,000

2011 : \$ 75,000

2012 : \$ 88,000

Primary RFCD 4103 CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

Administering Organisation Monash University

Project Summary

This study of new forms of digital, intermedial art will lead to a greater understanding of the position of film in the 21st Century. It will make a major contribution to the history of aesthetics and our understanding of the role of art in contemporary societies. It will raise the international profile of Australia's contribution to theory, criticism and creative practice in the fields of cinema and art, with its investigative team bringing inputs from Australia, Hong Kong and France. Within Australia, it will nurture an interdisciplinary, collaborative approach to understanding, making and exhibiting the newest audiovisual art forms.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094064 A/Prof JP McCormack; Dr A Dorin; Dr M Whitelaw; Prof W Latham

Approved Project Title **A Process-Based Approach to Generative Form Synthesis**

2010 : \$ 90,000
2011 : \$ 80,000
2012 : \$ 80,000
2013 : \$ 60,000
2014 : \$ 51,000

Primary RFCD 4103 CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

ARF A/Prof JP McCormack

Administering Organisation Monash University

Project Summary

This project addresses open problems in digital media art, introducing innovative methods for professional practitioners. Through close collaboration with a highly successful UK pioneer and his team, this research nurtures Australian expertise and scholarship. Creative industries are making an increasingly important global economic contribution. Related projects overseas demonstrate the potential for tangible commercial benefits as a direct result of research investment in this domain. The practical outcomes of this research find application in architecture, computer games, digital animation and new media art. This inter-disciplinary project enhances collaborative links between the research communities of Computer Science and Media Arts.

DP1093716 Prof CJ Mews; Dr DM Squire

Approved Project Title **Ethics and encyclopaedic culture in 13th-century France: adaptation, diffusion and contexts of innovation in the Speculum morale and its sources**

2010 : \$ 83,000
2011 : \$ 80,000
2012 : \$ 85,000

Primary RFCD 4401 PHILOSOPHY

Administering Organisation Monash University

Project Summary

This project will contribute to awareness of the ethical foundations of the Western intellectual tradition, both philosophical and religious, through studying an influential encyclopaedia of ethical instruction from 1300, known as the Speculum morale and its relationship to the evolution of ethical teaching in France during the 13th century. It will develop text similarity detection software for use with Latin texts, and by implication within humanistic studies more generally. Through connecting with an international research project into medieval encyclopaedic culture, it will enable Australian expertise in both medieval studies and information technology to become internationally recognised.

DP1093770 Dr MK Miles

Approved Project Title **Light, place and presence in the history of Australian photography**

2010 : \$ 81,000
2011 : \$ 81,000
2012 : \$ 81,000
2013 : \$ 81,000

Primary RFCD 4199 OTHER ARTS

Administering Organisation Monash University

Project Summary

Photography is central to Australian history and national identity. It is a powerful tool through which our identities are forged, and through photography our understanding of our place in relation to our environments, each other and the world are made visible. By grounding this research in the unique status of light as a physical agent in photography and a key symbol of identity and place in Australia, this project will develop a new approach to photography that enriches our social and cultural imagination, and propels Australian scholarship onto the international agenda.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095060 Prof RJ Mitchell; Prof IM Ramsay; A/Prof S Cooney; A/Prof PG Gahan

Approved Project Title **Legal Origins: The Impact of Different Legal Systems on the Regulation of the Business Enterprise in the Asia-Pacific Region**

2010 : \$ 85,000

2011 : \$ 81,000

2012 : \$ 84,000

Primary RFCD 3901 LAW

Administering Organisation Monash University

Project Summary

This project will locate Australia and several major countries in our region within a highly influential international scholarly debate about appropriate forms of business regulation. It will contribute to domestic policy-making debates about the most effective legal methods for promoting an innovative and productive economy, especially in the areas of corporate and labour law. It will also enable Australian policy makers to participate in international policy reform debates facilitated through international institutions. In particular, it will enhance Australia's capacity to understand and contribute to the establishment of better legal systems in our region, enhancing important trading and strategic relationships.

DP1093383 Prof JJ Monaghan; Prof TJ Pedley

Approved Project Title **Numerical simulation of the fish-like swimming of linked bodies**

2010 : \$ 95,000

2011 : \$ 80,000

2012 : \$ 80,000

Primary RFCD 2405 CLASSICAL PHYSICS

Administering Organisation Monash University

Project Summary

Although Zoologists have made detailed observations of swimming fish there are still many unanswered questions about how they swim. We do not know how the fins and undulating body work together to produce the high speed of the tuna, or the fast turns of a fish escaping danger. We see dolphins swim through the sea's surface but we don't know if they do that because it is much more efficient. This project is designed to simulate arbitrary fish motion and give answers to these and other questions concerning swimming. It may also help humans to swim more efficiently and provide simulation tools for the design of robotic undersea vehicles.

