

Queensland

The University of Queensland

DP0986496 Dr K Alexandrov

Approved Project Title **Novel approaches for structural and functional analysis of the protein complex COG, a tether that controls intra-Golgi trafficking**

2009 : \$ 180,000

2010 : \$ 180,000

2011 : \$ 180,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Production and engineering of proteins are key methodologies of the life sciences in general and biotechnology in particular. Our ability to produce and analyse protein-based components of the cell determines the expense and speed of discovery, as well as the creation of new vaccines, drugs, and diagnostic methods. The current project aims to develop new approaches for protein production and to apply them to the analysis of the basic mechanisms of cell self-maintenance.

DP0986621 Dr DH Arnold

Approved Project Title **Human Time Perception**

2009 : \$ 94,000

2010 : \$ 75,000

2011 : \$ 75,000

2012 : \$ 75,000

2013 : \$ 75,000

Primary RFCD 3801 PSYCHOLOGY

ARF Dr DH Arnold

Administering Organisation The University of Queensland

Project Summary

Most human tasks require timing on a scale of tens to hundreds of milliseconds. We must judge time to produce and comprehend speech, to move about and interact with our dynamic environment, to determine causality and decode information from sensory receptors. However, the neural bases of time perception are largely unknown. This project will explore temporal phenomena to determine how and where durations, temporal order and coincidence are encoded in the human brain. Project results will provide new insight into the mechanisms of time perception, with implications for disorders associated with impaired time perception, such as autism, dyslexia and schizophrenia.

DP0987835 Dr S Balasubramanian; Prof GL Hammer; Dr RM Clark; Dr DR Jordan

Approved Project Title **Mechanistic characterisation of genotype x environment interactions in sorghum and arabidopsis**

2009 : \$ 120,000

2010 : \$ 50,000

2011 : \$ 50,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

Sorghum is an economically important cereal crop for Australia. In Australia, sorghum is used as a staple animal feed and it is very important for the live stock industry. With the predicted changes of temperature and rainfall patterns due to climate change, negative effects on sorghum yield are expected, which can have adverse effects on Australian economy. Our studies will identify and mark genes that regulate flowering and seed production in sorghum in response to changes in temperature and light interactions. These studies will help to develop novel sorghum varieties with desirable characters through plant-breeding programmes.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0988312 Prof MS Barrett

Approved Project Title **Eminence perspectives: Case studies of the pedagogy of creative thought and practice in music**

2009 : \$ 70,000
2010 : \$ 40,000
2011 : \$ 50,000

Primary RFCD 3301 EDUCATION STUDIES

Administering Organisation The University of Queensland

Project Summary

The arts play a crucial role in the cultural, social and economic fabric of Australian society. However, the pedagogies that develop creative thought and practice within and/or across domains of arts activity are not well understood. This project will provide significant national benefit through the identification of learning and teaching practices, dispositions and environments that foster creativity and innovation in music. The project findings will provide new knowledge concerning eminence approaches to pedagogy in music, inform the development of creativity and innovation in domains of arts practice, and contribute to the further development of Australia's cultural community

DP0985953 Dr J Batley; A/Prof D Edwards; Mrs R Delourme

Approved Project Title **Co-evolution of the host pathogen interaction between *Leptosphaeria maculans* and Brassica species**

2009 : \$ 170,000
2010 : \$ 170,000
2011 : \$ 180,000
2012 : \$ 180,000
2013 : \$ 180,000

Primary RFCD 2704 BOTANY

QEII Dr J Batley

Administering Organisation The University of Queensland

Project Summary

Brassica canola is Australia's third largest export crop, producing 13% of the world's canola oil. However, blackleg disease, caused by the fungus *Leptosphaeria maculans* leads to annual yield losses of 15%, with 100% loss associated with breakdown of resistance. International investment has provided novel genome resources for Brassica and *L. maculans*. Applying these resources to understand the co-evolution of this plant-fungal interaction could prevent the current boom-bust cycle of canola production in Australia. This study will also provide a model and knowledge base for applications in other species, leading to enhanced crops with increased plant protection and robust, reliable productivity.

DP0985000 Dr DJ Batstone; Dr K Rabaey; Prof Dr BE Logan; Dr C Picioreanu; Mr AJ Stams

Approved Project Title **Interspecies electron transfer in biotechnology**

2009 : \$ 230,000
2010 : \$ 175,000
2011 : \$ 175,000
2012 : \$ 175,000
2013 : \$ 150,000

Primary RFCD 2703 MICROBIOLOGY

ARF Dr DJ Batstone

Administering Organisation The University of Queensland

Project Summary

While the project is fundamental in nature, it has direct technological gains to a wide range of biotechnology processes, and in particular, mixed culture anaerobic biotechnology. It therefore promotes Australian bioenergy, biofuel, and commodity renewable chemicals industries, and contributes to the national research priority of an Environmentally Sustainable Australia. In addition, this is a fast moving, high impact area that will demonstrate excellence in Australian research on an international scale. The exciting multidisciplinary nature of the project, excellent management team, and high-class partners will also provide for an excellent experience for the three PhD candidates to be educated through the project.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0984787 Prof JH Baxter; Dr BA Hewitt

Approved Project Title **For Better or For Worse? Understanding the Revolution in Married Life in Australia.**

2009 : \$ 140,000
2010 : \$ 120,000
2011 : \$ 120,000
2012 : \$ 80,000
2013 : \$ 100,000

Primary RFCD 3701 SOCIOLOGY

APF Prof JH Baxter

Administering Organisation The University of Queensland

Project Summary

Marriage has traditionally been viewed as the bedrock institution of society. But recent evidence suggests that marriage patterns have been transformed. People are marrying less, and those who do are marrying later, separating more, and often marrying after cohabiting and having children. What are the consequences of these changes for people's experience of these relationships and for other outcomes, such as relationship quality, life satisfaction and views about marriage? This project will provide important information that will enable greater understanding of changing family patterns and provide critical data for policy-makers concerned with the social welfare of individuals and the changing role of the family in Australia today.

DP0986159 Dr AJ Bellamy; Dr SE Davies

Approved Project Title **An Early Warning Framework for the Prevention of Genocide and Mass Atrocities**

2009 : \$ 110,000
2010 : \$ 110,000
2011 : \$ 130,000

Primary RFCD 3601 POLITICAL SCIENCE

Administering Organisation The University of Queensland

Project Summary

Australia is an active participant in international efforts to prevent mass killing and rebuild wartorn societies, with missions deployed in Timor-Leste, the Solomon Islands and Afghanistan. Australia is also a leading global advocate of the 'responsibility to protect'. The most important aspect of this doctrine is the prevention of genocide and mass atrocities. By developing a framework to provide timely and accurate forewarning of the outbreak of genocide and mass atrocities, this project aims to fill an important gap in the policy toolkit and make a positive contribution to evidence based policy-making that will help Australia prioritise humanitarian emergencies and craft appropriate preventive strategies.

DP0986429 Prof ME Bialkowski; Dr AM Abbosh

Approved Project Title **Design of Planar Microwave Components and Sub-systems for Wideband Applications**

2009 : \$ 80,000
2010 : \$ 80,000
2011 : \$ 60,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Queensland

Project Summary

The present research proposal will support the development of the Australian wireless communication industries by providing them with new solutions of fully integrated low-profile and compact size wideband wireless sub-systems, as demanded by emerging wideband applications. This goal will be accomplished by applying a new technique to the design of planar microwave circuits. The proposed solution should lead to improved competitiveness of the Australian communication companies in a global wireless communications market.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985078 Dr WP Bowen; Prof HA Bachor; Dr N Treps

Approved Project Title **Universal quantum imaging**

2009 : \$ 140,000

2010 : \$ 110,000

2011 : \$ 110,000

Primary RFCD 2404 OPTICAL PHYSICS

Administering Organisation The University of Queensland

Project Summary

This project will integrate quantum technology with the rapidly advancing techniques of spatial light modulation utilised in LCD displays and video projectors. We will develop, for the first time, broadly versatile imaging technology based on quantum mechanics, enabling both important applications in future medical diagnostic devices and communication systems; and fundamental advances in the biological and quantum sciences. Quantum technologies offer the promise to revolutionise many aspects of modern life, from computing and communications, to medical imaging and metrology. This project will put Australia at the international forefront of quantum imaging, enhancing Australia's already significant international presence in the area.

DP0987146 Dr WP Bowen

Approved Project Title **Integrated microresonator based quantum technology**

2009 : \$ 200,000

2010 : \$ 155,000

2011 : \$ 155,000

2012 : \$ 110,000

2013 : \$ 110,000

Primary RFCD 2404 OPTICAL PHYSICS

QEII Dr WP Bowen

Administering Organisation The University of Queensland

Project Summary

We will develop new 21st century physical technologies able to control the microscopic quantum world. These quantum technologies will build off world leading techniques to confine and manipulate light on a silicon chip, and have broad ramifications for future computing, medical, and sensing systems. New quantum architectures will be developed for information science, promising vast improvements over current systems; and new biological sensing systems with world leading sensitivity will be implemented with important applications in the early detection of debilitating diseases. This research will raise Australia's profile as a world leader in science and technology, building on our already significant presence in quantum technology.

