

Summary of Discovery Projects Proposals for Funding to Commence in 2008

New South Wales

The University of Sydney

DP0881537 A/Prof M Agastya; A/Prof S Chawla

Approved Project Title **Choice and Classification in complex and adversarial environments**

2008 : \$ 62,000

2009 : \$ 40,000

2010 : \$ 46,000

Primary RFCD 3401 ECONOMIC THEORY

Administering Organisation The University of Sydney

Project Summary

Any policy must take account of individuals' incentives to strategically manipulate. Mechanism Design is an area of economic theory that addresses precisely this. In its theoretical development however, it overlooks practical constraints for monitoring behavior. For instance, for fraud detection and credit scoring, automated statistical machine learning models discussed in computer science (CS) are used. Here, we constrain monitoring strategies to be such algorithms and address the monitoring of a population of individuals or a similarly constrained large adversary. Notable cross disciplinary implications exist for

DP0878371 Dr DM Alais

Approved Project Title **Human time perception: A crossmodal investigation**

2008 : \$ 111,268

2009 : \$ 93,471

2010 : \$ 102,541

2011 : \$ 83,255

2012 : \$ 84,007

Primary RFCD 3801 PSYCHOLOGY

QEII Dr DM Alais

Administering Organisation The University of Sydney

Project Summary

This research program investigates time perception in humans in the subsecond range. Time perception is a crucial aspect of cognitive functioning but one that is poorly understood. The subsecond scale is particularly relevant because it is the time-frame for crucial tasks such as motor coordination, speech perception and crossmodal integration. This project examines time in an audiovisual context, exploring the cognitive limits of our ability to keep track of time and testing whether time is encoded as a basic feature. These experiments will further our knowledge of time perception and lead to improved models of how the brain encodes time.

DP0881690 Dr CM Allan; Prof DJ Handelsman; Prof M Griswold; A/Prof G Denyer

Approved Project Title **Steroid control of male meiosis**

2008 : \$ 82,642

2009 : \$ 82,642

2010 : \$ 82,642

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Sydney

Project Summary

This innovative project will study a complex cellular process (meiosis) essential for sperm development and sexual reproduction. Collaborations and novel experimental design provide cutting edge techniques and opportunity for Australian researchers to contribute important discoveries to this field. We aim to provide new knowledge of steroid-dependent molecular factors that may activate (or inhibit) meiosis. Such novel information may significantly impact diverse areas related to controlling mammalian reproductive development, such as health and well-being (a healthy start to life, fertility control), farming and agriculture (livestock production, pest management) and the Australian environment (conservation, pest management).

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DP0881067 Prof WH Anderson

Approved Project Title **Reproductive Frontiers: The Twentieth-Century Sciences of Human Hybridity**

2008 : \$ 55,000

2009 : \$ 50,000

2010 : \$ 50,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

The proposed historical research will enrich our knowledge of scientific debates about biological absorption and population management, placing Australian ideas and experiences into their appropriate international context. It promotes awareness of how past scientific concepts continue to inform controversies about the quality of the Australian population. In particular, this project will enhance our understanding of scientific attitudes toward Aboriginal people, especially their reproduction and health.

DP0881787 Prof PF Apps; Prof R Rees; Prof I Walker

Approved Project Title **A Lifecycle Approach to Labour Supply, Human Capital Accumulation and Public Policy**

2008 : \$ 63,198

2009 : \$ 69,193

2010 : \$ 75,547

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation The University of Sydney

Project Summary

According to available time use data Australia has a relatively low labour supply, when compared with other major OECD countries, due primarily to low female working hours. This project will investigate the lifecycle dynamics of family labour supply decisions and human capital accumulation, to provide a more informed basis for policy debates. We therefore see the major national and community benefit as that of promoting Australia's rate of economic growth and ability to sustain funding for education, health and welfare, in an ageing population.

DP0880882 Dr A Argyros; Dr L Poladian; A/Prof F Ladouceur

Approved Project Title **Fabrication and design of spun and chiral microstructured fibres**

2008 : \$ 120,000

2009 : \$ 130,000

2010 : \$ 120,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Sydney

Project Summary

Novel optical fibre devices and especially sensors have established and growing markets in sectors as diverse as medical, aerospace & defence, energy, scientific and process control. This project will build on our existing success in developing microstructured polymer optical fibres (mPOF), and create major new opportunities, both in fundamental science and in applications that could be commercialised. Australia is currently leading the world in mPOF. This project builds on these past successes but moves beyond telecommunications into biophotonics with potential applications in magnetic field sensors, biological sensors, optical tweezers, polarisation emulators and new types of linear and nonlinear modes.

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DP0880860 Dr SD Bartlett
Approved Project Title **Quantum-enhanced reference systems**
2008 : \$ 100,000
2009 : \$ 108,000
2010 : \$ 109,000
Primary RFCD 2404 OPTICAL PHYSICS
Administering Organisation The University of Sydney

Project Summary

Reference systems, such as gyroscopes and clocks, constructed out of individual atoms or photons can have an incredible precision limited only by the laws of quantum physics. This project will investigate how such reference systems can be constructed and will propose new state-of-the-art experiments which demonstrate their power. This project will provide a foundation for future technologies necessary for navigation and communication systems, and for high-precision measurements needed for scientific and engineering applications. It will resolve many pressing problems regarding the role of reference systems in quantum theory that are currently inhibiting progress in the field.

DP0878924 Dr M Beekman; Prof BP Oldroyd
Approved Project Title **Understanding social cancers: Intra-specific parasitism by honeybee workers**
2008 : \$ 140,000
2009 : \$ 120,000
2010 : \$ 120,000
2011 : \$ 120,000
2012 : \$ 120,000
Primary RFCD 2707 ECOLOGY AND EVOLUTION
QEII Dr M Beekman
Administering Organisation The University of Sydney

Project Summary

Our project will study the conditions under which normally altruistic honeybee workers parasitise other colonies. Thus we will explore a fundamental question: how is the expression of selfish behaviour normally controlled? Outcomes of this project will be important to our understanding of insect societies but will also have application for those studying the development of tumours in multicellular organisms, the development of metazoan bodies, and social cohesion in human and non-human societies. Our project will also help protect Australia's honey industry from the devastating social parasites that have ruined the industry in South Africa.

DP0879503 Prof MR Bennett
Approved Project Title **Neuron-microglia signalling mechanisms**
2008 : \$ 110,000
2009 : \$ 110,000
2010 : \$ 110,000
Primary RFCD 2705 ZOOLOGY
Administering Organisation The University of Sydney

Project Summary

This research concerns determining the fundamental mechanisms by which one of the principal non-neuronal cells in the brain, the microglial cell, interacts with neurons to change their properties. The correct functioning of neural networks is necessary for our normal behaviour. Such networks can be disrupted and indeed destroyed by the release of inflammatory molecules from microglial cells. In this work the way in which anti-inflammatory molecules are released from the microglia will be elucidated, thus providing insight into how to prevent the destructive actions of the inflammatory molecules on the nervous system.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0877805 A/Prof AV Betts; Prof VN Yagodin; Dr FJ Kidd

Approved Project Title **A study of a newly discovered corpus of early Central Asian wall paintings**

2008 : \$ 140,000

2009 : \$ 130,000

2010 : \$ 130,000

2011 : \$ 125,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

APD Dr FJ Kidd

Administering Organisation The University of Sydney

Project Summary

We will examine the development of mural art in Central Asia through study of a remarkable corpus of newly discovered wall-paintings from a massive two thousand year old temple/palace. This extensive collection of images is the largest and best preserved early cycle of art yet discovered in Central Asia. Detailed iconographic study of the paintings will provide an extensive new database for scholars working on the history and culture of the ancient world. A broader study of Central Asian wall painting based on our work will benefit all those interested in the Classical world and its Asian and Iranian counterparts.

DP0881526 Dr AJ Bridgeman

Approved Project Title **New Strategies for Modelling Polyoxometalates**

2008 : \$ 104,599

2009 : \$ 105,791

2010 : \$ 100,000

Primary RFCD 2506 THEORETICAL AND COMPUTATIONAL CHEMISTRY

Administering Organisation The University of Sydney

Project Summary

Polyoxometalates are a versatile class of genuine nanomaterials with remarkable chemical and physical properties and dimensions ranging from tens to tens of thousands of atoms. Designing functional materials which exploit their enormous potential is limited by practical difficulties in their structural characterization and restrictions on our ability to model their behaviour. In this project, we will develop a new strategy for computer modelling of polyoxometalates based on the classical molecular mechanics approach and high-level techniques. This novel line of attack will be exploited in the characterization of large and highly substituted derivatives which are key to developing functional materials.