DP1095166 Prof LN Moresi; Dr TA Stern; Asst Prof CM Cooper; Dr S Zlotnik

Approved Project Title **The Initiation and 3D Evolution of Instabilities in the Deep Continental Lithosphere**

2010 : \$ 140,000

2011 : \$ 120,000

2012 : \$ 110,000

Primary RFCD 2601 GEOLOGY

APD Dr S Zlotnik

Administering Organisation Monash University

Project Summary

This project is part of a new international initiative in the Geodynamics of the Australian Plate bringing together studies of the active tectonics of the boundary regions of our plate and the ancient analogues of these processes which are locked into the stable interior of the Australian continent. The proposed research is a good fit to the Identification and Extraction of Deep Earth Resources priority goal. Detachment of the lithosphere is associated with fertile mantle being emplaced at shallow depth below the crust; an important precursory event for mineralization. The project builds upon AuScope (NCRIS 5.13) to create infrastructure for a new, smart resource exploration and extraction industry based on modelling and simulation.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092745 A/Prof MJ Morgan; A/Prof DM Paganin; Dr M Weyland

Approved Project Title **Electron Tomography of Electromagnetic Fields, Potentials and Sources**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 2404 OPTICAL PHYSICS

Administering Organisation Monash University

Project Summary

The proliferation of technologies incorporating magnetic materials with exquisitely fine structure demands precise characterization methods, which are able to keep pace with magnetic miniaturization. However, existing techniques are unable to directly image magnetic materials at high resolution in three dimensions. We will overcome this deficiency, by combining an exciting new methodology for the three-dimensional visualisation of electromagnetic fields, with the latest cutting-edge electron-microscopes, thereby facilitating advances in magnetic nano-manufacturing. The anticipated applications are vast, from patterned nanomagnets and magnetic proteins, through to semiconductors and superconductors.

DP1095487 A/Prof MM Murshed

Approved Project Title **Low-complexity Video Coding for Wireless Multimedia Sensor Networks**

2010 : \$ 65,000

2011 : \$ 60,000

2012 : \$ 60,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation Monash University

Project Summary

This project develops frontier technologies to capture and transmit videos by miniaturised sensing devices. It will improve Australia's telemetric surveillance capabilities and benefit defence, law enforcement, traffic control, and wildlife inhabitant monitoring agencies. It will enable the telecommunication industry to support quality video conferencing with mobile phones and the computer games industry to develop rich virtual reality games. The Australian health industry will be able to provide ubiquitous healthcare services through improved telemedicine and medical imaging with emerging technologies such as edible cameras. The project will also enable Australia to lead the world in setting up video coding standards for sensor networks.

DP1097177 Prof Y Ng

Approved Project Title **The economics of happiness, public policy, and national success indicators**

2010 : \$ 100,047

2011 : \$ 90,000

2012 : \$ 177,560

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation Monash University

Project Summary

The project will provide a sound analysis of happiness, taking account of traditional welfare economics and recent advances in happiness studies, including making the analysis more relevant for policy formulation, making happiness measures more comparable interpersonally, intertemporally, and interculturally. A new and more appropriate national success indicator will be devised that takes positive account of some appropriate measure of happiness (adjusted happy life-years) and negative account of some measure of per capita external costs. This will encourage people, organizations, and governments to focus on factors that have a more direct bearing on people's happiness.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095202 Prof CT Nyland; Ms H Forbes-Mewett

Approved Project Title **International student safety from crime**

2010 : \$ 75,000

2011 : \$ 102,000

2012 : \$ 127,000

2013 : \$ 81,000

Primary RFCD 3301 EDUCATION STUDIES

APD Ms H Forbes-Mewett

Administering Organisation Monash University

Project Summary

International education currently generates \$15.5 billion per annum in exports and involves 520,000 students in Australia. Safety from crime is a fundamental requirement of international students and source governments are insisting Australia needs to improve student safety. These demands must be met if Australia is to sustain its level of involvement in the industry. The project will assist this effort by helping develop solutions to student crime problems that are tailored to Australia's unique circumstances. The project will help enrich Australia's international reputation and improve the safety of international students and Australian communities.