DP0988280 A/Prof RP Brown; Dr G Leeves

Approved Project Title **Determinants, Motives and Channels of Pacific Island Workers' Remittances from Australia**

2009 : \$ 120,000

2010 : \$ 40,000

2011 : \$ 27,000

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation The University of Queensland

Project Summary

This research will inform current policy debate on the benefits to migrant-sending communities of expanding migration opportunities for migrants from the Pacific islands through targeted worker schemes. Australian industry and agricultural employers are experiencing acute labour shortages while Pacific island governments are urging Australia and New Zealand to open their labour markets to low-skilled workers in the face of growing unemployment and political instability. The findings will also provide Australian foreign aid organisations with a better understanding of the way in which migrants' remittances are determined and migrant's interaction with money transfer agencies.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986838 Prof P Burn; Dr S Collins
Approved Project Title **Dendrimers: multidimensional sensors**
2009 : \$ 220,000
2010 : \$ 170,000
2011 : \$ 170,000
Primary RFCD 2505 MACROMOLECULAR CHEMISTRY
Administering Organisation The University of Queensland

Project Summary

The threat of terrorism is presented to us on a daily basis. Although there is often talk of dirty bombs, and biological and nuclear terrorism, the most easily sourced weapon of the terrorist is still the conventional explosive. As such the ability to detect trace amounts of compounds such as TNT or Semtex is required. This means that there is a real need for a portable detection system with the ability to reliably sense a specific explosive, selectively at low concentrations. This project concerns the development of new sensors that have potential to increase the nation's security.

DP0988294 A/Prof BJ Carroll
Approved Project Title **Genetic and molecular analysis of long-distance gene silencing in Arabidopsis**
2009 : \$ 145,000
2010 : \$ 100,000
2011 : \$ 100,000
Primary RFCD 2702 GENETICS
Administering Organisation The University of Queensland

Project Summary

Gene silencing is a surveillance mechanism in plants and animals to ensure that all genes are switched on or off at the right time. It is also a defence mechanism against viruses. Perturbation of gene silencing can be a cause of genetic diseases, and conversely, gene silencing has immense potential as a therapeutic tool for correcting genetic diseases and curing viral diseases. When silencing is triggered against a gene or virus in plants, genetic signals are transmitted throughout the organism to systemically switch off the specific gene or virus. Expected long-term national/community benefits from understanding gene silencing are wide-ranging, from improved crops through to drugs and gene therapy.

DP0984955 Dr M Cemazar
Approved Project Title **Molecular grafting methods for design of peptide therapeutics**
2009 : \$ 70,000
2010 : \$ 70,000
2011 : \$ 70,000
Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)
Administering Organisation The University of Queensland

Project Summary

This project has the potential to lead to major economic benefits to Australia via royalty returns from novel drugs. Extra economic benefits derive from a reduction in the cost of treatment of diseases. The development of a new Australian developed peptide drug thus has the potential to lead to multimillion dollar savings to the Australian economy. Finally the project will provide training in state-of-the-art drug design that will enhance Australia's pharmaceutical industry generally.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0984753 Dr LA Cheshire; Prof GA Lawrence; Prof Z Skrbis; Dr MJ Woods

Approved Project Title **Globally Engaged? Responses to Neoliberal Globalisation among Family Farmers in Australia**

2009 : \$ 40,000

2010 : \$ 100,000

2011 : \$ 40,000

Primary RFCD 3701 SOCIOLOGY

Administering Organisation The University of Queensland

Project Summary

The pursuit of free trade regimes often requires significant adjustment at the farm level, which can carry high costs, both for farm families and governments in the payment of farm adjustment monies. Presently, there is little understanding about how Australian farmers think about and act under the conditions of a neoliberal, globally competitive world market. The project provides a unique insight into the effects of, and responses to, these conditions among farmers. It will contribute to the international scholarship on globalisation and rural studies and will assist governments develop policies more sensitive to farmers' needs. It will also be the starting point for comparable research projects internationally.

DP0987680 Dr CJ Clarkson; Dr MD Petraglia; Dr NL Boivin

Approved Project Title **Assessing lithic evidence for the impact of the Toba super-eruption (74,000 years ago) on long-term cultural, biological and ecological histories on the Indian subcontinent**

2009 : \$ 59,000

2010 : \$ 57,000

2011 : \$ 54,000

Primary RFCD 3703 ANTHROPOLOGY

Administering Organisation The University of Queensland

Project Summary

Human evolution in India has significant implications for the origins of the first Australians, and will contribute to understanding our shared and recent common ancestry and the emergence of human diversity. This project demonstrates that Australia is committed to understanding the origins of modern humans and solving research problems within and beyond our geographic region. Australian archaeological innovations, when applied to global issues, will showcase Australian scientific expertise and achievements. The international collaborative nature of the project demonstrates Australian universities are engaged in high-profile research. The project will also train high-quality research students and create new collaborative initiatives.

DP0985029 Dr BM Collins

Approved Project Title **Endosomal Protein Transport: From Molecular Structures to Biological Function**

2009 : \$ 120,000

2010 : \$ 85,000

2011 : \$ 85,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Intracellular transport of biomolecules through the endosomal organelle is critical for normal cellular processes such as signalling, homeostasis and development. Defects in this fundamental process and subversion of it by bacterial and viral pathogens also lead to many different human diseases. This project will build on Australia's strong programme of structural and cellular biology research to develop key insights into endosomal trafficking at the molecular level. Outcomes from this work will place Australia at the forefront of international efforts to understand this essential biological process and will have important implications for future design of pharmaceuticals.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986619 Prof JJ Cooper-White; A/Prof JC Patterson-Kane; A/Prof SM Mahler; Dr GP Brooke

Approved Project Title **Stem cell-based interface tissue engineering**

2009 : \$ 140,000

Primary RFCD 3299 OTHER MEDICAL AND HEALTH SCIENCES

Administering Organisation The University of Queensland

Project Summary

Osteoarthritis (OA) causes extreme pain, disability, and reduced quality of life and overall productivity. It is the musculoskeletal disorder with the greatest social and economic implications internationally, with 9.3% of the adult population projected to suffer from OA by 2030. A tissue engineered product capable of functional repair of ligament-cartilage-bone tissue interfaces will have significant benefits. It will improve patient activity and quality of life, and significantly reduce OA-associated health care costs. This proposal will train a total of 12 new generation researchers in the emergent fields of stem cell biology and tissue engineering, having important benefits for the Australian scientific and industrial communities.

DP0985502 Dr SR Corrie; Prof MA Kendall; Prof C Anderson

Approved Project Title **Non-invasive diagnosis using micropatches that sample biomarkers from skin**

2009 : \$ 180,000

2010 : \$ 120,000

2011 : \$ 120,000

Primary RFCD 2999 OTHER ENGINEERING AND TECHNOLOGY

Administering Organisation The University of Queensland

Project Summary

We are developing a technology called the micropatch that is laid onto the surface of the skin. When the patch is pulled away, it retains proteins found in the subsurface skin layers. We believe that by analysing these proteins we will be able to diagnose diseases like cancer earlier and therefore have a better chance of treating them successfully. The process is painless, and doctors already use it to give drugs and vaccines. In the future we hope that our technology will be simple enough for routine diagnosis, even in the Outback where doctors are hundreds of kilometres away

DP0984390 Prof DJ Craik; Prof MA Anderson; Dr ML Colgrave

Approved Project Title **Discovery and applications of circular proteins**

2009 : \$ 350,000

2010 : \$ 240,000

2011 : \$ 285,000

2012 : \$ 200,000

2013 : \$ 205,000

Primary RFCD 2503 ORGANIC CHEMISTRY

APF Prof DJ Craik

Administering Organisation The University of Queensland

Project Summary

The many national benefits that will flow from this program include (i) new knowledge in plant biochemistry, peptide chemistry and protein engineering protected by a strong intellectual property position that will give Australia a competitive edge in relevant biotechnology applications; (ii) the training of a new generation of skilled researchers to drive a sustainable biotechnology sector in Australia; (iii) economic benefits from royalty returns on drugs and agricultural products that will likely arise from the program; (iv) environment benefits due to a reduced need for chemical insecticides; and (v) social benefits due to a reduction in suffering from diseases for which drugs are developed as a result of this program.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986281 Dr NL Daly

Approved Project Title **Nicotinic acetylcholine receptors as targets in inflammatory and neurodegenerative processes**

2009 : \$ 80,000
2010 : \$ 70,000
2011 : \$ 60,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The national/community benefits that are expected to arise from this research are economic and social in nature. The novel approach employed in this project to identify inflammatory pathways and regulation has the potential to provide information that is critical in the design of novel peptide/protein based drugs. With blockbuster protein-based drugs having sales in excess of \$10 billion per annum this proposal has the potential for very significant economic benefits for Australia. Furthermore, novel therapeutic agents for inflammatory diseases would have social benefits for Australia by decreasing the number of individuals affected and thereby reducing the physical and emotional stress associated with inflammatory diseases.

DP0985995 Prof BM Degnan; Dr SM Degnan; Dr A De Tomaso

Approved Project Title **The essence of being an animal: sponge allorecognition and the evolution of individuality**

2009 : \$ 170,000
2010 : \$ 170,000
2011 : \$ 180,000
2012 : \$ 170,000
2013 : \$ 180,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

APF Prof BM Degnan

Administering Organisation The University of Queensland

Project Summary

The human genome encodes the ability to recognise self from nonself at the cellular level. In medicine, this innate ability results in the rejection of transplanted (grafted) tissues from unrelated individuals. This project seeks to get to the evolutionary foundation of self-nonself recognition by studying this process in a simple and tractable model - a sponge from the Great Barrier Reef. Like humans, sponges reject cells and tissues derived from another individual. By defining the genetic basis of self-recognition in sponges we reveal the antiquity of this system and the core features of histocompatibility and immunity. Such insights can inform a range of regenerative medical pursuits.