DP0881388 Prof M Byrne; A/Prof AR Davis

Approved Project Title **Development and calcification in benthic marine invertebrates (Mollusca and Echinodermata) in an acidified and warm ocean**

2008 : \$ 115,930

2009 : \$ 78,186

2010 : \$ 75,388

Primary RFCD 2799 OTHER BIOLOGICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

As an island continent Australia generates considerable wealth from its oceans with marine invertebrate resources playing a key role. These resources are at risk due to the impact of climate change, ocean acidification and warming, on availability of carbonate minerals for shell production. Of major concern is potential recruitment failure if planktonic larvae cannot produce their skeleton and if benthic stages cannot grow due to impaired skeleton formation. This project addresses uncertainties in knowledge of the response of ecologically and commercially important marine biota to climate change, knowledge crucial to inform risk assessment of future changes to our marine resources.

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DP0879522 Prof IH Cairns; Prof PA Robinson

Approved Project Title **Wave Localization and Burstiness in Type III Solar Radio Bursts**

2008 : \$ 175,000

2009 : \$ 150,000

2010 : \$ 145,000

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

Administering Organisation The University of Sydney

Project Summary

The project will raise Australia's scientific standing and expertise in space and plasma physics, space weather, and complex systems due to new discoveries, theories, publications, and invited talks. It supports Australia's involvement in NASA's \$600M STEREO mission and other space efforts, and greatly leverages Australia's small numbers and budget on the world stage. The project will enhance Australia's human capital due to high-level training and increased expertise of new staff, students, and CIs. The new data and methods will develop, better exploit, and make more competitive Australia's scientific infrastructure. Last, the exciting discoveries expected will attract the international media and increase science's appeal to the public.

DP0879465 Prof J Canning

Approved Project Title **Laboratory in a Fibre: diagnostic, sensing and telecommunications technologies**

2008 : \$ 220,000

2009 : \$ 190,000

2010 : \$ 170,000

Primary RFCD 2999 OTHER ENGINEERING AND TECHNOLOGY

Administering Organisation The University of Sydney

Project Summary

The lab-in-a-fibre aims to provide the next generation of diagnostic, sensing and telecommunications technologies. Mass production of km long optical fibre platforms for the lab-in-a-fibre offers cost competitive alternative to lab-on-a-chip technologies in applications where several diagnostic, sensing processes or component technologies are required. It will benefit not only advanced instrument industries but also others involved with materials processing, sensing diagnostics, biomedicine and defence. The overall integration within the program will provide the mechanism to create new, highly skilled Australian industries.

DP0880724 Dr JJ Cannon; Prof RP Brent; Dr D Stehle

Approved Project Title **Integral lattices and their theta series**

2008 : \$ 130,000

2009 : \$ 120,000

2010 : \$ 110,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of Sydney

Project Summary

Lattice algorithms play a very important role in solving problems in algebra, number theory, combinatorics, optimisation and cryptography. Our proposed work will fill a major hole in current capabilities for computing with lattices. The enhanced ability to enumerate short vectors will have important applications to Diophantine equations, linear optimisation and also to understanding the security of cryptosystems based on the difficulty of finding a shortest vector. The work on theta series should result in the first algorithm for this problem. This will also find many applications including to the construction of spherical codes and designs.

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DP0881471 A/Prof S Carlile

Approved Project Title **Acoustic, spatial and informational cues used to solve the cocktail party problem**

2008 : \$ 40,000

2009 : \$ 35,000

2010 : \$ 35,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

Speech is the principal mode of human communication and yet we understand little about how we are able to concentrate on one talker against a noisy background. Significant improvements in supporting listening by the hearing impaired, in teleconferencing systems and computer speech interfaces are dependent on a more advanced understanding of how we solve this cocktail party problem. This research explores the acoustic, spatial and informational cues used by the healthy auditory system to achieve this remarkable feat of signal processing. There is significant potential for commercialization of the IP that will arise from this research.

DP0880374 Dr MJ Carter

Approved Project Title **With or without pots: Investigating the archaeology of human settlement on Santa Isabel, western Solomon Islands**

2008 : \$ 85,000

2009 : \$ 80,000

2010 : \$ 60,000

2011 : \$ 58,986

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

APD Dr MJ Carter

Administering Organisation The University of Sydney

Project Summary

Following the recent civil unrest in the Solomon Islands, the SI National and Provincial Governments, as well as community bodies, have identified a better understanding of the past and the revival of traditional systems and knowledge (Kastom) as a route to stability and cohesion throughout the region. This study responds to direct requests from the Santa Isabel community for assistance with archaeological research and the recording of cultural histories. By assisting a Pacific neighbour to develop a more durable, internally generated basis for social and economic development, Australia not only encourages security in the region, but also increases its engagement with and understanding of adjacent cultures.

DP0877750 Dr L Chang

Approved Project Title **Towards new generations of lubricants using nanoparticles**

2008 : \$ 100,000

2009 : \$ 100,000

2010 : \$ 90,000

Primary RFCD 2905 MECHANICAL AND INDUSTRIAL ENGINEERING

APD Dr L Chang

Administering Organisation The University of Sydney

Project Summary

Engines are essential to the Australian manufacturing, transport, power generation, mining and construction industries. Our project will develop the basic science for high-performance lubricants and wear-resistant materials using nanoparticles. These lubricants and materials will have a significant impact in reducing system failure from the chronic wear and friction of moving parts and optimise the cost structures of system manufacturing.

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DP0879958 Dr LA Chappell

Approved Project Title **Achieving Gender Justice: national implementation of the gender provisions of the Rome Statute of the International Criminal Court**

2008 : \$ 50,000
2009 : \$ 50,000
2010 : \$ 70,000

Primary RFCD 3903 JUSTICE AND LEGAL STUDIES

Administering Organisation The University of Sydney

Project Summary

As only one of 15 states internationally to recognise gender-based crimes of the International Criminal Court Australia has an important leadership role to play globally in encouraging non-compliant states to implement and enforce their ICC gender commitments. This project will assist in advancing Australia's leadership in the field of women's rights by establishing Australian scholarship at the forefront of knowledge about the diffusion of international gender justice norms. This research project will enhance Australia's reputation as a defender of international rights and as a good global citizen.

DP0878174 Dr M Chen

Approved Project Title **The evolutionary transition from anaerobic to aerobic metabolism**

2008 : \$ 160,000
2009 : \$ 160,000
2010 : \$ 160,000
2011 : \$ 160,000
2012 : \$ 160,000

Primary RFCD 2702 GENETICS

QEII Dr M Chen

Administering Organisation The University of Sydney

Project Summary

This project aims to find out how life on Earth survived the revolutionary changes when cyanobacteria first released oxygen into the atmosphere. These events led to a transition from anoxic (oxygen-free) to oxic (oxygen-rich) conditions. A comparative genomic view across a series of photosynthetic organisms will be performed at the molecular level with ecological interpretation. Understanding of what metabolic changes occurred in response to the shifts in the environment will have wide implications for predicting the evolutionary events that are still occurring today, such as rapidly changing climatic conditions. This fundamental research will enhance Australia's profile in this field.

DP0880126 Dr WH Christie

Approved Project Title **A Critical Investigation into the Life and Writings of Francis Jeffrey (1773-1850)**

2008 : \$ 59,437
2009 : \$ 92,987
2010 : \$ 55,386

Primary RFCD 4202 LITERATURE STUDIES

Administering Organisation The University of Sydney

Project Summary

Insofar as our culture was and to a large extent remains a development of the culture of Britain during the Romantic period, and of its often conflicting ideas of nature and subjectivity, individualism and nationalism, my research into Jeffrey's career and writings will bring benefit to Australia by making conceptual advances in key areas of our cultural and political history. The only places where Francis Jeffrey's enormously influential 'Edinburgh Review' was read more avidly than in Britain in the early decades of the nineteenth century were in the ex-colony of America and in British colonies like Australia.

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DP0879505 Dr EL Christopher; Dr MS Delofski; Prof PE Lovejoy
Approved Project Title **Sierra Leone and Australia: a case of the vanishing twin**
2008 : \$ 90,000
2009 : \$ 45,000
2010 : \$ 50,000
Primary RFCD 4301 HISTORICAL STUDIES
Administering Organisation The University of Sydney

Project Summary

By considering the settlement of Australia as a process within an interconnected global empire the project will increase understanding of our beginnings and inject Australian experience into international scholarship. It will increase our understanding of Africa, 'the world's largest unstable region', which is peculiarly absent from the Australian consciousness. Paul Lovejoy, our international PI, is a world leader in African history, and his involvement in this initiative will focus the attention of the international African historical community on Australia. The project will also provide an inclusive historical context to assist the incorporation of a large refugee cohort from Sierra Leone.