DP1092840 Prof JR Ogloff; Prof PE Mullen; Dr TE McEwan; Dr MD Daffern; Dr RD MacKenzie

Approved Project Title **Recognising, assessing, and managing high risk stalking behaviour: An evidence-based approach**

2010 : \$ 132,000

2011 : \$ 140,000

2012 : \$ 134,000

2013 : \$ 118,000

2014 : \$ 30,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

APD Dr TE McEwan

Administering Organisation Monash University

Project Summary

Developing effective methods of assessing and treating stalkers will directly impact the health and safety of thousands of stalking victims across Australia, and reduce the number of stalkers coming into contact with the criminal justice system. Application of the assessment and treatment tools developed during this project by mental health and corrective services around Australia will help to reduce physical and psychological harm experienced by both stalkers and their victims. The development and implementation of practical and effective strategies that lessen the impact of stalking will reduce the burden of mental ill-health caused by stalking, increase community safety, and reduce overall levels of victimisation in Australian society.

DP1094582 Dr TA Oliynyk

Approved Project Title **Comparing Einstein to Newton: a mathematical foundation for the Newtonian limit and post-Newtonian expansions**

2010 : \$ 80,000

2011 : \$ 80,000

2012 : \$ 80,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation Monash University

Project Summary

This proposal will benefit the nation in the following ways: (i) to make Australia a world leader in post-Newtonian research, (ii) to contribute to Australia's existing commitment to the search for gravitational waves by providing theoretical tools that will aid in the analysis of gravitational wave data, (iii) to train the next generation of Australian gravitational researchers in a field whose importance will only grow as the field of gravitational wave astronomy matures, and (iv) to facilitate visits by my collaborators to Australia who will bring world class expertise for the benefit of both Australian students and experts in general relativity.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093541 Prof GR Oppy; Dr N Trakakis

Approved Project Title **Models of Divinity**

2010 : \$ 40,000

2011 : \$ 73,000

2012 : \$ 60,000

Primary RFCD 4402 RELIGION AND RELIGIOUS TRADITIONS

Administering Organisation Monash University

Project Summary

At a time of religious conflict around the world, interfaith dialogue is becoming increasingly important. This project will provide a platform for such dialogue to take place, thus advancing the National Research Priority Goal of improving Australia's capacity to interpret and engage with its regional and global environment. The project will also have distinct social benefits that will result from exploring the links between competing conceptions of the divine and (very often oppressive) social-cultural practices. Finally, the project will advance Australia's reputation and standing in the philosophy of religion, thus stimulating greater postgraduate and postdoctoral research in this area.

DP1095229 A/Prof M Pavlyshyn

Approved Project Title **Bilingualism and Multilingualism in a National Movement: Ukrainian Writers in the Nineteenth Century**

2010 : \$ 35,000

2011 : \$ 35,000

2012 : \$ 40,000

Primary RFCD 4202 LITERATURE STUDIES

Administering Organisation Monash University

Project Summary

This analysis of the role of languages with different social and political roles in the formation of a modern Ukrainian literature will advance the study of Eastern Europe in Australia, foster international research links and open avenues for collaboration between humanities and social science scholars in Australia and countries of the former Soviet Union. It will contribute to research training and enhance the standing of Australian scholarship in Slavic and East European Studies. By contributing to knowledge about the gestation of nations - political and cultural units into which most people today believe themselves to belong - the project will advance the national priority goal of understanding our region and the world.

DP1093107 A/Prof SJ Pickering; Dr L Weber; Dr C Tazreiter; Dr MT Segrave

Approved Project Title **Fluid security in the Asia Pacific**

2010 : \$ 85,000

2011 : \$ 120,000

2012 : \$ 89,000

Primary RFCD 3701 SOCIOLOGY

Administering Organisation Monash University

Project Summary

At a time of global and regional insecurity fuelled by economic and terrorism concerns, this project will provide a rigorous evidence base for the Asia Pacific to better manage mobility in a more inclusive way. This directly fits with understanding our region and the world by providing an evidence base for better understanding of how and why people move throughout the Asia Pacific and their impact and experiences of security. It also contributes to protecting Australia from terrorism and crime by identifying the reasons and ways people move in unauthorized ways and therefore to help to design systems that reduce experiences of victimization and criminalisation.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094585 Dr DJ Price
Approved Project Title **The role of magnetic fields in star formation**
2010 : \$ 95,000
2011 : \$ 95,000
2012 : \$ 95,000
Primary RFCD 2401 ASTRONOMICAL SCIENCES
Administering Organisation Monash University

Project Summary

Recently we have performed the world's first calculations of star cluster formation that incorporate the effects of magnetic fields and radiation. This research has recently been brought back to Australia and the goal of this proposal is to extend our competitive edge in this area.

Whilst calculations of the formation of stars gives us fundamental understanding about a very basic physical process in the universe (namely, the conversion of gas into stars), the equations we solve and the methods used to solve them, are the same as those used to describe many gases and fluids on earth. Solving these equations in difficult astrophysical regimes develops new methodology which translates readily to earth-bound problems.