DP0987969 Prof DD Do; Dr S Qiao; Dr GR Birkett

Approved Project Title **Synthesis of Unique Mesoporous Graphitic Carbons and their Application to Fundamental Problems in Adsorption Science**

2009 : \$ 100,000
2010 : \$ 90,000
2011 : \$ 100,000
2012 : \$ 150,000
2013 : \$ 160,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

ARF Dr S Qiao

Administering Organisation The University of Queensland

Project Summary

The development of synthesis techniques to create porous graphitic carbons with highly ordered pore structures, easily accessible pore volume and good electrical conductivity can underpin technological advancements in many industrial applications such as energy storage, removal of pollutants from exhaust streams, direct-methanol fuel cells and lithium ion batteries. Techniques developed in this project are also applicable to creating other materials important to advanced sensors and optoelectronics. The fundamental study of water adsorption and hysteresis using these carbons will help us create better models for adsorption. This will underpin theoretical studies, characterisation and optimisation of carbon materials into the future.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985232 Prof SC During
Approved Project Title **Anglicanism and the modernisation of English literary culture**
2009 : \$ 78,590
2010 : \$ 78,590
2011 : \$ 78,590
2012 : \$ 78,590
2013 : \$ 78,590
Primary RFCD 4202 LITERATURE STUDIES
APF Prof SC During
Administering Organisation The University of Queensland

Project Summary

This project significantly deepens our understanding of historical relations between religion and culture in the West. This is important in the current geopolitical situation where religion, culture and politics are so interconnected. More specifically, by offering an innovative account of how Anglicanism helped produce English culture, it helps us recognize that religion has played a formative role in shaping the secular modern forms and values that characterise Western cultures. Furthermore, it will help Australia become a research leader in a field of cultural studies and cultural history that is increasingly important to the humanities and social sciences globally.

DP0986932 Dr TL Duty; Prof GJ Milburn; Dr CA Holmes; Prof J Twamley; A/Prof S Rebic; Dr AS Parkins
Approved Project Title **Nonlinear quantum science with superconducting circuit quantum-electrodynamics**
2009 : \$ 250,000
2010 : \$ 180,000
2011 : \$ 180,000
Primary RFCD 2404 OPTICAL PHYSICS
Administering Organisation The University of Queensland

Project Summary

Circuit quantum electrodynamics has rapidly emerged in recent years as a new field of experimental quantum science, with applications to precision measurement, nanomechanical transducers and quantum information processing. We will design and demonstrate new experimental devices, grounded in a long-standing expertise in quantum optics, and enabled by a new low temperature laboratory under development at The University of Queensland. This project will deliver a new technological capability for Australia.

DP0986387 Dr PE Dux
Approved Project Title **The Ins and Outs of the Central Bottleneck**
2009 : \$ 105,000
2010 : \$ 65,000
2011 : \$ 105,000
2012 : \$ 58,943
Primary RFCD 3801 PSYCHOLOGY
APD Dr PE Dux
Administering Organisation The University of Queensland

Project Summary

Humans display severe capacity limitations at multiple levels of information processing. When considering, with modern technological advances, the amount of multitasking one is called upon to do in every day life (e.g., talking on a hands-free mobile phone device and driving) it is vital to understand what stages of information processing interfere with one another. The present work will extend our knowledge regarding which cognitive operations can be performed concurrently without impairment. In addition, it will help us better understand processing limitations that have been linked to a variety of clinical groups such as those suffering from schizophrenia and mood disorders.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987316 Dr AS Fairbairn

Approved Project Title **Agriculture and the Late Bronze Age collapse of the Hittite Empire**

2009 : \$ 61,090

2010 : \$ 52,050

2011 : \$ 37,130

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

Administering Organisation The University of Queensland

Project Summary

National benefit will be accrued through the major scholarly contribution the project makes to a key debate in world archaeology, namely the extent to which environmental change affected ancient complex societies, especially climate change. As such it fosters an awareness of world cultures and the interrelation between political stability and environmental change. The project also will encourage international collaboration between Australian, Turkish and Japanese scholars and will provide training for several research scholars in an area of archaeology in which Australia has a recognised major deficit, namely archaeobotany.

DP0985694 Prof MJ Gidley; Prof RG Gilbert; Dr P Castignolles

Approved Project Title **Establishing the relations between starch nano- and mesostructure and macroscopic physical properties**

2009 : \$ 220,000

2010 : \$ 190,000

2011 : \$ 190,000

Primary RFCD 2901 INDUSTRIAL BIOTECHNOLOGY AND FOOD SCIENCES

Administering Organisation The University of Queensland

Project Summary

Starch is the major energy component within human diets, and the most abundant polymer that can be readily extracted from annual crop plants, leading to many actual and potential industrial applications. There are major opportunities to optimise the nutritional value of starches in the human diet, and to enhance the properties of extracted starches as renewable alternatives to petrochemical polymers. This project will open up our understanding of the structure of starch polymers and show how this relates to important properties such as enzyme digestibility rates, leading to new opportunities for public health and commercial benefits.

DP0986043 A/Prof ID Godwin; Prof RG Gilbert

Approved Project Title **Factors controlling higher-level starch structure**

2009 : \$ 120,000

2010 : \$ 100,000

2011 : \$ 100,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

In a new paradigm for cereal chemistry, we will link structural and functional genomics to a mechanistic understanding of starch polymer structure. By using our novel characterization techniques, we will obtain the first data on the complex multiscale structure of starch in cereal grains that will be sensitive to the mechanisms of starch biosynthesis. These results will enable us to identify the genetic and environmental factors that, separately and together, control starch structure in a range of cereals. This knowledge will provide a powerful tool for plant breeders and biotechnologists to produce cereals with improved properties.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985025 Prof TJ Gonda; A/Prof RG Ramsay; Dr MA Brown

Approved Project Title **The MYB gene as a model for global transcriptional regulation: stopping, starting and looping**

2009 : \$ 120,000

2010 : \$ 120,000

2011 : \$ 120,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

This project will study how transcriptional elongation controls the MYB gene, a key regulator of normal and cancerous growth and regulation. There are three major benefits that are likely to flow from the proposed research. It will strengthen research in new and important areas of transcriptional regulation, by building research capacity in Australia in the area of gene expression, particularly with respect to transcriptional elongation and long-range regulation. It will highlight a new approach to the therapeutic targeting of MYB in cancer: data generated from this research may enable us to target MYB expression in a range of cancers including breast cancer by inhibiting transcriptional elongation. And it will provide training in advanced molecular biology to postdoctoral scientists and students.

DP0988754 Dr SM Grimmond; Prof JS Mattick

Approved Project Title **Sequencing the mammalian transcriptome in toto**

2009 : \$ 180,000

2010 : \$ 180,000

2011 : \$ 100,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

The mammalian genome projects have provided a huge leap forward for biological research by giving the framework to study genes on a global scale. This project will provide human genome project scale information for every major tissue in mammals and will provide the research community with a world class resource to further genomic research. It will also investigate parts of gene regulation which have been invisible to researchers in the past. Discovering these rules will provide novel insights in pathology with a genetic component and provide a further boost to biotechnological approaches to obtain expression of specific sets of genes in model systems.

DP0986893 Dr SA Haine

Approved Project Title **Fundamental tests of Quantum Mechanics with the Atom Laser.**

2009 : \$ 78,591

2010 : \$ 78,591

2011 : \$ 83,000

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

APD Dr SA Haine

Administering Organisation The University of Queensland

Project Summary

This is high profile scientific research that is important to Australia's standing in the world scientific community. Atom optics was singled out as a key area of Australian science through the formation of the ARC Centre for Quantum Atom Optics in 2003, and is in the Breakthrough Science category of the Frontier Technologies priority funding area. The experimental schemes developed in this proposal contribute to the already strong experimental atom optics research in Australia. In order to remain at the forefront of fundamental physics research, Australia must maintain a world-class research effort in this area.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987010 Dr RA Hall; A/Prof PR Young; A/Prof AA Khromykh; Dr NA Prow

Approved Project Title **Detection of imported exotic strains of West Nile virus for national biosecurity surveillance.**

2009 : \$ 110,000

2010 : \$ 90,000

2011 : \$ 90,000

Primary RFCD 2708 BIOTECHNOLOGY

APD Dr NA Prow

Administering Organisation The University of Queensland

Project Summary

West Nile virus (WNV) is transmitted by mosquitoes and causes a fatal disease of the brain in animals and humans. WNV is currently exotic to this country, however a closely related, but benign cousin of this virus (Kunjin) can be found in Northern Australia. Currently it is very difficult to differentiate between infections with WNV and Kunjin using standard laboratory tests, therefore it will be difficult for public health officials to detect WNV if it is introduced to Australia. In this project we aim to develop more accurate laboratory tests to detect infections with the deadly, exotic WNV using new strategies.