DP0877692 Prof JA Clark
Approved Project Title **The Asian Modern**
2008 : \$ 105,000
2009 : \$ 105,000
2010 : \$ 130,000
2011 : \$ 110,000
2012 : \$ 85,000
Primary RFCD 4199 OTHER ARTS
APF Prof JA Clark
Administering Organisation The University of Sydney

Project Summary

Australia needs to understand Asia, and in particular the cultures of modern Asian states. Art is a vital part of the expression of those cultures, and we will know these better in our region for seeing how their modern art is an intrinsically self-generated set of cultural forms. The project will reveal what is modern in Asian art by making comparisons across national boundaries and with representative examples of Australian modern art. Through this process, we will gain a deeper understanding of where Australia fits in the region. The project will produce a comparative theoretical framework that will be capable of application beyond Asia and Australia.

DP0879681 Prof M Colyvan
Approved Project Title **Ethics and Formal Theories of Decision**
2008 : \$ 40,000
2009 : \$ 34,000
2010 : \$ 26,000
Primary RFCD 4401 PHILOSOPHY
Administering Organisation The University of Sydney

Project Summary

The benefits of this project will include improved methods for making ethically-informed decisions in various practical situations. Among the more important applications are legal decisions and conservation management. The theory developed in this project will also help shed light on both the statistical and ethical issues raised in much-debated areas such as racial profiling. The project will also serve to enhance Australia's reputation in technical philosophy and decision theory.

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DP0878255 Dr MA Connor; Prof MJ Christie

Approved Project Title **Anandamide activated chloride channels in sensory neurons**

2008 : \$ 85,000

2009 : \$ 85,000

2010 : \$ 85,000

Primary RFCD 2706 PHYSIOLOGY

Administering Organisation The University of Sydney

Project Summary

We are seeking to understand how the nerve cells that sense our environment are regulated by signalling molecules produced by our body. Understanding how these cells function in normal conditions is essential as basis for understanding how they may function abnormally in physically stressful situations or in chronic pain conditions. The work may eventually lead to better treatments for a wide range of disorders that involve the sensory nervous system.

DP0880919 Dr EJ Cowley; Miss C Ioannou

Approved Project Title **Reducing irresponsible gambling: Changing a justification to an avoidance strategy.**

2008 : \$ 105,000

2009 : \$ 104,000

2010 : \$ 118,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

APD Miss C Ioannou

Administering Organisation The University of Sydney

Project Summary

The results will aid policy makers in their assessment of harm minimisation strategies such as voluntary self-exclusion. Discovering when 'flawed' thinking about previous gambling episodes can be used to justify potentially irresponsible gambling decisions will assist in the design of new prevention measures for irresponsible gamblers and those at risk. The strategies developed here will be useful for gamblers to empower themselves and avoid behaviour they will regret later. Australia will benefit from insights into how and why irresponsible episodes occur and how to prevent them.

DP0878936 Prof NE Dancer

Approved Project Title **Finite Morse index solutions of nonlinear partial differential equations**

2008 : \$ 80,000

2009 : \$ 80,000

2010 : \$ 75,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of Sydney

Project Summary

We aim to produce mathematics which is of not only of interest to mathematicians but is useful in the study of many physical and biological processes. They occur in the study of processes in industry and the study of the environment.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881855 Dr M de Rosnay; Dr L Zadro; Dr CJ Hunt

Approved Project Title **Fitting in and making friends: The psycho-social underpinnings of children's adaptation to school**

2008 : \$ 100,000

2009 : \$ 90,000

2010 : \$ 110,000

2011 : \$ 30,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

This project has four areas of national benefit: It will provide vital information for researchers, educators and clinicians about the psycho-social processes underpinning children's social integration within the classroom; Key factors that assist in school transition will be identified, thus presenting the opportunity for early identification of children at risk of social exclusion; This work will facilitate the extension of existing models of School Readiness and child-school transition, and contribute to Australia's international profile for conducting influential and cutting-edge research. Given the involvement of research students, this research will promote future research directions of upcoming Australian researchers.

DP0881597 Dr NA Eckstein

Approved Project Title **The Anatomy and Physiology of Renaissance Florence: the Dynamics of Social Change in the Fifteenth Century**

2008 : \$ 140,000

2009 : \$ 65,000

2010 : \$ 40,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

In 2004, Australia's reputation as an international leader in Italian Renaissance history contributed directly to an agreement with Italy's Cassamarca Foundation bringing \$22.5 million AUD to Australian universities. This has funded a dozen Italian-studies lectureships, numerous fellowships and scholarships in Australian universities, raising Italian culture's profile in academia, the student body and the wider community. This new project on Florentine society will advance the field of Renaissance social history, reinforce Australia's outstanding reputation in the area, promote international agreements like that with the Fondazione Cassamarca, and confer further major academic, cultural and economic benefits on Australian national culture.

DP0881876 Prof S Elliot; Prof M Williams

Approved Project Title **Developing and Managing Sustainable Technology-Enabled Innovation Capabilities: An Information Systems Approach**

2008 : \$ 95,000

2009 : \$ 90,000

2010 : \$ 85,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation The University of Sydney

Project Summary

Australian industry's search for competitive advantage in global markets is creating increasing pressure to innovate. The only pathway to business success is perpetual innovation but this is fraught with challenges, pitfalls and risk.

This project assists industry innovation by advancing our understanding of two key areas: technology-enabled innovation and the adoption and impact of disruptive frontier technologies. It will develop, test, analyse and evaluate a new framework for technology-enabled business innovation in the area of Treasury Risk Management.

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DP0880490 Mr DH Evans

Approved Project Title **Hydraulic Systems and State Development in Early Cambodia: Mapping the Engineered Landscapes of the Khmer Using Remote Sensing**

2008 : \$ 95,000
2009 : \$ 90,000
2010 : \$ 80,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

APD Mr DH Evans

Administering Organisation The University of Sydney

Project Summary

Due to recent discoveries, Australian research at Angkor, in Cambodia, has gained increasing visibility worldwide. The ARC-funded Greater Angkor Project (Discovery) and Living With Heritage project (Linkage) have produced results of international significance, developed strong long-term partnerships with Cambodian agencies and UNESCO, and have pioneered the large-scale mapping of World Heritage-listed sites using airborne imaging radar systems in collaboration with NASA. This project will extend these partnerships, consolidate Australia's leading position in radar analysis methods, and continue to produce results with global implications for the understanding and management of World Heritage sites.

DP0881814 Dr KL Felmingham

Approved Project Title **Emotion Regulation in Posttraumatic Stress Disorder**

2008 : \$ 85,968
2009 : \$ 62,000
2010 : \$ 62,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation The University of Sydney

Project Summary

Posttraumatic Stress Disorder (PTSD) can affect 7-12% of Australians in their lifetime. It is a chronic disorder with enormous personal, social and economic costs. In the current climate of increasing mass violence and natural disaster, the health burden of PTSD is expected to rise. This project will help us identify core processes and mechanisms involved in PTSD, and help us to develop more effective and specialized treatments. It will also extend our understanding of how the brain inhibits emotion, which has wider relevance for many anxiety disorders in terms of their development and prevention.

DP0880790 Dr T Ferenci

Approved Project Title **Evolutionary and ecological complexity in an experimentally controlled environment**

2008 : \$ 85,000
2009 : \$ 85,000
2010 : \$ 85,000

Primary RFCD 2703 MICROBIOLOGY

Administering Organisation The University of Sydney

Project Summary

Understanding the capacity and mechanism of microbial evolution provides the framework for developing new strategies for preventing infectious disease. If we know how evolution works, it will be possible to hamper the capacity to evolve as a mechanism of preventing new diseases and controlling existing ones. This project will provide a mechanistic description of evolution in real time under controlled conditions. This detailed information will be used in the education of the public and in debates about evolution. The project will also train at least five students in molecular and evolutionary microbiology, essential for facing future challenges.

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DP0881883 Dr MA Figliozzi; Dr SP Greaves

Approved Project Title **Modelling the Environmental Impacts of Commercial Vehicle Tours and Freight Management Policies in Urban Areas**

2008 : \$ 62,568

2009 : \$ 66,774

2010 : \$ 71,112

Primary RFCD 3504 TRANSPORTATION

Administering Organisation The University of Sydney

Project Summary

Commercial vehicle flows have a negative impact on the health and wellbeing of millions of pedestrians and urban dwellers. Commercial vehicles' environmental costs per kilometre are about four times higher the corresponding environmental costs of a private car. However, the amount and level of these impacts are highly dependent on the population density and its proximity to freight flows. Existing methods to assess environmental impacts such as air quality or noise tend to focus on the production source of the pollutant not the impacts, without providing the necessary framework and methodology to evaluate freight management policies in urban areas.