DP1093226 Dr TA Reuter; Prof GJ Barton
Approved Project Title **Under New Leadership: A study of the composition, behaviour and interactions of cultural, religious and political elites in democratic Indonesia**
2010 : \$ 65,000
2011 : \$ 50,000
2012 : \$ 56,000
Primary RFCD 3703 ANTHROPOLOGY
Administering Organisation Monash University

Project Summary

Good communication, mutual understanding and sound working relationships between Indonesian and Australian elites are vital for maintaining fruitful diplomatic relations. Such relations, however, are often impeded by cultural differences and a lack of understanding of informal political processes in Indonesia, all the more so in the current context of tensions between Muslim and Western nations. This study explores religious and other cultural factors that shape aspects of behaviour of Indonesian leaders that puzzle their Australian counterparts. It will shed light on the visions that direct Indonesia's most influential people in their thinking about the future of their nation and its relations with Australia.

DP1094619 Dr A Roujeinikova
Approved Project Title **Understanding the molecular mechanism of force generation in the bacterial flagellar motor**
2010 : \$ 135,000
2011 : \$ 115,000
2012 : \$ 125,000
2013 : \$ 50,283
2014 : \$ 50,283
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY
ARF Dr A Roujeinikova
Administering Organisation Monash University

Project Summary

The proposed research will advance the knowledge about how the bacterial flagellar motor works, enabling scientists to learn more about nature's blueprint of a nanoscale engine. It will address the fundamental question of how bacterial cells convert electrochemical energy into mechanical energy of rotation. At present, the smallest artificial electric motor is still on a micro-, rather than nanoscale. Nanotechnology would therefore benefit from this work by basing their designs on the principles behind the mechanism of the bacterial motor. This research is also of interest for veterinary science, as motility by flagellar motor is a key virulence factor of common animal pathogens associated with, for example, listeriosis and gastroenteritis.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094366 Dr JM Ryan; Prof K Louie

Approved Project Title **Respectful encounters: Enhancing understanding and engagement between Western and Confucian-heritage educators**

2010 : \$ 40,000

2011 : \$ 40,000

2012 : \$ 34,100

Primary RFCD 3301 EDUCATION STUDIES

Administering Organisation Monash University

Project Summary

One in four students in Australian universities is an international student and Chinese students are the largest group. International education is our third largest export and contacts between Australian and Chinese universities are rapidly increasing. This, however, is often based on outmoded or stereotyped assumptions about scholarship and learning. This project on both sides will build Australian educators' knowledge of complexities and contemporary developments within China's cultural and intellectual paradigms. It will thus increase the appeal and relevance of Australian education to Chinese students and academics, enhance our engagement with China, and improve the international reputation and competitiveness of our universities.

DP1096456 A/Prof JG Sanjayan; Dr GP Ranjith; Dr GA Narsilio

Approved Project Title **Development of Leakage Resistant Well-Cements for Geo-Sequestration of Carbon Dioxide Application using Alkali Activated Slag and Geopolymer Cements**

2010 : \$ 140,000

2011 : \$ 90,000

2012 : \$ 120,000

2013 : \$ 180,000

Primary RFCD 2908 CIVIL ENGINEERING

APD Dr GA Narsilio

Administering Organisation Monash University

Project Summary

The biggest threat facing life now is climate change due to carbon dioxide (CO₂) emissions. Extreme weathers are increasing in frequency and intensity, as evidenced by recent bushfires, and it is predicted to get worse unless carbon mitigation strategies are quickly implemented. Geo-sequestration is the technology of capturing and storing of the CO₂ deep below ground for long time (>1000 years). It offers the best hope for large reductions of CO₂ emissions. However, CO₂-brine stored under pressure is acidic and has the risk of leaking in the long term by dissolving the cement used to seal the pipe wells. This project will develop alternative novel cements which are acid resistant and will not allow CO₂ to leak through the sealed wells.