DP0987452 Prof IJ Hayes; Prof Dr CB Jones; Prof A Burns; Prof KL Clark

Approved Project Title **Combining Time Bands and Teleo-Reactive Programs for Advanced Dependable Real-Time Systems**

2009 : \$ 110,000

2010 : \$ 80,000

2011 : \$ 100,000

Primary RFCD 2803 COMPUTER SOFTWARE

Administering Organisation The University of Queensland

Project Summary

Society is becoming increasingly reliant on sophisticated real-time computer systems in applications ranging from car stability control to critical infrastructure, such as railway signalling systems. Further, there is a demand for ever greater automation and sophistication in the software controlling these systems. The research challenge in this project is to provide robust implementations of these systems in a way that allows one assess their dependability.

Australia industry is actively working in these areas through companies like Ansaldo Australia, in automated railway systems, and Boeing Australia, in the defence sector.

DP0987727 Prof BW Head; Prof H Ross

Approved Project Title **Collaboration as a solution to wicked public policy problems: the example of regional environmental and natural resources policy in Australia**

2009 : \$ 78,000

2010 : \$ 74,000

2011 : \$ 70,000

Primary RFCD 3602 POLICY AND ADMINISTRATION

Administering Organisation The University of Queensland

Project Summary

This project contributes to the water national priority by assessing two major national programs to improve Australia's land and water management through innovative collaboration models. It examines whether new collaborations between governments and NGO stakeholders, together with the creation of numerous regional bodies, are likely to achieve better outcomes than the previous regulatory models. The project will enhance public policy models through analysis of the strengths and limitations of the new program approach. Problems and prospects at the national, state and regional levels will be assessed including how different forms of collaboration are linked to effective and accountable institutional arrangements.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0988039 Prof O Hoegh-Guldberg; Dr JE Williamson; Prof JN Havenhand; Dr S Ward; Dr G Diaz-Pulido; Dr DI Kline; Dr VJ Hernaman

Approved Project Title **The impact of ocean acidification on the fertilization, larval development and recruitment of key Australian marine organisms.**

2009 : \$ 170,000
2010 : \$ 125,000
2011 : \$ 125,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of Queensland

Project Summary

This work will define the potential vulnerability for Australian marine ecosystems that arises from the rapid acidification of Australia's coastal environments by rising atmospheric carbon dioxide. Our preliminary data suggest that the early life history stages of a wide range of marine species are very sensitive to the impact of ocean acidification. At present, almost nothing is known about the impacts and implications of these changes. Without this knowledge, however, we are in a poor position as a nation to respond and adapt to these changes. We plan to explore this vulnerability for Australian marine organisms and develop a detailed understanding of its implications for Australia's marine ecosystems and associated industries.

DP0985624 Dr M Hong

Approved Project Title **Geometric partial differential systems and their applications**

2009 : \$ 100,000
2010 : \$ 90,000
2011 : \$ 90,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of Queensland

Project Summary

This proposal addresses questions central to the understanding of nonlinear partial differential systems from classical, quantum field theory and liquid crystals. Applications to physical problems such as the Yang-Mills flow, Faddeev's model and liquid crystal systems are of great interest and importance in the broader scientific community. The project will yield internationally significant results in theoretical mathematics, with applications in physics and other sciences. Specialist training will be provided for Australia's next generation of mathematicians. This project will enable Australian researchers to stay at the forefront of research in this area, strengthening links with a number of world-leading mathematicians.

DP0984522 Prof H Hu; Prof A Griffin; Dr E Taylor; Prof JE Thomas

Approved Project Title **Ultracold atomic Fermi gases in the strongly interacting regime: A new frontier of quantum many-body physics**

2009 : \$ 127,000
2010 : \$ 127,000
2011 : \$ 127,000
2012 : \$ 125,000
2013 : \$ 125,000

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

QEII Prof H Hu

Administering Organisation The University of Queensland

Project Summary

Ultra-cold atoms are one of the most rapidly developing areas in twenty-first century physics. The scientific importance of studying strongly interacting Fermi gases is indicated by the fact that five Nobel prizes in physics have been awarded in fields relevant to ultra-cold atoms in the last decade. Australia is now developing a reputation for world-class research in this new area, with new cold-fermion experiments now underway in Melbourne. This project will build national and international cooperation in this field, provide world-class research training opportunities and advance Australia's leadership position. As well as improving scientific understanding, it has the potential to lead to new energy-saving technologies in future.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985830 Prof MS Humphreys; Dr JM Tangen; Prof TB Cornwell; Prof JR Vokey; Prof JM Pearce

Approved Project Title **Learning and Deciding Under Low Levels of Awareness: Representation Issues and Memory Processes**

2009 : \$ 55,000

2010 : \$ 56,000

2011 : \$ 58,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Human decision making is frequently sub-optimal and can be influenced by factors of which we are only dimly aware. At times, this sub-optimality produces large social, economic, and health costs. We address decisions made under low levels of awareness including those typically influenced by advertising and other marketing activities, such as pairing brands with images of attractive people. We examine the cognitive processes invoked by this pairing in order to determine how it competes with the provision of factual information. We aim to improve decision making in areas such as food choice and consumer understanding, as well as provide the knowledge base to support policy for regulating marketing communications.

DP0986880 Dr A Iyer; Dr MJ Hornsey; Dr J Vanman

Approved Project Title **Emotional and political reactions to representations of terrorism**

2009 : \$ 46,000

2010 : \$ 41,000

2011 : \$ 33,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

This project offers the first systematic account of Australians' responses to representations of terrorism, including terrorists' persuasion messages and images of terrorism. It will advance the priority goal of understanding how Australians engage with the global environment. The project also identifies the psychological processes underlying responses to terrorist persuasion and terrorism images. Results will contribute to the development of effective counter-terrorism education strategies, which will enhance our ability to anticipate and tackle critical threats to Australian society. The findings will also help editors and media directors develop strategies to ensure balanced coverage of terrorism.

DP0984576 Prof J Jetten; Dr A Iyer; Prof NR Branscombe

Approved Project Title **When groups perceive the discrimination they receive as legitimate: Consequences for well-being and collective action**

2009 : \$ 61,000

2010 : \$ 46,000

2011 : \$ 65,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Our current theorizing cannot inform us about the antecedents and consequences of perceiving discrimination as legitimate (e.g., ageism, singelism). There is an urgent need to examine these issues because being confronted with legitimate group discrimination has important consequences for mental health and group functioning. The unique value of the research lies in addressing an important hidden social problem that groups face in everyday society and its outcomes will inform policy development. In addition, the research helps to advance Australia's intellectual leadership position in this area, provides research training and strengthens existing collaborative networks.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987152 Prof B Key

Approved Project Title **Assessing gene function in the developing brain using zebrafish as a model system**

2009 : \$ 120,000

2010 : \$ 90,000

2011 : \$ 100,000

Primary RFCD 2705 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

As the average life expectancy in western countries rises there is an increasing incidence of mental health problems. Therapeutic approaches to both Alzheimer's and Parkinson's disease, as well as to brain injury following stroke, rely on a thorough understanding of how the brain develops. This is consistent with the everyday principle that if you want to fix something that is broken, then you need to understand how it is put together in the first place. This project seeks to understand how the normal brain is wired together in the embryo and, in doing so it will expose novel targets for therapy in the aged.

DP0984827 Prof B Kobe; Dr PN Dodds; Dr JG Ellis

Approved Project Title **Molecular basis of the interaction between plant disease resistance proteins and pathogen avirulence proteins**

2009 : \$ 100,000

2010 : \$ 100,000

2011 : \$ 100,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Management of crop diseases involves the integrated use of resistant cultivars and the application of chemical pesticides. Many diseases, however, including rust, continue to pose an economically significant threat to agricultural productivity in Australia. The research outlined in this proposal aims to understand the mechanisms, at a molecular and structural level, that enable resistant plants to detect and respond to pathogen attack. The outcomes of this currently unavailable fundamental understanding will enable new, durable and more effective resistance genes to be engineered. Therefore, the work has significant economic and environmental implications for agricultural crop plant productivity in this country.

DP0985177 Dr DP Kroese

Approved Project Title **Improved Monte Carlo Methods for Estimation, Optimisation and Counting**

2009 : \$ 170,000

2010 : \$ 100,000

2011 : \$ 120,000

2012 : \$ 180,000

2013 : \$ 150,000

Primary RFCD 2302 STATISTICS

APF Dr DP Kroese

Administering Organisation The University of Queensland

Project Summary

The project will benefit the Australian society by building the theoretical and methodological foundations for the next generation of Monte Carlo techniques. The advancement of the knowledge in this area will provide important tools for solving complex estimation, optimisation and counting problems in engineering, statistics, computer science, mathematics and the physical and life sciences. As a result it will generate a competitive advantage for various sections of the Australian industry, including telecommunications, biotechnology and finance. The project will enable Australian researchers to continue to work at the forefront of this fast moving and exciting area of international research.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987005 Prof MF Lavin; Dr GW Birrell

Approved Project Title **A novel role for SMG-1 protein kinase in stress granule formation and the stress response.**

2009 : \$ 110,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Humans are constantly exposed to agents in the environment that threaten the integrity of their cells and increases the risk of cancer and other pathologies. Cells have developed repair mechanisms to cope with damage to their DNA and avoid long term effects. The emphasis in this application is to investigate the mechanisms by which stress affects the transcriptional machinery in the cell. A description of the processes involved will assist in understanding how specific disease states arise and will provide a means of devising compounds/drugs to assist the response to stress.