DP0880081 Dr MT Ford

Approved Project Title **From Migrant to Worker: New Transnational Responses to Temporary Labour Migration in East and Southeast Asia**

2008 : \$ 49,763

2009 : \$ 68,000

2010 : \$ 60,000

Primary RFCD 3705 DEMOGRAPHY

Administering Organisation The University of Sydney

Project Summary

This project compares the nature and impact of civil society initiatives concerning temporary labour migration in Hong Kong, Korea, Malaysia, Singapore and Taiwan. It provides a model for understanding NGO-union cooperation on migrant labour issues, useful not only in East and Southeast Asia, where foreign workers - and foreign workers' rights - are already matters of serious concern, but in countries like Australia, where skills shortages and ageing populations are increasing pressure on governments to allow large-scale temporary foreign labour. The project's findings will assist government agencies and local and transnational civil society groups to respond more effectively to temporary labour migration.

DP0877530 Dr GM Goggin; Ms KJ Crawford

Approved Project Title **Young, Mobile, Networked: Mobile Media and Youth Culture in Australia**

2008 : \$ 136,615

2009 : \$ 120,480

2010 : \$ 140,000

Primary RFCD 4001 JOURNALISM, COMMUNICATION AND MEDIA

APD Ms KJ Crawford

Administering Organisation The University of Sydney

Project Summary

Mobiles are a common part of life for young Australians, yet there is very little reliable data about how these are used and their social and cultural implications - especially new services such as mobile music, cameras and television. The qualitative and quantitative data from this project will give a detailed, national picture of mobile media use, and will be highly valuable for Australian companies, policymakers, regulators, non-governmental organizations as well as researchers. It will provide new knowledge to inform planning and innovation, and contribute to a better understanding of the social and cultural implications of mobile technologies.

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DP0878650 Prof PE Griffiths; Dr K Stotz

Approved Project Title **Postgenomic perspectives on human nature**

2008 : \$ 112,630
2009 : \$ 104,626
2010 : \$ 201,000
2011 : \$ 124,916
2012 : \$ 98,643

Primary RFCD 3706 HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

ARF Dr K Stotz

Administering Organisation The University of Sydney

Project Summary

The rapid growth of biological knowledge and the need for societal reflection on this knowledge and its applications in Australia and overseas make it increasingly urgent that the humanities and social sciences draw on a biologically credible vision of human nature. We will study how non-scientists understand human nature and compare their ideas to those of scientists from a range of different disciplines. We will examine what current biology reveals about the biological basis of human characteristics and develop an account of human nature that is defensible in the light of that knowledge.

DP0879206 Dr IM Harris; Prof SM Andrews; Dr W Hayward

Approved Project Title **The ingredients of conscious identification**

2008 : \$ 120,000
2009 : \$ 92,000
2010 : \$ 90,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

Research from a variety of psychological domains indicates that a lot of mental processing goes on unconsciously, but that we are only generally aware of a small fraction of the information delivered by our senses. This research will provide new insights into the cognitive and neural mechanisms underlying our conscious and unconscious identification of visual stimuli and will lead to a better understanding of the limitations we are likely to experience under conditions which make different demands on our perception, attention and the need to remember the relevant information. The results will also inform assessment and remediation of neurological conditions such as stroke and dementia.

DP0880428 Prof MA Harris; Prof EA Webby

Approved Project Title **Patrick White in the twenty-first century**

2008 : \$ 98,328
2009 : \$ 114,815
2010 : \$ 122,421

Primary RFCD 4202 LITERATURE STUDIES

Administering Organisation The University of Sydney

Project Summary

Patrick White (1912-1990) is the only Australian to be awarded the Nobel Prize for Literature, the citation commending him for having 'introduced a new continent into literature'. How did White represent Australia? Analysis of newly-available manuscripts and related material in the National Library will establish fresh perspectives on White's view of his native land, illuminating his writing in relation to national and international literary traditions. His social and political critique of twentieth-century Australia still confronts readers in the twenty-first century, stimulating debates over such topical issues as national identity, indigeneity, and understanding our national heritage.

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DP0881263 Dr BR Henderson; Dr H Rizos
Approved Project Title **Mitochondrial targeting of the DNA repair protein BARD1**
2008 : \$ 88,000
2009 : \$ 88,000
2010 : \$ 88,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY
Administering Organisation The University of Sydney

Project Summary

This is a fundamental research project to address a novel localisation pattern of the nuclear DNA repair protein, BARD1. BARD1 gene mutations occur in a subset of breast/ovarian cancer patients, and improved insight into BARD1 regulation could enhance our understanding of this disease. There are over 13,000 new cases of breast/ovarian cancer each year with more than 3,300 deaths, making it a serious healthcare issue in Australia, and placing this project within Research Priority 2: Promoting and Maintaining Good Health. If successful this project will characterise the cellular transport route of BARD1 which could help in anti-cancer agent development.

DP0877315 Dr AJ Holmes; Dr NV Coleman; Dr JM Guss
Approved Project Title **Bacterial monooxygenases as new biocatalysts**
2008 : \$ 80,000
2009 : \$ 80,000
2010 : \$ 80,000
Primary RFCD 2708 BIOTECHNOLOGY
Administering Organisation The University of Sydney

Project Summary

Using enzymes for synthesis of new pharmaceuticals is of increasing importance. Monooxygenases are particularly interesting because of their capacity to perform chemically difficult reactions thus increasing potential to make new pharmaceuticals. We have shown that an enormous pool of diverse and novel monooxygenases exists in naturally occurring bacteria. These enzymes are naturally important in pollutant degradation and regulating the emissions of greenhouse gases. We will develop these enzymes for biotechnology by characterizing structural features that influence catalytic properties relevant to challenges in pharmaceutical synthesis. The outcomes will enable their engineering for specific applications in synthesis of new drugs.

DP0881706 Dr S Hong
Approved Project Title **Algorithmics for Interactive 2.5D Graph Drawing**
2008 : \$ 70,000
2009 : \$ 65,000
2010 : \$ 60,000
2011 : \$ 60,000
2012 : \$ 49,322
Primary RFCD 2804 COMPUTATION THEORY AND MATHEMATICS
ARF Dr S Hong
Administering Organisation The University of Sydney

Project Summary

Technological advances have provided a data deluge over the past few years, and consequently have led to many large and complex network models in many domains. This includes terrorist networks and biological networks, software engineering structures, and webgraphs. Visualisation is an effective tool in helping humans to understand such networks. This project aims to provide a new direction in network visualisation, using 2.5 dimensions. The algorithms developed in the project will help security analysts to detect abnormal behaviours such as money laundering, help biologists understand protein-protein interaction networks, and help engineers to understand large software systems.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881467 Prof RW Hunstead

Approved Project Title **Massive galaxies: tracers of extreme density peaks in the early universe?**

2008 : \$ 120,000

2009 : \$ 110,000

2010 : \$ 100,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

The formation of the most massive galaxies poses one of the biggest challenges to our understanding of how structures evolved in the early universe. We identify these galaxies from their powerful radio emission, signalling the presence of a central supermassive black hole which converts infalling matter into radiation and energetic particles. Our goal is to determine the role played by the environments of these galaxies in allowing them to grow so large. This project addresses questions of key importance to Australian and international astronomy, and stands to enhance the prospects of Australia being chosen as the site for the international Square Kilometre Array.

DP0879402 Prof DM Ivison

Approved Project Title **The uneasy alliance between democracy and justice**

2008 : \$ 43,932

2009 : \$ 49,540

2010 : \$ 50,354

2011 : \$ 52,234

Primary RFCD 3601 POLITICAL SCIENCE

Administering Organisation The University of Sydney

Project Summary

This project will make a significant contribution to the understanding of our commitment to democratic values and practices, and what it entails for our local, regional and international obligations. It will directly address the challenge of maintaining social cohesion in an era of rapid social, economic and political change. And it will offer a fresh perspective on important public debates to do with Australian national identity and the relation between democratic rights and individual responsibility. The project will also contribute to helping maintain and develop Australian research excellence and innovation in the field of political philosophy.

DP0877666 A/Prof DS Jeng; Prof JC Small; Prof P Liu

Approved Project Title **Integrated prediction of wave-induced liquefaction for stable breakwater heads**

2008 : \$ 110,000

2009 : \$ 110,000

2010 : \$ 110,000

Primary RFCD 2912 MARITIME ENGINEERING

Administering Organisation The University of Sydney

Project Summary

Breakwaters are central to the economies and lifestyles of many coastal areas around the world. The liquefaction of breakwater foundations causes the failure of breakwaters, with potentially deleterious consequences for life and property. The remedies involve large investments in maintenance and cause major disruptions to coastal activities. More accurate and reliable methods for analysing the stability of structures and their foundations is urgently required, and will bring major benefits to Australian coastal facilities. We will create the science to transform our understanding of the mechanisms of wave-induced liquefaction. This will enable engineers to significantly improve the stability and robustness of marine structures.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0877726 Dr KA Jolliffe

Approved Project Title **Novel Synthetic Receptors For Selective Recognition of Phosphate Oxoanions**

2008 : \$ 115,000

2009 : \$ 114,000

2010 : \$ 109,000

Primary RFCD 2599 OTHER CHEMICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

Anions are critical to the maintenance of life, playing roles in almost every biochemical process. Artificial anion receptors that bind strongly to specific anions have considerable potential applications in biomedicine, but current receptors do not possess the required selectivity for applications. We will undertake the design and construction of a number of molecular receptors tailored to complement the size, shape and charge of specific biologically important anions and will assess their ability to bind selectively to their target guests. This will lead to the development of small molecule receptors for use in biomedical applications.