DP1093729 Prof BC Scates; Dr KP Blackburn; Em/Prof HN Nelson; Dr SJ Clarke; Dr KJ Reeves

Approved Project Title **Revisiting Australia's war: international perspectives on heritage, memory and ANZAC pilgrimages to the cemeteries, sites and battlefields of World War Two (WW2)**

2010 : \$ 75,000

2011 : \$ 45,000

2012 : \$ 42,000

2013 : \$ 45,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Monash University

Project Summary

War has assumed an iconographic status in Australia and New Zealand; for many the spirit of Anzac defines the values of both nations. A study of WW2 pilgrimage will explore ways the Anzac legend has been revisited, reinvented and revitalised by successive generations. This project will retrieve the memory of war from those who suffered it, empower communities of mourners on both sides of the Tasman and help to explain why the Anzac mythology captivates such a diverse cross-section of society. It will explore a neglected dimension of Australasia's relationship with the world and the Asia/Pacific region in particular.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094179 Dr W Shen; A/Prof SD Kolev; Dr CF Hogan; Prof G Whitesides

Approved Project Title **Paper fluidics - A novel approach to low cost printable microsensors**

2010 : \$ 170,000

2011 : \$ 160,000

2012 : \$ 170,000

Primary RFCD 2903 MANUFACTURING ENGINEERING

Administering Organisation Monash University

Project Summary

Printing is perhaps the cheapest means of mass production available, yet it is used almost exclusively to mass produce only one thing, i.e. the printed word! This project will enable the development of disposable printed sensors for assessing the quality of water or the health of an individual. Sensors are generally relatively expensive, but the ability to print them on paper by the thousand will bring down the cost to a few cents. Such cheap, portable, easy-to-use sensors if widely available could profoundly affect the lives of people living in remote areas and developing countries.

DP1096444 Prof J Sheridan; A/Prof HM Blackburn; Prof JN Sorensen; Dr S Le Dizes

Approved Project Title **Understanding and modifying vortex structures in wind turbine wakes**

2010 : \$ 125,000

2011 : \$ 115,000

2012 : \$ 110,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

At a fundamental research level, Australia's active participation in this area of national priority and research strength will be advanced through our published research, which will increase our understanding of wind turbine wakes and their effects in wind farms. This understanding will then be used to produce improved methods of predicting wind turbine performance. Such methods are needed by wind energy designers to produce better wind farms. It will also be used to recommend how to improve the aerodynamic design of turbine components, such as the blades and hub. Numerical tools will be developed for industry use, and training will be provided to personnel, thereby increasing the capabilities of Australia's growing wind energy industry.

DP1096150 Prof GP Simon; Dr DR Nisbet

Approved Project Title **New Biomimetic Nanostructured Coatings for Hip Implants**

2010 : \$ 180,000

2011 : \$ 160,000

2012 : \$ 170,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation Monash University

Project Summary

Over 30,000 hip implants operations take place in Australia each year, due largely to a significant and growing proportion of the population suffering from conditions such as osteoporosis. The coating on the implants, required to cause good bone ingrowth and adhesion between bone and implant, is far from perfect. We propose to spray coatings which mimic the structure of bone, and thus offer improved mechanical properties such as appropriate rigidity and toughness, and stimulate better bone growth at the interface. In this way the implant should be much longer lasting and the need for undesirable revision surgery reduced. The processing technique proposed could also be a useful platform coating technology in a number of other industries.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092723 Dr IM Smyth; Prof A Bradley; Prof F Watt; Prof P Martin; Prof IJ Jackson; Dr D Headon; Dr R Ramirez-solis

Approved Project Title **A knockout approach to identifying genes involved in epidermal development and homeostasis**

2010 : \$ 112,500
2011 : \$ 110,000
2012 : \$ 110,000

Primary RFCD 2702 GENETICS

Administering Organisation Monash University

Project Summary

These studies will identify new genes which play a role in the development or maintenance of the skin, some of which may subsequently be shown to play a role in disease. The project capitalises on an investment of tens of millions of dollars by the Wellcome Trust in generating a significant cohort of knockout mice. Our involvement in this international initiative will ensure Australia's participation in a project at the forefront of mouse genetics, using cutting edge infrastructure and technologies to provide insights into the complement of genes involved in skin biology. Models of interest will be repatriated to Australia for further study capitalising on existing infrastructure provided through the NCRIS funding program.

DP1095620 Prof J Soria; Prof J Jimenez

Approved Project Title **Structure, Dynamics and Control of Wall-Bounded Turbulence**

2010 : \$ 125,000
2011 : \$ 135,000
2012 : \$ 130,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

This research has immense impact in engineering and environmental science including aeronautical, mechanical, biomedical engineering, and meteorological science. The energy savings with reduction in carbon dioxide (CO₂) emissions resulting from this research and economic benefits will impact directly on global climate change and a sustainable urban environment in Australia. This research will deliver technological advances in complex fluid dynamics and instrumentation, in addition to new and exciting training opportunities for future generations of researchers and engineers. This project will secure Australian science and engineering as world leaders in the crucial area of Fluid Dynamics that influences our everyday lives.