DP0988718 Prof L Li; A/Prof DA Lockington; Dr BR Gibbes; Prof DS Jeng

Approved Project Title **Multiphase flow and transport in complex coastal wetland systems**

2009 : \$ 130,000

2010 : \$ 90,000

2011 : \$ 70,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Salt marshes play an essential role in maintaining Australia's coastal bio-diversity. They also function as barriers to fluxes of terrestrial pollutants to our coastal sea. Australia has a large number of salt marshes listed by the Ramsar Convention as coastal wetlands of international importance but many of them are subject to loss and degradation due to competing land uses. This project, examining in detail the flow and transport processes in marsh soils, will lead to (1) better understanding of the marsh's response to anthropogenic stress; and (2) improvement of strategies and methods for marsh wetland preservation and restoration.

DP0985578 Dr S Liu; Prof Dr Z Shao

Approved Project Title **Methane Coupling Using Mixed Conducting Catalytic Ceramic Hollow Fibre Membrane Reactor**

2009 : \$ 110,000

2010 : \$ 80,000

2011 : \$ 90,000

Primary RFCD 2906 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The Gas product industry is one of the most important economic sectors in Australia, employing 10000 people with market value of \$ 100 billion per year from power generation and LNG export. However, there are increasing concerns over issues of the green house gases emission and petroleum dwindling. This project addresses the technology needs in converting natural gas to more useful chemicals via a more efficient and cleaner means of methane utilization. The project target is to make the natural gas resources in Australia to delivery high value products with considerable economic benefits and increased employment opportunities.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986942 Dr SD Loft; Prof RW Remington

Approved Project Title **How attention and memory for past events interact in determining performance in an air traffic control conflict detection task**

2009 : \$ 91,000

2010 : \$ 52,000

2011 : \$ 65,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

This project addresses the priority of safeguarding Australian transportation systems because it concerns failures of attention or memory as sources of human error in aviation. Outcomes will inform the development of training exercises aimed at improving attention management skills critical to safe performance. The research will strengthen Australia's reputation for cutting edge research that extends basic science to applied domains, as this project is one of few world-wide investigating attention and memory processes in multi-item display tasks. More broadly, the project will provide insight into why individuals can make errors when basing decisions on past experience.

DP0986179 Dr CE Lovelock; Dr JM Pandolfi

Approved Project Title **Development of a theoretical framework for predicting responses of coral reef ecosystems to nutrient enrichment and herbivory**

2009 : \$ 100,000

2010 : \$ 70,000

2011 : \$ 70,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of Queensland

Project Summary

Australia relies greatly upon its rich natural environmental resources for goods and services and for economic growth (tourism, fisheries, and recreational industries). Our work on the Great Barrier Reef will provide a fresh perspective on the influence of nutrient pollution on corals and seaweeds. We will use new models to understand the sensitivity of reef organisms to nutrient enrichment. Our results will substantially enhance our ability to manage coral reef resources with climate change and increasing nutrient influx from urban or agricultural activities, underpinning a key National Research Priority.

DP0985834 Dr JP Macarthur; Dr AS Leach; Dr M Delbeke

Approved Project Title **The Baroque in Architectural Culture, 1880-1980**

2009 : \$ 98,000

2010 : \$ 90,000

2011 : \$ 83,028

Primary RFCD 3101 ARCHITECTURE AND URBAN ENVIRONMENT

APD Dr AS Leach

Administering Organisation The University of Queensland

Project Summary

This project will show the significance of historical architecture in the present day, and lead to better understanding of the cultural role of building. It will enhance the reputation of Australian research on the architectural history of early modern Europe, and on issues of historical method. It will train emerging researchers and develop a research environment for further research on this field. The project will foster international connections and collaborations and support the publication of internationally relevant research.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987043 Mr AK Malde

Approved Project Title **Development of methodology for high throughput free energy calculations in drug design applications.**

2009 : \$ 100,000
2010 : \$ 79,000
2011 : \$ 80,000

Primary RFCD 2506 THEORETICAL AND COMPUTATIONAL CHEMISTRY

APD Mr AK Malde

Administering Organisation The University of Queensland

Project Summary

The aim of the project is to develop a high throughput computational screening protocol for use in fragment-based drug design. The method will have universal applications to any plausible and available drug targets. The method will accelerate drug discovery on the targets associated with diabetes, obesity, dengue, skin cancer, etc., which are the primary disease focus of Australia. Australia as a whole and the University of Queensland in particular have invested heavily in various drug discovery programs, this will be of direct benefit to the ongoing research within Australia.

DP0985866 Dr RD Marcotte

Approved Project Title **Soul Searching in the Islamic East: Self-knowledge and the Avicennan Legacy in the 13th Century Islamic East**

2009 : \$ 60,000
2010 : \$ 45,000
2011 : \$ 60,000

Primary RFCD 4402 RELIGION AND RELIGIOUS TRADITIONS

Administering Organisation The University of Queensland

Project Summary

By deepening our understanding of the philosophical tradition of the Islamic world, this project will 'enhance Australia's capacity to interpret and engage with its regional environment through a greater understanding of languages, societies and cultures' (Research priority 4: Understanding our region and the world), an understanding so much needed in Australia's increasingly pluralistic society. The pure research aspect of this project will attract attention to Australian based research in Medieval and studies and Arabic philosophy that is of international quality, contribute to the reputation of Australia's high quality research capability, and open new possibilities for international cooperation in the field.

DP0988851 Prof JS Mattick; Dr SM Grimmond

Approved Project Title **Discovery and characterization of new classes of small regulatory RNAs in mammals**

2009 : \$ 210,000
2010 : \$ 190,000
2011 : \$ 200,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

The project will reaffirm and enhance Australian leadership in the most rapidly developing area of molecular biological and genetic research, by the application of ultra high-throughput sequencing technologies to discovery of regulatory RNAs, thereby to identify the characteristics of important regulatory pathways that underpin mammalian development, brain function and species diversity. The results of this research will have wide implications and applications in biotechnology, genetic engineering, animal breeding, medical science and advanced informatics.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986578 Prof AG McEwan

Approved Project Title **NmlR-dependent thiol-based redox systems and their role in global stress responses in bacteria**

2009 : \$ 120,000
2010 : \$ 90,000
2011 : \$ 90,000

Primary RFCD 2703 MICROBIOLOGY

Administering Organisation The University of Queensland

Project Summary

All cells sense changes to their environment and respond by altering their metabolism. A major environmental change is oxidative stress which damages cells. Cells have the ability to sense oxidative stress and alter metabolic processes to defend against the damage that it elicits. This proposal will characterize a novel oxidative stress defense system that is found in a number of bacterial pathogens that need to defend themselves against attack by the host. The project may identify new ways to manage these bacterial pathogens. It may also provide an insight into oxidative stress defense processes that are linked to pathologies in humans.

DP0985024 Dr FH Meakins

Approved Project Title **Life after death: Exploring the birth of Gurindji Kriol, a new Aboriginal mixed language.**

2009 : \$ 81,375
2010 : \$ 65,093
2011 : \$ 81,043
2012 : \$ 65,593

Primary RFCD 3802 LINGUISTICS

APD Dr FH Meakins

Administering Organisation The University of Queensland

Project Summary

Considerable attention is currently being directed towards the problems faced by Indigenous people living in remote communities. Just how best to help the younger generations emerge from the cycle of poor health and education standards is the topic of many debates in contemporary Australian society and politics. This project addresses the issue of what it is to be a modern Indigenous person and how this identity is expressed linguistically. In understanding more clearly what it means to be a modern Indigenous person, communication channels between mainstream Australia and Indigenous communities can be improved.

DP0987669 A/Prof FA Meunier; Dr NA Lavidis

Approved Project Title **Sustaining neuronal communication through bulk endocytosis**

2009 : \$ 150,000
2010 : \$ 60,000
2011 : \$ 60,000

Primary RFCD 3207 NEUROSCIENCES

Administering Organisation The University of Queensland

Project Summary

Brain activities such as learning and memory rely on the ability of neurons to communicate. This research will improve our understanding of how synaptic vesicles recycle during periods of intense synaptic activity. This is a fundamental process relevant to neuronal communication, insulin release, hormone secretion, and allergic responses in health and disease and therefore has broad significance. This work will enhance Australia's existing strength in cell biology and neuroscience and provide high quality training for an undergraduate student and post-doctoral scientist.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985215 A/Prof MJ Monteiro; Dr NA McMillan

Approved Project Title **Engineered Polymer Nanoparticles: A Potent Weapon Against Cancer**

2009 : \$ 140,000

2010 : \$ 130,000

2011 : \$ 130,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

Cervical cancer is the commonest cause of cancer death in women under the age of 50 worldwide, the 8th most common cancer among women in Australia, and is the leading cause of cancer death in Aboriginal women. While a vaccine is available to prevent HPV-mediated disease, it would not impact upon death rates for at least 25 years. The systemic delivery of RNAi offers the best opportunity to solve this problem. The delivery devices will be designed with precision and function to meet the delivery needs in vivo. These polymer structures will be suitable for use in drug and gene delivery providing Australian products with advanced features and capabilities, significantly improving product performance.