DP0877733 A/Prof CA Jones; Prof AL Cunningham; Dr SI Alexander

Approved Project Title **The effect of age on regulatory T cell control of the innate and adaptive antiviral immune responses**

2008 : \$ 106,000

2009 : \$ 106,000

2010 : \$ 106,000

Primary RFCD 2703 MICROBIOLOGY

Administering Organisation The University of Sydney

Project Summary

Viral pathogens are a lead cause of infant mortality in the world. This project will define how T regulatory cells limit protective antiviral immune responses in the young. This information is critical for the development of potent antiviral vaccines that are effective from the newborn period without inducing autoimmunity. It will also provide novel insight into the way T regulatory cells can be manipulated both to dampen immunity, which can be used to develop strategies to reduce immune mediated disease and limit transplant rejection.

DP0877665 A/Prof J Kay; A/Prof RJ Kummerfeld

Approved Project Title **Pervasive Lifelong User Modelling for User Controlled Personalisation and Augmented Cognition**

2008 : \$ 85,000

2009 : \$ 80,000

2010 : \$ 75,000

2011 : \$ 60,000

2012 : \$ 49,322

Primary RFCD 2801 INFORMATION SYSTEMS

ARF A/Prof J Kay

Administering Organisation The University of Sydney

Project Summary

This project will give users the ability to scrutinise and control their personal data gathered in pervasive computing environments.

This addresses people's concerns about privacy and overcomes a critical barrier for progress in the development of pervasive computing. This provides national benefit in the following ways:

we will build software infrastructure that will have commercial and strategic value; we will build a set of demonstrator applications

that address the national priority areas of smart information use, and promoting and maintaining good health; and we will enhance knowledge of the complementary fields of user modelling, context aware computing and personal privacy management.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881063 Dr J Kim

Approved Project Title **Innovative visualization of next-generation biomedical images**

2008 : \$ 58,986

2009 : \$ 58,986

2010 : \$ 88,000

2011 : \$ 84,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

APD Dr J Kim

Administering Organisation The University of Sydney

Project Summary

This project addresses the difficult problems associated with managing the vast amounts of data that are currently available with advanced imaging devices and displaying these data so that the maximum amount of information can be extracted. Developing visualization capabilities for such data is not a trivial undertaking but the outcome of this research will produce enabling visualization technologies that will significantly impact the life science, biomedical research and the way clinicians view and use these data for patient management. These technologies will have broad applications across biology and molecular science and will enhance Australia's leading position in the development of frontier technologies.

DP0877789 Prof PW Kuchel

Approved Project Title **Nuclear magnetic resonance (NMR) studies of complex cellular responses: isotopomer sub-spaces, 'lost' ATP and 'tunable' anisotropy**

2008 : \$ 169,000

2009 : \$ 167,000

2010 : \$ 164,500

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

Red blood cells (RBCs) transport oxygen around the body but they have other roles that are mediated by complex interconnecting metabolic pathways that generate myriad metabolites including ATP. A longstanding conundrum is the inability to account for ~60% of ATP turnover in human RBCs. Processes that may consume this 'lost' ATP, include autonomous motion of the cell membrane called 'flickering', and maintenance of the biconcave-disc shape. NMR spectroscopy of quadrupolar nuclei in chiral aligned media, and isotopomer analysis will be used to define the kinetics of metabolism and membrane processes and thus help define the molecular basis of major blood disorders.

DP0881528 Dr BT Kuhlmeij; Prof BJ Eggleton; Prof JC Knight

Approved Project Title **Ultra-sensitivity through resonances in photonic bandgap fibres**

2008 : \$ 90,000

2009 : \$ 85,000

2010 : \$ 80,000

Primary RFCD 2999 OTHER ENGINEERING AND TECHNOLOGY

Administering Organisation The University of Sydney

Project Summary

The project will develop innovative biochemical sensors with extreme sensitivity using recently discovered physical processes in novel holey optical fibres. These sensors will be able to detect biological molecules, toxins or dangerous chemicals in minute concentrations, in very small sample sizes. The sensors can be mass-produced cheaply with current fabrication facilities within Australia, enabling their widespread use for water quality monitoring, environmental monitoring, threat detection, and rapid and reliable diagnosis in medicine.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0878069 Dr S Kuyucak; Dr T Bastug

Approved Project Title **Quantum mechanical and dynamical investigation of ion channels**

2008 : \$ 100,000

2009 : \$ 99,000

2010 : \$ 94,000

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

Many genetic diseases result from mutations in the genes that transcribe the channel proteins. Ion channels are also primary targets for development of therapeutic drugs for many ailments. Development of proper simulation tools is essential for a molecular-level understanding of their operation, which will be very helpful in finding treatments for genetic diseases as well as new drugs that target ion channels. Another aim of the project is to provide research training in computational biology. Research in this area is rapidly growing elsewhere but it has been rather neglected in Australia, and there is a shortage of researchers with such skills at present.

DP0878496 Dr MC Large

Approved Project Title **Liquid light: aqueous bio-sensing in microstructured polymer optical fibres**

2008 : \$ 50,000

2009 : \$ 20,000

2010 : \$ 20,000

Primary RFCD 2404 OPTICAL PHYSICS

Administering Organisation The University of Sydney

Project Summary

This project builds on Australia's world-leading position in the development of microstructured polymer optical fibres, and applies the unique benefits they provide to for ultra-sensitive bio-sensing. By using the microstructure to simultaneously confine light and liquid, microstructured optical fibres provide a unique platform for ultra-sensitive spectroscopy and structural studies of biomolecules in solution. The work has profound implications both for fundamental science and applications, particularly in medical diagnostics.

DP0881700 Dr Z Liu; Dr M Mo

Approved Project Title **High-resolution In-situ Characterisation of the Vapour-deposition Growth, the Structures and the Plasmonic Properties of Metallic Nanostructures**

2008 : \$ 100,000

2009 : \$ 100,000

2010 : \$ 100,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Sydney

Project Summary

This project will examine the atomic-scale nucleation and growth of metallic nanostructures in the transmission electron microscope, and will use electron spectroscopy to reveal the relationship between nanoscale morphology and key optical properties. The resulting insights into the kinetics and thermodynamics of nanostructural nucleation and growth will be vital for the design and synthesis of nanomaterials through vapour deposition processes. The project also will provide a deep understanding of the origin of the surface plasmon resonances of metallic nanostructures, which will provide the basis for development of advanced materials for applications in solid-state lighting, electronics, sensors and other technologies.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0880865 Dr EJ Livesey
Approved Project Title **Attentional Processes in Human Associative Learning**

2008 : \$ 68,000
2009 : \$ 65,000
2010 : \$ 68,000
2011 : \$ 65,000

Primary RFCD 3801 PSYCHOLOGY

APD Dr EJ Livesey

Administering Organisation The University of Sydney

Project Summary

This project will identify the mechanisms responsible for changes in stimulus processing during learning and will shed light on the relationship between learning and attention, factors which are crucial to our understanding of human cognition and behaviour. The project will help to build an informed understanding of attentional change and the neural basis for attention and learning. Many professions involve constantly competing demands on attention, often under strict time constraints. A better understanding of how attentional processes change with learning will benefit skill-based training practices, particularly in high-pressure occupations.

DP0877588 Dr D Lu

Approved Project Title **Theoretical study and experimental verification of low cost, integrated and efficient AC/DC power supplies using time-multiplexing control**

2008 : \$ 50,236
2009 : \$ 50,236
2010 : \$ 50,236

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Sydney

Project Summary

The project aims to reduce the amount of energy waste and cost due to inefficient AC/DC power supplies by introducing a novel power supply technique - combining conventional two-stage power circuits and using time-multiplexing control. Improvements in power supply efficiency and size will mean reduced total cost, improved product lifetime and reduced heating up of the environment, leading to a reliable product that is particularly relevant to the Australian switching power supply industry. The development of this technology will help to put Australia into a leading position internationally in the design and manufacturing of AC/DC power supply.