DP1096474 Prof J Soria; A/Prof A Ooi

Approved Project Title **Fluid physics of cold gas-dynamic spray process**

2010 : \$ 245,000
2011 : \$ 205,000
2012 : \$ 200,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

Cold gas-dynamic spray has the potential to revitalize and revolutionize the Australian manufacturing sector and economy. It is a technologically advanced flexible free-forming process with potential applications in the aviation, automotive, naval and bio-medical sectors. It allows for the design of functional surfaces from the nano-scale to the macro-scale that can be manufactured by spraying material coatings of arbitrary thickness and density on a substrate. The process of the spray particle delivery is crucial and not understood. This research will investigate the fluid physics and spray particle physics to gain the essential understanding necessary to make this process energy efficient and extend its range of application.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093398 Dr SJ Spencer

Approved Project Title **Early life overfeeding - mechanisms for programming obesity and long-term immune dysfunction.**

2010 : \$ 107,000

2011 : \$ 107,000

2012 : \$ 97,000

Primary RFCD 2706 PHYSIOLOGY

Administering Organisation Monash University

Project Summary

Early life overfeeding can lead to obesity and related changes in adulthood. With this study we will discover how overfeeding can permanently alter an animal's development so that its body weight and immune functions are dysregulated. The outcomes will facilitate appropriate design of animal experiments considering the impact of neonatal programming. They will also contribute to more efficient feeding protocols for meat production in agriculture and identify targets for risk management and for preventing and ameliorating early life overfeeding effects in humans. This investigation therefore has clear benefits to the social, economic, and health aspects of obesity and to basic science and agriculture.

DP1094100 Prof L Spiccia; Dr B Graham; Prof Y Tor

Approved Project Title **Metal complex-aminoglycoside conjugates for sequence-specific cleavage of ribonucleic acid (RNA)**

2010 : \$ 150,000

2011 : \$ 150,000

2012 : \$ 150,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

Ribonucleic acid (RNA) is emerging as an increasingly attractive drug target in the search for new approaches to combat diseases such as HIV/AIDS. This project will help position Australia at the forefront of research developments in the field of RNA-drug interactions, through the development of novel compounds that can cleave RNA molecules found in bacteria and retroviruses. In addition to a valuable body of knowledge that will assist in the future development of new drugs, this project will provide high quality multi-disciplinary training for young scientists keenly sought by emerging medical and biotechnological industries, research organisations and universities.

DP1094181 Dr T Tian; Dr AS Harding

Approved Project Title **Multiscale stochastic modelling of tumour robustness**

2010 : \$ 80,000

2011 : \$ 80,000

2012 : \$ 80,000

Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES

Administering Organisation Monash University

Project Summary

This project will develop cutting-edge modelling methodologies of systems biology and innovative experimental techniques to investigate the principles of tumour initiation and progression, which lay at the heart of the national research priority Frontier Technologies for Building and Transforming Australian Industries. The primary outcome will be fundamental new paradigms explaining tumour initiation, cancer disease progression and the evolution of therapy resistance. The deep insights gained in this research have the potential for the optimal treatment strategies of cancer diseases, which is strongly relevant to promoting and maintaining good health for Australians.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094317 Dr AG Tomkins; A/Prof J Mavrogenes; Prof S Barnes

Approved Project Title **Platinum deposit genesis: A new way of thinking**

2010 : \$ 75,000

2011 : \$ 65,000

2012 : \$ 60,000

Primary RFCD 2601 GEOLOGY

Administering Organisation Monash University

Project Summary

Platinum is becoming increasingly crucial to the high technology sector, and is used particularly in catalytic converters and fuel cells, which serve to minimise or eliminate car exhaust pollution. Greatly expanded resources of this precious metal are needed to help society's transition to a low carbon dioxide (CO₂) lifestyle. This project will combine high temperature-pressure experiments with geological field research to greatly improve our understanding of how platinum ore deposits form and thus where to find them. The outcomes of this project will change mineral exploration strategies in Australia and around the world, and facilitate our progression to a cleaner, greener future.

DP1092850 Dr A Traven; Prof TJ Lithgow

Approved Project Title **Ribonucleic acid (RNA)-binding proteins regulate protein targeting and organelle biosynthesis.**

2010 : \$ 105,000

2011 : \$ 105,000

2012 : \$ 105,000

Primary RFCD 2702 GENETICS

Administering Organisation Monash University

Project Summary

We will investigate a new paradigm in biology: the coordination of protein expression in space and time. Detailed knowledge will be gained about proteins that perform important roles in ensuring the proliferative potential of cells an essential aspect of stem cell biology, regenerative medicine and development of cancer. The study combines skills in several aspects of genetics, biochemistry and molecular cell biology and will therefore provide excellent training opportunities for PhD students and postdoctoral fellows in an internationally highly competitive field of research.