DP0987315 A/Prof MJ Monteiro; Prof V Percec

Approved Project Title **Designer Nanoreactors: An Environmentally Friendly Solution for Polymer Synthesis**

2009 : \$ 160,000

2010 : \$ 150,000

2011 : \$ 150,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The advanced materials made from the designer nanoreactors developed in this project will be high value-added products made from cheap materials with much greater design capacity for a wide range of applications. The knowledge gained from this project will have potential applications in many areas where polymer materials are used, including high strength coatings, conducting coatings for the electronic industry, degradable drug and vaccine nanodelivery devices, tissue scaffolds, and gene delivery. These polymers will provide Australian Industry with advanced features and capabilities, significantly improving product performance.

DP0985317 Dr Y Mu; Prof J Keller

Approved Project Title **Biotransformation and biodegradation of organic nitrogen compounds from wastewater in bio-electrochemical systems**

2009 : \$ 200,000

2010 : \$ 160,000

2011 : \$ 160,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

APD Dr Y Mu

Administering Organisation The University of Queensland

Project Summary

The rapid emergence of water recycling in Australia requires more vigilant control of pollutants that are discharged to sewers. This project will develop a novel, cost-effective process to remove organic nitrogen compounds (and likely other organics) present in many industrial wastewaters. It could provide an excellent solution for the pre-treatment of such industrial wastewaters at the source without any chemical addition, hence reducing the challenge and risks facing the water recycling plants. This innovative technology will further expand the growing research capacity and know-how in water recycling in Australia.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985662 Prof HB Muhlhaus; Dr JF Grotowski; Dr GP Chitombo; Dr H Hermann

Approved Project Title **The Influence of particle shape fragmentation and compaction on 3D hopper flow**

2009 : \$ 202,000

2010 : \$ 168,000

2011 : \$ 168,000

Primary RFCD 2907 RESOURCES ENGINEERING

Administering Organisation The University of Queensland

Project Summary

According to world-leading material scientist Patrick Richard, "Granular materials are ubiquitous in nature and are the second-most manipulated material in industry (the first one is water)". Our research will produce massive three dimensional computer simulations predicting and analysing the influence of particle size and shape on the morphology of industrial and natural granular flows. The results will have directly and immediately relevant applications in a range of Australian industries, including mass mining and minerals processing and will further make a major contribution to understanding and modelling a variety of geo-hazards.

DP0985079 Prof AV Nguyen; Dr GR Birkett

Approved Project Title **Molecular phenomena and engineering of saline water-air interfaces**

2009 : \$ 110,000

2010 : \$ 110,000

2011 : \$ 110,000

Primary RFCD 2907 RESOURCES ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Saline water use in Australia's mining, agricultural, and drinking water industries is increasing. Many of the production processes of these industries are underpinned by many complex molecular phenomena and interactions at the saline water - air interfaces which we want to understand, optimise and design. The findings will have direct benefits in the field of flotation used to recover valuable minerals using hyper-saline bore water and to produce drinking water from seawater by desalination. This project is important because it will lead to sustainable ways of producing water and using water in industry. Its success will ensure that our industries remain at the forefront of innovation and are globally competitive.

DP0986172 Dr D Ortiz-Barrientos; A/Prof PB Mather; Prof Dr LH Rieseberg

Approved Project Title **Does divergent natural selection drive the early stages of speciation?**

2009 : \$ 70,000

2010 : \$ 70,000

2011 : \$ 70,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of Queensland

Project Summary

Australia is a megadiverse country containing more than one million species, including many endemic and endangered species. Nonetheless, human driven activities, including climate change and the introduction of invasive pests, threaten Australia's biodiversity and economic wealth. This project will test how species diversify in response to environmental differences and will provide resources to compliment efforts to better understand the destructive effects of interbreeding between native and invasive plants. Information on the role of the environment on the origin of new species will help us manage Australia's unique biodiversity. This project will provide research training opportunities in ecology, genetics, and molecular biology.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986175 Dr D Ortiz-Barrientos; Dr E Baack

Approved Project Title **Speciation and the breakdown of coevolution during hybridisation**

2009 : \$ 41,000

2010 : \$ 90,000

2011 : \$ 90,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of Queensland

Project Summary

The preservation of Australia's biodiversity depends on understanding its origins and the mechanisms that prevent its disappearance. Interacting genes, such as those coding for the machinery of the cell, evolve together and can prevent the fusion of species during hybridisation. This occurs because the cellular machinery evolves independently in different species, leading to incompatible parts that fail in hybrids. This project will investigate novel genetic mechanisms that lead to reduced hybrid survival and reproduction, and therefore to the preservation of species. Australian students will receive advanced training at the frontier where ecology, genetics, and molecular biology intersect.

DP0984209 Dr AE Rafferty; Dr SL Restubog

Approved Project Title **The two faces of leadership: Constructive and destructive leadership and their consequences for employees**

2009 : \$ 40,000

2010 : \$ 40,000

2011 : \$ 40,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

This proposal is designed to strengthen Australia's social and economic fabric by enhancing understanding of the impact of both constructive and destructive leadership on follower and organisational outcomes. This research enables us to identify ways in which organisations can reduce tangible (e.g., low production levels, reduced performance) and intangible losses (e.g., reduced psychological health), which have wider societal implications. Our focus on developing a training program to build constructive leadership and minimise destructive leadership is a key strategy designed to promote a healthier and more productive work environment.

DP0988072 Dr AD Rakic; Dr SJ Wilson; Prof TM Bosch

Approved Project Title **Biomedical Applications of Self-Mixing Sensors based on Vertical-Cavity Surface-Emitting Laser Arrays**

2009 : \$ 175,000

2010 : \$ 135,000

2011 : \$ 135,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Queensland

Project Summary

The Vertical-Cavity Surface-Emitting Laser (VCSEL) is a new optical device of choice for high speed optical data networks. We propose that this communications technology can be used as a platform to develop a completely new family of sensors ideally suited to medical monitoring. Specifically, we will develop VCSEL based technology for measurement of heart activity and sensing of blood flow in skin and tissues. This will provide novel sensors for heart monitoring and imaging, and management of skin disorders (burns and cancer).

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0985813 Prof DP Rao; Dr AN Rambaldi; Dr HE Doran

Approved Project Title **Construction of Consistent Panels of Real Gross Domestic Product and its Components at Current and Constant Prices**

2009 : \$ 130,000

2010 : \$ 115,000

2011 : \$ 110,000

2012 : \$ 67,934

2013 : \$ 166,618

Primary RFCD 3404 ECONOMETRICS

APF Prof DP Rao

Administering Organisation The University of Queensland

Project Summary

The Australian government, international organizations, private sector and academic researchers will find from this project a wealth of economic information on Australia, its geographical neighbours and trading partners which can be used in assessing Australia's economic performance and role in a global context. This project will result in internationally comparable real income, consumption, investment and government expenditures spanning all years since 1950 and covering over 180 countries based on an econometric methodology that is superior to those currently in use. Successful completion of the project will place the research team, the University of Queensland and Australia on the international map.

DP0984643 A/Prof LJ Richards

Approved Project Title **Specialized glial cells within the hippocampus of the brain regulate important morphological events in embryonic development**

2009 : \$ 153,000

2010 : \$ 148,000

2011 : \$ 153,000

2012 : \$ 153,000

2013 : \$ 153,000

Primary RFCD 3207 NEUROSCIENCES

Administering Organisation The University of Queensland

Project Summary

Memories of past experiences, and our ability to learn new information, is processed in a region of the brain called the hippocampus. In order for this to occur, the cells that make up the hippocampus must form correctly during embryonic development. This proposal investigates the cellular and molecular mechanisms regulating hippocampal formation. The national benefit of this work is to provide basic knowledge about the processes that underlie correct brain formation and function, and to understand what processes are disrupted when the brain fails to function correctly. Such disruptions lead to mental retardation and learning difficulties, and in the aged, an inability to form and store new memories, as occurs in dementia.

DP0985145 Dr RL Rietze; Prof Dr MJ Waters

Approved Project Title **Identifying the pathways employed by growth hormone to regulate the proliferation of adult neural stem cells**

2009 : \$ 180,000

2010 : \$ 150,000

2011 : \$ 150,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

As stem cells underpin the maintenance and regeneration of the brain and are known to decline in number and competence with age; understanding exactly how these cells are regulated is of broad national benefit. Furthermore, given the regulatory role of growth hormone throughout the body, insights gained from this project should lead to the discovery of novel therapeutic targets both within and outside the nervous system, ultimately leading to preventative and restorative strategies for maintaining good health. Finally, this Proposal is of significant national benefit as it will undoubtedly advance our knowledge base in stem cell biology, helping to maintain Australia as a global leader in stem cell research.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986762 Dr G Rosenbaum

Approved Project Title **Origin of the New England contorted mountain belt: implications for plate tectonics, magmatism and mineralisation**

2009 : \$ 80,000

2010 : \$ 80,000

2011 : \$ 80,000

Primary RFCD 2601 GEOLOGY

Administering Organisation The University of Queensland

Project Summary

The southern New England mountain chain in eastern Australia is characterised by a tight curved geometry. This research will reconstruct the formation of these, hitherto unexplained, mountain curves, unravelling their driving mechanisms and tectonic processes. Results will provide a plate tectonic model for the formation of economic resources, thus facilitating future discoveries of ore deposits in the New England belt, or energy resources in the associated sedimentary basins. The project will foster a pool of highly trained professionals and researchers in the fields of structural geology and tectonics, and will enhance Australia's scientific reputation, maintaining its leading international standing in plate tectonic research.