DP0877080 Prof Y Mai; A/Prof Q Guo

Approved Project Title **Nanostructure Design and Toughening Mechanisms of Novel Thermosets**

2008 : \$ 170,000
2009 : \$ 160,000
2010 : \$ 160,000
2011 : \$ 140,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation The University of Sydney

Project Summary

The research will enable a new technology to manufacture a class of novel nanostructured thermosets that will impact many application areas in Australia, such as protective surface coatings, structural adhesives and composite matrix materials for aerospace and automotive, and microelectronic devices, etc. The intellectual properties and patents generated will contribute to the overall competitiveness and productivity of Australia's R&D. They will also provide business opportunities to develop niche markets for these new and high-value added materials on a large scale in Australia so as to maximise return and create jobs.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881513 Prof JR Martin; Dr PG Dwyer; Ms MS Zappavigna

Approved Project Title **Enacting Reconciliation: Negotiating Meaning in Youth Justice Conferencing**

2008 : \$ 95,000

2009 : \$ 97,000

2010 : \$ 67,000

2011 : \$ 58,986

Primary RFCD 3802 LINGUISTICS

APD Ms MS Zappavigna

Administering Organisation The University of Sydney

Project Summary

'Restorative justice' initiatives like youth justice conferencing are aimed at strengthening the social fabric by making sure the voices of victims are heard while giving offenders a genuine opportunity to 'set things right' and get back on track with their lives. More detailed research into the way participants use language and other communicative modes will help the convenors of conferences, and the trainers of convenors, to understand better the potential of this social healing process. This project will also add to Australia's reputation as a world-leader in the field of restorative justice.

DP0881856 Prof AR Masri

Approved Project Title **Investigations of Surface-Gas Reactions and Mixing in Micro-combustion**

2008 : \$ 130,000

2009 : \$ 130,000

2010 : \$ 130,000

Primary RFCD 2905 MECHANICAL AND INDUSTRIAL ENGINEERING

Administering Organisation The University of Sydney

Project Summary

This proposal is closely aligned with the third national research priority of 'Frontier Technologies and Transforming Australian Industries'. Micro-power generation is one such technology that will provide power for a broad array of current and future devices ranging from micro-electronics to micro-propulsion systems. Studies conducted here will lead to enhanced mixing and flame stability in micro-combustors. This will place Australia at the leading edge of international research in this field and enables technological advancement in the emerging micro-power generation industry. Another benefit of this research is the training of graduates who will most likely lead future developments in micro-combustion engineering.

DP0881714 A/Prof AF Masters; Prof Dr T Maschmeyer; Prof RI Christopherson

Approved Project Title **Nanotherapeutics: nanoparticles with high specificity for the delivery and controlled release of drugs**

2008 : \$ 115,000

2009 : \$ 114,000

2010 : \$ 109,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Sydney

Project Summary

This technology will deliver therapeutic drugs and/or MRI contrast agents to individual diseased cells with very high specificity and selectivity. The cells can be interrogated to determine when they are "loaded" and the site of the "loaded" cells precisely determined. Drugs can be released photochemically. The administered dosage can be decreased with no loss of efficacy, and side effects reduced.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0877202 A/Prof A Mathas
Approved Project Title **Modular representations of cyclotomic algebras**
2008 : \$ 88,000
2009 : \$ 83,000
2010 : \$ 78,000
Primary RFCD 2301 MATHEMATICS
Administering Organisation The University of Sydney

Project Summary

This project addresses cutting edge questions in the representation theory of cyclotomic Hecke algebras. Our main focus will be computing decomposition matrices for these algebras. We approach this question from several different directions, each of which will give new insights and lead to significant advances in the theory. The decomposition number problem is important because its solution gives deep structural information about these algebras which can then be applied in other areas. This project will have high impact because cyclotomic Hecke algebras have applications in many different areas and they are currently a hot topic of research in mathematics.

DP0877585 Dr C McArthur; Dr P Banks
Approved Project Title **How do foraging herbivores negotiate the twin perils of plant toxins and predators?**
2008 : \$ 85,000
2009 : \$ 85,000
2010 : \$ 85,000
Primary RFCD 2707 ECOLOGY AND EVOLUTION
Administering Organisation The University of Sydney

Project Summary

Our research uses a new framework which links the costs of both plant toxins and predation risk to determine their effects on individual foraging herbivores. This will enable a new way of analysing and predicting the impact of changes to habitat diversity on native herbivores, and the impact of invasive alien herbivore and predator species on natural ecosystems and in human crop production. This is extremely valuable in today's economic and social climate, when management must be underpinned by evidence of impact and by quantification of costs and benefits of mitigation.

DP0881859 Prof RC McCallum; Dr S Jamieson; Dr T Schofield
Approved Project Title **Workplace Death and Injury: Re-visiting the Regulatory Impact of Prosecution and Deterrence**
2008 : \$ 91,694
2009 : \$ 126,674
2010 : \$ 126,869
Primary RFCD 3901 LAW
Administering Organisation The University of Sydney

Project Summary

The project will be conducted in Australia's two most populous States and falls squarely within the Commonwealth Government's mission of 'promoting good health and well being for all Australians' - one of the key national research priorities. In particular the project supports the specific goal of 'strengthening Australia's social and economic fabric' by examining the role played by legal prosecution of OH&S offences in deterring serious workplace injuries and fatalities. It is anticipated that the results of the project will be used to reduce the heavy costs that current rates of workplace injuries and deaths impose on Australian workers, their families and the national economy.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881806 Prof DR McKenzie

Approved Project Title **Control of Protein Attachment and its Optical Detection**

2008 : \$ 170,000
2009 : \$ 170,000
2010 : \$ 170,000
2011 : \$ 160,000
2012 : \$ 120,000

Primary RFCD 2999 OTHER ENGINEERING AND TECHNOLOGY

APF Prof DR McKenzie

Administering Organisation The University of Sydney

Project Summary

Protein array technologies have applications in the rapid diagnosis of disease. Biosensors can detect traces of biohazards. Before widespread implementation of these technologies can occur however, a rapid, sensitive and convenient readout method for the control and readout of attachment of proteins to antibodies is needed. I will use electric fields, combined with array imaging at surface plasmon resonance to achieve this aim. This protein diagnostic array technology will enable accurate and rapid diagnosis of disease, generating savings on health costs and improving public health. Manufacture in Australia will bring further economic benefits.

DP0878083 Prof DB Melrose; Dr MS Wheatland

Approved Project Title **Quantum plasmas**

2008 : \$ 110,000
2009 : \$ 109,000
2010 : \$ 104,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Organisation The University of Sydney

Project Summary

Quantum effects become important under extreme conditions, and a newly developing field of "quantum plasmas" is motivated by two different extremes for ionized systems. One is in very small electronic devices, where electrons carrying the currents become wave-like with a wavelength comparable with the size of the device. The other is in the extremely intense optical light spots now available by focusing high-power lasers. In this project we propose to take a leading role in the development of this emerging field by applying a recently completed general theory to it.

DP0878870 Dr B Minasny

Approved Project Title **Devising a methodology for the digital soil map of the world**

2008 : \$ 220,000
2009 : \$ 200,000
2010 : \$ 200,000
2011 : \$ 130,000
2012 : \$ 130,000

Primary RFCD 3001 SOIL AND WATER SCIENCES

QEII Dr B Minasny

Administering Organisation The University of Sydney

Project Summary

Soil mapping is a key part of land-resource assessment for sustainable environmental management. The output will enable the use of soil data and information to give a clear understanding of the status of, and changes in, the nation's land, vegetation and water resources and implications for their sustainable use. This global good will be used by district agricultural extension workers, and policy decision makers in developing countries to assist in improved crop production and sustainable land management.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0878914 Dr Al Molev
Approved Project Title **Quantum algebras: their symmetries, invariants and representations**
2008 : \$ 80,000
2009 : \$ 75,000
2010 : \$ 70,000
Primary RFCD 2301 MATHEMATICS
Administering Organisation The University of Sydney

Project Summary

The project addresses major outstanding mathematical problems, which are of fundamental importance to theoretical physics. The algebraic structures originated from statistical mechanics will be investigated by methods of modern mathematics. Successful completion of the project will provide physicists with important new tools for investigating the symmetry of phenomena such as quantum gravity and spinor reflections. Success of the project will help to create a scientific environment in Australia that fosters technological creativity and innovation. Results of the project will greatly enhance the scientific reputation of Australia internationally, attracting foreign researchers and PhD students to Australia.