DP1094399 Dr LD Turner

Approved Project Title **Quantum magnetometry on the microscale**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 110,000

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

Administering Organisation Monash University

Project Summary

This proposal will create a microscope for magnetic fields by measuring the quantum spin of a Bose-Einstein condensate at temperatures near absolute zero. Classical measurements of spin have underpinned transforming technologies, from magnetic resonance imaging to terabyte-scale hard-disc storage. We will make a truly quantum measurement of spin which will create a magnetic field microscope one million times more sensitive than the current state-of-the-art. The magnetic field microscope will be sensitive enough to measure fields from single biological cells and from superconducting nanosurfaces, giving critical new perspectives in biomedical research and next-generation electronics.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094873 Dr CL Twomey

Approved Project Title **Captive Australians: the place of prisoners of war (POWs) in post-war Australian culture**

2010 : \$ 57,000
2011 : \$ 33,000
2012 : \$ 57,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Monash University

Project Summary

The project addresses the Research Priority Goal 'Understanding our region and the world' through enhancing Australia's capacity to interpret its historical experiences and explain their impact upon regional relationships. The factors that continue to inform Australia's relationship with Asia, particularly cultural memories of the Pacific War, are a key concern. The project will add significantly to our understanding of recent Australian history, foster scholarly interchange about the impact of the historical legacy of World War Two on contemporary politics and international relations, and give an increased profile and recognition for Australia within the fields of war history and memory studies.

DP1095243 Prof JA Walter; Prof P 't Hart; Dr PA Strangio

Approved Project Title **The pivot of government? Understanding the Australian prime minister: The office and its holders**

2010 : \$ 126,000
2011 : \$ 126,000
2012 : \$ 140,000

Primary RFCD 3601 POLITICAL SCIENCE

Administering Organisation Monash University

Project Summary

This study offers the most comprehensive study of Australia's prime ministership to date and will greatly augment our understanding of the conduct of the office over time. Ideally, it will promote a more informed understanding of the exercise of leadership, feeding directly into public education about this key aspect of our political system (through the Prime Ministers' Centre/proposed Museum of Democracy in Canberra), leading to better citizen appreciation of the role, possibly to better leadership practices and, if our research shows it to be necessary, providing an evidence base for consideration as to whether there is a need for institutional reform.

DP1092605 Dr H Wang; Prof M Tsapatsis

Approved Project Title **Zeolitic Nanoflake-Polymer Composite Membranes for Low Energy Desalination**

2010 : \$ 150,000
2011 : \$ 150,000
2012 : \$ 160,000

Primary RFCD 2906 CHEMICAL ENGINEERING

Administering Organisation Monash University

Project Summary

The desalination of seawater is becoming an important source of drinking water for Australia. The current desalination process using polymer membranes is energy-intensive. The proposed project will contribute to the development of low energy desalination technology by advancing membrane design and fabrication techniques. The use of zeolitic nanoflake-polymer composite membranes developed in this project is expected to substantially reduce energy consumption in the desalination process. This research will produce important economic and environmental benefits by developing a green technology for fresh water production and water treatment for power generation, irrigation and other industrial uses.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093320 Dr IM Wanless; Prof BD McKay
Approved Project Title **Permanents, permutations and polynomials**
2010 : \$ 50,000
2011 : \$ 50,000
2012 : \$ 50,000
Primary RFCD 2301 MATHEMATICS
Administering Organisation Monash University

Project Summary

The benefits to Australia of fundamental research in core disciplines such as mathematics are well documented. Discrete mathematics and combinatorics are boom disciplines of the computer age and this project seeks new knowledge concerning basic building blocks of combinatorial mathematics. The outcomes will be of interest to theoreticians around the world, enhancing Australia's already high research profile in this crucial area. Importantly, the project also offers substantial postgraduate training in mathematics, an area in which Australia has an identified skill shortage.

DP1093739 Dr JA Windle
Approved Project Title **A social geography of school choice: Educational decision-making and markets in the new age of accountability**
2010 : \$ 80,182
2011 : \$ 80,182
2012 : \$ 80,182
Primary RFCD 3301 EDUCATION STUDIES
APD Dr JA Windle
Administering Organisation Monash University

Project Summary

The functioning of school choice is a major government and public concern because of increasing reliance upon individual use of information as a mechanism for driving system-wide innovation, excellence and equity. This project will strengthen the empirical and conceptual basis for developing future policies strengthening the relationship between families and schooling. It will provide particular assistance to education systems striving to provide greater equity and inclusion. Knowledge of how school choice works will thereby produce benefits for the future wellbeing of individuals, and for the capacity of schooling to contribute to national social cohesion and economic prosperity.