DP0985142 Prof H Rubinsztein-Dunlop; Prof NR Heckenberg; Dr SA Haine; Prof GJ Milburn; Dr KP Helmerson; Prof CM Caves

Approved Project Title **Superfluidity and metrology with ring shaped Bose-Einstein condensates**

2009 : \$ 246,000

2010 : \$ 224,000

2011 : \$ 165,000

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

Administering Organisation The University of Queensland

Project Summary

This proposal will answer a fundamental question about superfluidity, expanding our understanding of quantum many-particle systems. Australia excels in the fields of ultra-cold gases and quantum physics, and this proposal will further strengthen our international standing in these flagship areas of modern physics. The project will train a number of students in high-level technology and computing skills that are in high demand in our growing knowledge-based economy. Improved understanding of how Bose-Einstein condensates behave will assist in their development as sensitive measurement devices, with possible intellectual property benefits in the future as we learn to tame these unique systems.

DP0986791 Prof V Rudolph; Dr AP Radlinski; Dr P Massarotto; Dr MM Abdel-jawad

Approved Project Title **Anisotropic behaviour of coal for coalbed methane recovery and CO2 geosequestration**

2009 : \$ 200,000

2010 : \$ 150,000

2011 : \$ 140,000

Primary RFCD 2906 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Amongst the cheapest and safest options for clean energy are to use natural gas from coal seams for electricity and fuel production and then permanently store carbon dioxide within the depleted seams. This requires information about the underground behaviour of coal at a level of detail which is not available. In particular, the directional and dynamic response of coal to changes in pressure, stress and gas interactions is required, which is the subject of this project. Coal bed methane is rapidly growing into a multi-billion dollar industry for Australia. The geosequestration of carbon dioxide in deep coal is widely recognised presenting a secure and economical opportunity for greenhouse gas control.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986042 Prof GB Schaffer; Dr M YAN; Dr Q Ma; Prof J Xu

Approved Project Title **The fabrication of amorphous metallic components by powder injection moulding.**

2009 : \$ 300,000

2010 : \$ 225,000

2011 : \$ 225,000

Primary RFCD 2913 METALLURGY

APD Dr M YAN

Administering Organisation The University of Queensland

Project Summary

This project has both national and international significance and addresses the National Research Priority: Frontier Technologies - Advanced Materials (light alloys). It represents new science and innovative engineering and has the potential to produce valuable new intellectual property. The project will contribute to emerging Australian expertise in both bulk metallic glasses and powder injection moulding. It will train postgraduate students in powder processing, sintering science, metallic glasses and electron microscopy.

DP0986292 Dr G Schenk; Dr RP McGeary; Dr LW Guddat; A/Prof LR Gahan; Prof AC Hengge

Approved Project Title **Structure-based design of anti-osteoporotic drug leads: an integrated approach**

2009 : \$ 150,000

2010 : \$ 100,000

2011 : \$ 100,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

One of the major consequences of Australia's aging population is that age-related diseases, such as osteoporosis, are increasing. Apart from the significant human suffering caused by this disease, there is an immense financial burden on the community, patients and their families. Current treatments for osteoporosis are often ineffective and also have major side-effects. An enzyme has been identified which plays a crucial role in the progression of this disease by increasing the rate of bone-thinning. We will make compounds to slow down this enzyme. This project will provide the basis for the future development of new and improved drugs to treat osteoporosis.

DP0986495 Dr S Schmidt; Prof D Rentsch; Prof TL Nasholm; Dr S Robatzek

Approved Project Title **Towards sustainable bioproduction systems: harnessing organic nitrogen for plant growth**

2009 : \$ 120,000

2010 : \$ 50,000

2011 : \$ 50,000

Primary RFCD 2704 BOTANY

Administering Organisation The University of Queensland

Project Summary

It is of great concern that over 50% of nitrogen fertiliser applied to crops is lost to the environment, resulting in a large environmental footprint and greenhouse gas emission. Future farming systems have to reduce nitrogen fertiliser use but this threatens crop and biofuel production. Alternatives to man-made nitrogen fertilisers are crop residues and organic materials which are more stable in soils but less available to plants. How plants can best access organic nitrogen will be explored, based on our recent discovery that plants can use protein as a nitrogen source for growth. The project will produce essential knowledge for nitrogen-efficient bioproduction.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987273 Dr HT Shen; Dr W Wang

Approved Project Title **Effective and Efficient Video Search**

2009 : \$ 100,000

2010 : \$ 60,000

2011 : \$ 60,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation The University of Queensland

Project Summary

This project will add a much desired level of sophistication to the current data management and search technologies. Success of this project will not only establish us as an internationally leading research group but also bring significant economic and social benefits to Australia. Many Australia organizations specializing in media communication, entertainment, management and services will be benefited by saving enormous cost, improving service quality, protecting their intelligence properties, etc. It will also advance Australia's intellectual leadership in copyright compliance, benefit commercialization of research results, form strong international collaborations and networks, and underpin the National Research Priority.

DP0987639 Prof B Sherman; Dr CG Lawson; Dr M Rimmer; Ms LG Wiseman

Approved Project Title **Promoting Plant Innovation in Australia: maximising the benefits of intellectual property for Australian agriculture**

2009 : \$ 130,000

2010 : \$ 96,000

2011 : \$ 80,000

Primary RFCD 3901 LAW

Administering Organisation The University of Queensland

Project Summary

The development of new plant varieties is crucial to the ongoing competitiveness and sustainability of Australian agriculture. It also has wider social, cultural and economic consequences. Intellectual property laws have the potential to promote and hinder the developments of new plant varieties. In recent years there has been a shift towards the use of patents to protect plant innovations: a trend which has the potential to transform existing research and development arrangements and industry practices in Australia. By providing policy-makers and stakeholders with recommendations on how to respond to and manage these changes, the project will promote plant breeding in Australia and also enhance the sustainability and competitiveness of Australian agriculture.

DP0985969 A/Prof VP Slaughter; Dr M Nielsen; A/Prof T Suddendorf

Approved Project Title **Charting the prevalence, time course and social-cognitive correlates of neonatal imitation.**

2009 : \$ 113,000

2010 : \$ 100,540

2011 : \$ 114,662

2012 : \$ 20,000

2013 : \$ 120,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Imitation is something that we do naturally and often. However, because the necessary research has not been done, it remains controversial whether or not humans can imitate from birth and what role this may play for later developments. The proposed research aims to settle these issues through a comprehensive, longitudinal study of infant imitation and its relation to later-developing social skills. A training condition will examine the viability of potential early interventions aimed at promoting social responding in infants and toddlers. This project will generate new knowledge about the development of early social skills and provide the foundation for new programs to enhance social development in typical and at-risk infants.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986352 Dr TM Stace

Approved Project Title **Modelling Superconducting Quantum Devices**

2009 : \$ 110,000
2010 : \$ 110,000
2011 : \$ 110,000
2012 : \$ 110,000
2013 : \$ 110,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

ARF Dr TM Stace

Administering Organisation The University of Queensland

Project Summary

The capability to incorporate quantum mechanical systems into electronic circuits leads to devices with fundamentally new properties. These devices are very sensitive to their environment, so can be used as sensitive sensors. In the extreme, with many such devices connected together, it would lead to a full scale quantum computer, which has the capacity to perform tasks that are unfeasible on an ordinary computer. This proposal aims to characterise quantum electronics from a theoretical perspective, complimentary to experimental efforts that will soon begin at the University of Queensland.

DP0986218 Dr JT Steen; Mr TH Kastle; Prof MJ Dodgson

Approved Project Title **Innovation and dynamic networks in project-based firms**

2009 : \$ 50,000
2010 : \$ 60,000
2011 : \$ 60,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

Administering Organisation The University of Queensland

Project Summary

Innovation is central to Australia's future prosperity but many commentators have bemoaned national performance in 'obvious' indicators of innovation such as R&D spending and patents. We argue that a lot of innovation in Australia is actually hidden in the business of projects. To compete in the international economy it is vital to know how to manage innovation in this context. The proposed research will use new methods in network analysis to show how firms can be better structured to encourage innovation.

DP0987170 Dr RW Strachan; Prof GM Koop

Approved Project Title **Computing probabilities of theories where these probabilities vary over time with applications in macroeconomics**

2009 : \$ 80,000
2010 : \$ 80,000
2011 : \$ 80,000

Primary RFCD 3404 ECONOMETRICS

Administering Organisation The University of Queensland

Project Summary

This project will present a method to produce empirically based policy advice that accounts for the changing economic environment and that allows for a range of assumptions about how the economy works. The research and training will place Australia at the forefront of empirical macroeconomic research and strengthen international research networks. Policy making will be improved as: it will use information that is more robust to false assumptions; it will quickly incorporate new information; and we will understand better why certain policies did or did not work at different times in the past. The research will impact upon other sciences such as physics and engineering that use the same underlying tools far more than do economists.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0984755 Dr Y Wang

Approved Project Title **Understanding of nanostructures and magnetic properties of Ge-based diluted magnetic semiconductors for spintronic devices**

2009 : \$ 100,000

2010 : \$ 85,000

2011 : \$ 85,000

Primary RFCD 2914 MATERIALS ENGINEERING

APD Dr Y Wang

Administering Organisation The University of Queensland

Project Summary

The success of growing high-quality germanium-based diluted magnetic semiconductors will position Australian fundamental & applied research at the world forefront of magnetic semiconductors. This multi-disciplinary research will not only secure a number of high-impact publications in leading international journals, but also has the potential to generate patentable technologies which might bring potential economic benefits to Australia. In addition, the project will strengthen the collaboration between Australian researchers and world-renowned scientists and will allow Australian researchers to access world-best fabrication facilities. All these will enhance the international competitive profile of Australia in the field of spintronics.