DP0879609 Dr T Nguyen
Approved Project Title **Developing a new technology: advanced surface hardening and grinding in a single operation**
2008 : \$ 105,000
2009 : \$ 100,000
2010 : \$ 100,000
Primary RFCD 2905 MECHANICAL AND INDUSTRIAL ENGINEERING
APD Dr T Nguyen
Administering Organisation The University of Sydney

Project Summary

Our advances will give Australian manufacturing industry first access to a significant technological advance in precision grinding, a critical machining process. This will improve our international competitiveness, through major cost reductions by simplifying the manufacturing procedure and by eliminating the use of toxic coolants. The technology will provide significant opportunities for further Australian research in precision machining by creating a foundation for extending the technology to more complex manufacturing processes.

DP0880844 Prof KN North; Dr GA Huttley
Approved Project Title **Molecular dissection of the effects of alpha-actinin-3 deficiency on normal variation in skeletal muscle function**
2008 : \$ 119,188
2009 : \$ 119,188
2010 : \$ 119,188
Primary RFCD 2702 GENETICS
Administering Organisation The University of Sydney

Project Summary

We will study the mechanisms by which a common genetic variant influences muscle bulk, muscle strength and the metabolic efficiency of muscle in the general population. Common genetic variants that influence skeletal muscle function have major potential public health implications as they are likely to influence individuals' response to exercise and diet, and to contribute to susceptibility to common diseases such as obesity, diabetes, and the loss of muscle strength in the elderly. In addition, the identification of genetic factors that influence muscle bulk in vertebrates has implications for breeding programs in sheep and cattle and may provide commercial benefit to the livestock industry.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0880342 Prof VG Oklobdzija; Dr BR Zeydel

Approved Project Title **Design Methodology for Low- and Ultra-Low Power Integrated Circuits**

2008 : \$ 130,000

2009 : \$ 130,000

2010 : \$ 120,000

2011 : \$ 80,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Sydney

Project Summary

This project will develop low-power and ultra low-power technology that is applicable to wide range of products and electronic devices. The results will benefit many areas, for example, wireless sensors employed in environmental monitoring, bio and life monitoring, bio-sensors to improve patient care, reduce medical costs, implantable devices and bio-interfaces that will enhance the quality of life and public health. This project will benefit Australia by developing frontier technologies with a strong potential for global impact. Bringing these solutions to the public and realizing their financial benefits will add a valuable component of economic diversity to the country in addition to positioning Australia as a leader in this field.

DP0880667 A/Prof BR Paltridge; Dr SB Starfield; Dr LJ Ravelli

Approved Project Title **Writing in the academy: the practice-based thesis as an evolving genre**

2008 : \$ 70,000

2009 : \$ 70,000

2010 : \$ 70,000

Primary RFCD 3303 PROFESSIONAL DEVELOPMENT OF TEACHERS

Administering Organisation The University of Sydney

Project Summary

National benefits of this project include:

An improvement in the quality of research higher degree scholarship in the areas of the Creative and Performing Arts in Australian universities

A greater understanding of what counts as successful writing in practice-based doctoral theses in Australian universities

A research-informed basis for the development of training initiatives which target the specific needs of students writing practice-based doctoral theses in Australian universities

A research-informed basis for improving the quality of research higher degree supervision in the areas of the Creative and Performing Arts in Australian universities

DP0881396 Dr AR Parker; Dr C Grillet

Approved Project Title **Optical Biomimetics of Diatoms**

2008 : \$ 135,000

2009 : \$ 134,000

2010 : \$ 129,000

Primary RFCD 2404 OPTICAL PHYSICS

Administering Organisation The University of Sydney

Project Summary

Optics is a research and economic strength of Australia. We will aim to provide a new optical sensor for chemicals using a diatom. This use of an optical device found in nature is groundbreaking and may provide a more efficient form of sensor to help to detect pollution such as metals in marine environments. Alternatively, diatoms could become the component of an iridescent paint for cars or other commercial objects. Diatoms could be made-to-measure in the laboratory on a commercial scale, and so may introduce a new industry, where other optical devices in nature could be cultured by the tonne.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0880657 Prof H Price; Dr G Bacciagaluppi; Dr MA Schlosshauer

Approved Project Title **Time-asymmetry and the Bohmian view of the quantum world**

2008 : \$ 64,000

2009 : \$ 60,000

2010 : \$ 84,000

Primary RFCD 4401 PHILOSOPHY

Administering Organisation The University of Sydney

Project Summary

Australia is among the world leaders in research on decoherence and time asymmetry. This research will make significant and innovative contributions to a unified understanding of these two areas by determining their connections and mutual implications. It will thus play an important role in further expanding Australia's role in fundamental research on the boundary between philosophy and physics. Results from this research will also be relevant to the theoretical and conceptual basis of next-generation quantum technologies.

DP0881564 Mr FT Ramos

Approved Project Title **Learning from Uncertain and Missing Labelling in Relational Data**

2008 : \$ 78,648

2009 : \$ 78,648

2010 : \$ 78,648

Primary RFCD 2903 MANUFACTURING ENGINEERING

APD Mr FT Ramos

Administering Organisation The University of Sydney

Project Summary

Perceptual models for unstructured environments require complex modelling, usually specified in an ad-hoc manner. This project will substantially increase the range of robotic applications by learning more complex spatial statistical models for perception in challenging environments. Robots will be able to improve their perception capabilities with minimal human supervision.

Mining is one of the major components of the Australian economy. This project will improve mining automation and contribute to a more efficient industry, capable to compete internationally in the new globalisation context. Efficient extraction will also reduce the human impact and will be a significant factor for an environmentally sustainable development.

DP0879018 Dr SM Robertson

Approved Project Title **Private Eyes and Ears: Covert Surveillance in American Life, 1865-1941**

2008 : \$ 50,572

2009 : \$ 32,312

2010 : \$ 32,500

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

Australia's political engagement with the United States is central to its foreign and domestic policies. Encounters with American culture are a regular part of Australians' daily lives. Enhancing the capacity to interpret the United States is therefore crucial to the Priority Goal of 'Understanding our region and the world.' The project provides a historical perspective on the attitudes that underpin American responses to terrorism, and on ideas of freedom that are crucial to interpreting American foreign policy. It develops a framework for thinking about personal surveillance that can also contribute to discussions of Australia's own responses to terrorism.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0877816 Prof PA Robinson

Approved Project Title **Quantitative dynamics of functional magnetic resonance imaging**

2008 : \$ 90,000

2009 : \$ 100,000

2010 : \$ 100,000

Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

By modeling and verifying the dynamics of brain activity and blood flow that underlie functional magnetic resonance imaging (fMRI), this project will yield improved scientific outcomes and imaging sensitivity. The new data analysis techniques and technologies that result will yield potentially patentable intellectual property, and will increase the standing of Australia in this rapidly developing field, including via links being built to leading international workers. The National Research Priority Goals of Frontier Technologies, Breakthrough Science, Smart Information Use, and Promoting an Innovation Economy will thus be advanced.

DP0880610 A/Prof JR Sheen

Approved Project Title **Noisy Parity Relationships in International Macroeconomic Models**

2008 : \$ 82,000

2009 : \$ 55,000

2010 : \$ 20,000

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation The University of Sydney

Project Summary

Macroeconomic models of the Australian economy play a key role in the design of monetary and fiscal policy. Policymakers use these models either implicitly or explicitly, and usually begin to learn about them in principles courses. Parity relationships are foundation elements of these models, and have powerful implications for our understanding of macroeconomic dynamics. Classical statistical tests may have falsely led to an unhealthy agnosticism regarding many of these relationships. This research will bring more appropriate statistical techniques to bear upon the problem, and if successful will restore confidence in decision-making processes and the relevance and applicability of macroeconomic models.

DP0877595 Dr JH Simpson; Dr I Arka; Dr AD Andrews; Dr ME Dalrymple

Approved Project Title **Understanding Indonesian: developing a machine-usable grammar, dictionary and corpus**

2008 : \$ 96,000

2009 : \$ 76,000

2010 : \$ 97,000

Primary RFCD 3802 LINGUISTICS

Administering Organisation The University of Sydney

Project Summary

Australia's relationship with Indonesia is of great significance. The need for good relationships founded on appreciation of the range of societies and views in modern Indonesia is widely acknowledged. A better knowledge of the languages is essential for this, and so are fast, efficient information gathering systems for processing multilingual sources (including Indonesian text), that can analyse large volumes of text. The skills to build such systems exist internationally. Through collaboration with established international teams, we plan to transfer cutting-edge skills in the development of machine-useable grammars to Australian researchers, and to create the language resources essential for understanding Indonesian.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0878935 Dr NJ Smith
Approved Project Title **A Computational Solution to the Problem of Reference**
2008 : \$ 42,972
2009 : \$ 22,000
2010 : \$ 20,000
Primary RFCD 4401 PHILOSOPHY
Administering Organisation The University of Sydney

Project Summary

This project will attack the core problem of philosophy of language by developing and applying tools from the theory of algorithmic complexity. Groundbreaking pure research at the intersection of logic, language, information and computation is the lifeblood of commercial research and development in information technology and telecommunications. The project will foster a cross-fertilisation of ideas between philosophy, computer science, mathematics, linguistics and psychology, and will provide students with skills and analytic techniques that will be valuable in future pure and applied research.