DP1093563 Dr B Winther-Jensen
Approved Project Title **Novel Fuel-Cell Structures based on Electroactive Polymers**
2010 : \$ 135,000
2011 : \$ 145,000
2012 : \$ 145,000
2013 : \$ 240,000
2014 : \$ 120,000
Primary RFCD 2914 MATERIALS ENGINEERING
QEII Dr B Winther-Jensen
Administering Organisation Monash University

Project Summary

The Discovery Project will tackle some of the challenging issues regarding the conversion of our society into a post-petroleum era through: Development and understanding of a new class of organic catalysts for efficient low temperature fuel-cells; Developing cheap and effective, ultra-thin, ion-conducting membranes for fuel-cells based on new plasma-polymers; and Integrating the components into fuel-cells suitable for stationary, portable and automotive applications. These outcomes will contribute to national research priorities: Frontier Technologies for building and transforming Australian Industries, and An Environmentally Sustainable Australia.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092610 Dr O Winther-Jensen

Approved Project Title **Photo-enhanced water oxidation using novel structures and conjugated polymers**

2010 : \$ 80,182

2011 : \$ 80,182

2012 : \$ 80,182

Primary RFCD 2914 MATERIALS ENGINEERING

APD Dr O Winther-Jensen

Administering Organisation Monash University

Project Summary

This project will lead to a more sustainable environment in Australia as it will help reduce greenhouse gas emission from energy consumption. The proposed solar water splitting cell will facilitate an efficient, low-cost and renewable production of hydrogen. Hydrogen is considered to be the ultimate fuel since only water is produced as a product of combustion. Already hydrogen powered fuel cell vehicles are being produced by a number of the major car manufacturers. The solar water splitting technology based on sustainable materials and the novel cell configuration to be developed in this project will provide the needed stability and efficiency of the cell as well as reduce the manufacturing cost.

DP1092955 Dr LY Yeo; Dr PR Stoddart; Prof HC Chang

Approved Project Title **Opto-Microfluidics: A Rapid and Sensitive Platform for Biological Diagnostics**

2010 : \$ 95,000

2011 : \$ 100,000

2012 : \$ 95,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

One in four people above 25 years suffer from diabetes-related diseases in Australia, with an associated economic cost exceeding \$3 billion a year. A microdevice for continuous glucose monitoring would help patients to manage the disease, leading to huge individual, clinical and societal benefits. Life expectancy is expected to increase along with quality of life. Integration of the microdevice with insulin delivery would realise an 'artificial pancreas', revolutionising the management and treatment of the disease. The technology will also provide a platform for other point-of-care medical diagnostic devices, which will allow early participation in this emerging market and cement Australia's position in bionanotechnology.

DP1095838 Dr X Zhang; Prof ML King

Approved Project Title **Nonparametric estimation of regression models with unknown error distributions**

2010 : \$ 65,000

2011 : \$ 65,000

2012 : \$ 65,000

Primary RFCD 3404 ECONOMETRICS

Administering Organisation Monash University

Project Summary

In discipline areas ranging from bioinformatics to economics and commerce, researchers make important decisions based on regression models, where the error density is often unknown. This project will result in a new sampling procedure that aims to choose bandwidth parameters for estimating the regression function and error density in nonparametric regression models. Our approach is of practical importance and can be used to investigate relationships between variables that are observable in our economy and community. The nation will benefit from the output of this project by having its own experts in the area of proposed research, raising Australia's academic profile in econometrics and statistics.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

| | | |
|-----------------------------------|--|-------------------|
| DP1095466 | Prof X Zhao; A/Prof R Al-Mahaidi; Dr W Duan; Prof J Teng | |
| Approved Project Title | Retrofit of Steel Connections subject to Fatigue Load by Utilizing carbon fibre reinforced polymeric (CFRP) and Modified Epoxy Structural Adhesives | |
| 2010 : | \$ 95,000 | |
| 2011 : | \$ 95,000 | |
| 2012 : | \$ 80,000 | |
| Primary RFCD | 2908 | CIVIL ENGINEERING |
| Administering Organisation | Monash University | |

Project Summary

The proposed research project will challenge conventional methods of repairing or strengthening steel structures by using an advanced material (CFRP) together with modified epoxy structural adhesives. It will not only provide reliable retrofitting of existing structures but will also build safe, more economic and smarter steel structures. It will contribute to the socio-economic wellbeing of Australia, including road and railway infrastructure, offshore, mining and recreation industries, increasing the international competitiveness of the Australian steel industry and infrastructure maintenance capability. Australia will be better positioned in the region for potential technology transfer to Asian and surrounding countries.