DP0988805 Dr RS WARE; Dr AA Mamun; Dr R Alati

Approved Project Title **Attrition in longitudinal studies: advancing and evaluating statistical methods**

2009 : \$ 150,000

2010 : \$ 100,000

2011 : \$ 100,000

Primary RFCD 2302 STATISTICS

Administering Organisation The University of Queensland

Project Summary

Longitudinal studies are a vital tool for monitoring the health and well-being of Australians. They are uniquely placed to examine changes in diseases over time and prospectively collect data on exposure and disease onset. There have been many successful longitudinal studies in Australia that have led to significant breakthroughs in evidence-based health (e.g. the Nambour Skin Cancer Prevention Trial). Unfortunately all longitudinal studies suffer from attrition, or loss of participants, which leads to questions concerning their validity and generalisability. This project will investigate the causes of attrition, and the effect attrition has on longitudinal studies, in order to improve their design and analysis.

DP0986542 Dr MI Weisler; A/Prof J Zhao

Approved Project Title **Voyaging, Trade and the Development of Ancient Complex Societies in East Polynesia: An Interdisciplinary Approach**

2009 : \$ 105,000

2010 : \$ 80,000

2011 : \$ 120,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

Administering Organisation The University of Queensland

Project Summary

Developing a knowledge-based economy has long-term benefits to Australia and is independent of fluctuations in the resource sector on which our nation heavily relies. Intellectual innovations are crucial for sustainable growth and help establish Australia as a regional and world leader in science. We use innovative methods to 'fingerprint' prehistoric stone tools and raw material sources for determining the geographic extent of travel between island groups and ascertaining how inter-connected Pacific island communities were about 800 to 200 years ago. Documenting this long-term prehistory will provide insights into our modern neighbours and promote regional understanding, and enhance international collaboration and research training.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987626 Dr CR White; A/Prof PB Frappell

Approved Project Title **The evolution of energy metabolism in ectotherms**

2009 : \$ 210,000
2010 : \$ 130,000
2011 : \$ 130,000
2012 : \$ 130,000
2013 : \$ 130,000

Primary RFCID 2706 PHYSIOLOGY
QEII Dr CR White

Administering Organisation The University of Queensland

Project Summary

Metabolic rate is the rate at which organisms take up, transform, and expend energy and materials. The primary outcome of this initiative is a comprehensive understanding of the effect of climate on the metabolic rate of ectothermic vertebrates, including goannas, fish and toads. Our research will encompass aquatic and terrestrial environments; temperate and tropical habitats; and include both iconic native species and alien invasive ones. We seek to understand not only how and why species in these environments vary in their metabolic rate, but also the consequences of this variation. Such knowledge will be important in understanding how climate change does and will affect animals and in predicting its consequences.

DP0987407 Prof AK Whittaker; Dr KS Jack; Dr H Peng

Approved Project Title **Designed Delivery - Novel Hydrogels for Drug Delivery from Precisely-Structured Networks**

2009 : \$ 154,000
2010 : \$ 130,000
2011 : \$ 136,000

Primary RFCID 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project will lead to the development of new biodegradable biomaterials ideally suited to many applications in drug delivery and tissue engineering. The understanding of their properties will be built on comprehensive models for diffusion of molecules through the material. The availability of these new biomaterials will facilitate future developments in drug delivery, and will ultimately lead to improved medical outcomes in many areas such as tissue and bone regeneration. The materials designed in this project will help position the Australian biotechnology and pharmaceutical industries to take advantage of the more than \$100B USD market (US alone; growth ~ 10% p.a.) in drug delivery.

DP0987078 Dr GF Wyeth; Prof J Wiles

Approved Project Title **Talking with Robots: Evolving Grounded Language for Embodied Agents**

2009 : \$ 70,000
2010 : \$ 65,000
2011 : \$ 65,000

Primary RFCID 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation The University of Queensland

Project Summary

The coming personal robot revolution will be built on robots that have real-world intelligence, with an ability to understand and communicate about the world in the way we humans do. This project extends a previous ARC project, which developed robot-friendly languages for naming places in the world. This new project will develop the robots' abilities and language to understand a comprehensive range of real world objects, places, actions, attributes and relationships. This project represents a major advance for Australia in the new and fast growing personal robot industry.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986382 Dr X Yao; Prof H Cheng

Approved Project Title **Fundamental study on hydrogen desorption from nanoscale Magnesium (Mg) hydrides**

2009 : \$ 130,000
2010 : \$ 100,000
2011 : \$ 120,000
2012 : \$ 170,000
2013 : \$ 160,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

ARF Dr X Yao

Administering Organisation The University of Queensland

Project Summary

Hydrogen storage is the most challenge in realizing the hydrogen economy, especially for on-board application in hydrogen-driving vehicles. Magnesium is among the few promising candidates of effective, safe, high density and cheap hydrogen storage, which has attracted tremendous interests of research. This project creates an innovative science and technology to solve the critical problem of hydrogen storage that will enhance the international reputation and impact of Australian research in nanoscience and nanotechnology. Realizing the practical hydrogen storage will also enable hydrogen vehicles soon in Australia that adds Australia great potential to reducing the reliance on fossil fuels and greenhouse emissions.

DP0988935 Dr AS Yap

Approved Project Title **Actin cytoskeleton regulation by E-cadherin and Src.**

2009 : \$ 100,000
2010 : \$ 100,000
2011 : \$ 100,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

This project examines a fundamental, novel mechanism of how cells work together in tissues. It will provide important new knowledge about how tissues become organized in health, and how organization might be disturbed in disease. It will build Australia's skill base in cutting-edge scientific research, and promote knowledge directed to the research priority area of Promoting and Maintaining Good Health.

DP0984782 Dr GB Yeo; Dr SD Loft; Dr LD Smillie

Approved Project Title **Goal orientations, self-regulation and performance: Implications for accelerating learning via goal-setting interventions**

2009 : \$ 67,000
2010 : \$ 35,000
2011 : \$ 37,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

This project relates to the priority of strengthening Australia's social and economic fabric. The question of when and why various goals are adaptive versus maladaptive is of fundamental importance for understanding human behaviour. Society benefits from research into this question, because it provides a pathway for tapping into human potential. The results have implications for the development of effective training programs and thus have the potential to influence personal growth and financial stability. The results will have wide application in a variety of industries. Examples include the development of interventions for more rapid training, and the development of performance-management plans for facilitating career advancement.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0987204 Prof Z Yuan; Dr PA Lant; Prof DJ Richardson

Approved Project Title **Understanding Fugitive Greenhouse Gas Emissions from Wastewater Systems for Reliable Accounting and Effective Mitigation**

2009 : \$ 75,000

2010 : \$ 75,000

2011 : \$ 75,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Climate change caused by greenhouse gas (GHG) emissions is one of the most serious challenges facing mankind. Substantial reductions in emissions must be achieved, with responsibility shared by all industrial sectors. Wastewater systems contribute to GHG emission through not only energy consumption but also direct emissions of fugitive GHG such as methane and nitrous oxide. This project aims to deliver the urgently needed knowledge and technology support to the Australian wastewater industry to achieve reductions in fugitive emissions. The research will also provide support to the greenhouse office via more reliable estimation of such emissions.

DP0988150 Prof MP Zalucki; Prof JR Botella; Dr JJ De Voss; Prof CD Poulter

Approved Project Title **Putting smells into context: Using in vivo technologies to understand plant-insect odour signalling.**

2009 : \$ 200,000

2010 : \$ 200,000

2011 : \$ 200,000

Primary RFCD 2705 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

How insects find host plants is central to understanding their basic ecology and management. We use a novel cross-disciplinary approach to target a key pest insect's responses to a host-plant, genetically modified to smell different. This insect pest, the cotton bollworm, costs the Australian economy millions in lost revenue every year. Reliance on insecticides to control insect pests is exacerbated by increasing insecticidal resistance and is a major economic, environmental and health concern. Our research will open the door to novel control strategies that use the natural odours of plants to reduce their attractiveness to insect pests.

DP0985084 A/Prof J Zou; Mr ZG Chen

Approved Project Title **Epitaxial growth of Zn-VI/III-N nanowire-based structures for future device applications**

2009 : \$ 150,000

2010 : \$ 120,000

2011 : \$ 120,000

Primary RFCD 2914 MATERIALS ENGINEERING

APD Mr ZG Chen

Administering Organisation The University of Queensland

Project Summary

This project, aiming for developing zinc and nitrogen epitaxial nanowires, addresses specific National Research Priorities in the areas of breakthrough science, frontier technology and advanced materials. Outcomes will significantly advance the understanding of the evolution of epitaxial nanowire structures and their demonstrated properties. This project will provide informative guidelines for designing, developing and manufacturing nanowire-based nanostructures for future nanodevices and nanosystems, which is strategically important to Australia's emerging high-tech industries. This project will also enhance the international reputation and impact of Australian research in the internationally focused field of nanoscience and nanotechnology.