DP0881829 Prof AW Snyder; Prof TR Bossomaier; Dr IR Harvey
Approved Project Title **Evolving largest scale concept structures**
2008 : \$ 80,000
2009 : \$ 75,000
2010 : \$ 70,000
Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING
Administering Organisation The University of Sydney

Project Summary

This project will find new methods of collective intelligence- many small computer programs acting in synergy. Such software has many applications from data mining to networks of sensors, but the main focus will be on one of the Grand Challenges of artificial intelligence -- the Japanese game of Go. Go is at least as difficult as Chess but computers are far from reaching the skill of human experts. Insights into the human brain from autism and savants will form the foundations of the new computational approaches we will develop.

DP0881012 Dr L Soon; A/Prof FC Braet; A/Prof EW Thompson; Dr P Vallotton
Approved Project Title **A New Model for 3D Migration Involving Claw Structures and Metalloproteinases**
2008 : \$ 80,000
2009 : \$ 80,000
2010 : \$ 80,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY
Administering Organisation The University of Sydney

Project Summary

This proposal will revolutionize ideas related to cell movement through three-dimensional (3D) matrix. Our method in mimicking the body's dense 3D matrix environment have led to the discovery of a new cell structure called Claws, and the formulation of a new model for 3D invasion in high density matrix. We will study the genes that control this type of migration including those involved in the formation of the cell front (Claw region), the back of the cells and matrix digestion. This work will have significant impact on normal and pathological human conditions from immune responses to tissue regeneration and cancer.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0879121 Dr M Sunde; Dr AH Kwan; Dr ER Tovey

Approved Project Title **A novel approach to fighting fungal infections: targeted disruption of hydrophobin monolayers.**

2008 : \$ 82,838

2009 : \$ 81,264

2010 : \$ 80,149

Primary RFCD 2703 MICROBIOLOGY

Administering Organisation The University of Sydney

Project Summary

Fungal infestations of important crops such as cotton cause large economic losses to Australian agriculture while in the medical sector, fungal infections are responsible for high levels of mortality in immunocompromised patients. Our research will provide a new approach to fighting fungal infections by targeting the hydrophobin proteins, which form a robust coating on fungal aerial structures, such as spores. This layer is critical for fungal growth and reproduction and confers water resistance and tolerance to harsh conditions. Our work seeks to develop reagents that can specifically block regions on the protein that are responsible for forming this coating.

DP0877542 Dr GA Sword; Prof SJ Simpson; Dr N Lo; Prof L Kang

Approved Project Title **The functional genomics of locust migratory behaviour**

2008 : \$ 203,000

2009 : \$ 213,000

2010 : \$ 203,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of Sydney

Project Summary

Unravelling the molecular genetic basis of locust migratory behaviour will place Australia at the forefront of international biological research and simultaneously contribute to the development of new and safer ways to manage these notorious agricultural pests. We will use genomics and gene expression analyses to identify the suite of genes involved in the behavioural changes that catalyse locust swarm formation and migration. This collaborative study will enhance international relations with China, foster the development of gene-focused locust control strategies, and provide an exemplar study of an important and complex problem faced by Australia and international community.

DP0878618 Prof FC Teiwes; Dr WW Sun

Approved Project Title **The Post-Mao Transition in China: From the Ashes of Revolution toward Reform, 1976-1978**

2008 : \$ 63,000

2009 : \$ 50,000

2010 : \$ 50,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

The project contributes to national benefit by deepening understanding of a regional powerhouse, the People's Republic of China. While the study is historical, it has relevance for Australia's contemporary dealings with China since key aspects of Chinese leadership politics such as the tension between formal and informal authority derive from the period under examination. As such it furthers the national research priority of 'Understanding our region and the world'. In addition, the study will further enhance the reputation of Australian scholarship on China, thus sustaining its world standing as second only to that of the United States.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0878619 Prof MB Thompson; Prof CR Murphy

Approved Project Title **Plasticity in placental vasculature and the evolution of viviparity in lizards**

2008 : \$ 120,000

2009 : \$ 120,000

2010 : \$ 120,000

Primary RFCD 2706 PHYSIOLOGY

Administering Organisation The University of Sydney

Project Summary

This cross-disciplinary research will provide thorough understanding of the reproductive physiology of animals with different forms of reproduction, information critical for conservation and management of Australia's biodiversity. Australia's unique reptiles provide the best animal system in the world for research in this area. Our research on maternal-embryonic interactions in this animal model has direct implications for understanding some medical disorders, such as human angiogenic disorders. The research will strengthen ties internationally through research in South Africa, and provide training in combined biological and medical technologies. It will maintain Australia's long-term leadership in this area of research.

DP0878674 Dr PG Tuthill; Dr MJ Ireland; Dr TA ten Brummelaar

Approved Project Title **Multiplicity in Star and Planet Formation with the PAVO instrument**

2008 : \$ 140,000

2009 : \$ 164,000

2010 : \$ 109,000

2011 : \$ 90,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

APD Dr MJ Ireland

Administering Organisation The University of Sydney

Project Summary

The Precision Astronomical Visible Observations (PAVO) instrument will pursue some of the most active and inspirational topics in contemporary astrophysics: tracing the formation of stars and solar systems. PAVO will focus on binary and multiple stars, directly detecting many new stellar companions, finding planets through the side-to-side wobble induced on their parent stars and imaging the complex process of stellar and planetary birth. The path to these goals lies through advances in the manipulation of light embodied by the PAVO instrument which will allow it to obtain higher spatial resolution on fainter objects than any competing approach.

DP0881219 Dr FA van Schaik

Approved Project Title **Electronic Auditory Pathway**

2008 : \$ 195,000

2009 : \$ 180,000

2010 : \$ 105,000

2011 : \$ 105,000

2012 : \$ 60,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

QEII Dr FA van Schaik

Administering Organisation The University of Sydney

Project Summary

We will develop electronic building blocks to investigate biological signal processing. In particular, we will investigate the auditory pathway and develop the most accurate electronic model of the biological cochlea and auditory nerve. These will be followed by electronic circuits that model the processing of sensory signals in the brain. Processing signals with neural spikes offers distinct advantages over current analogue and digital signal processing techniques in terms of noise, energy consumption and extraction of temporal information. We will implement the first spike-based models of pitch and timbre perception, and a neural model of speech recognition in noisy environments.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0877090 Prof B Vucetic; Dr Y Li; Dr M Dohler

Approved Project Title **Dynamic Spectrum Access in Multi-Hop Wireless Broadband Networks**

2008 : \$ 214,000
2009 : \$ 214,000
2010 : \$ 214,000
2011 : \$ 170,000
2012 : \$ 141,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

QEII Dr Y Li

Administering Organisation The University of Sydney

Project Summary

Recent studies have shown that significant portions of the licensed spectra are idle most of the time. Cognitive radio is a technology allowing unlicensed devices to use parts of the licensed spectrum not occupied by the licensed devices. In this program we will design communication networks capable of sensing the radio environment and selecting suitable spectral bands for transmission. This program will expand the knowledge of cognitive networks theory by creating new dynamic spectrum access and interference cancellation techniques. The proposed research is significant for improving the radio spectrum usage in Australia and it will have an excellent commercial potential.

DP0881760 Prof GG Warr

Approved Project Title **Kinetic Control of Nanomaterial Assembly by Novel Polymerisable Surfactants**

2008 : \$ 115,000
2009 : \$ 114,000
2010 : \$ 109,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Sydney

Project Summary

To build a competitive edge in the future Australian industries need to exploit the manipulation of matter at and near molecular length scales in order to create and use advanced nanostructured materials. In this project, using newly-discovered reactive surfactants we will develop novel methods for assembling and templating the formation of nanostructured polymeric and composite materials with a very broad range of potential applications. Australian postgraduate and postdoctoral researchers will be trained in advanced techniques for the creation and characterisation of self-assembled materials.

DP0879728 Dr SB Williams

Approved Project Title **Autonomous Exploration and Characterization of Benthic Habitats Linked to Oceanographic Processes**

2008 : \$ 49,000
2009 : \$ 45,000
2010 : \$ 40,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation The University of Sydney

Project Summary

The work specifically addresses the National Research Priorities in sustainable use of Australia's biodiversity and climate change. Without a thorough understanding of processes that affect the state of health of our oceans they will continue to be affected by natural phenomena and stresses caused by human activity. A more comprehensive understanding of these natural systems and the interplay with human activities is therefore essential.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0878559 Dr PK Witting
Approved Project Title **Cellular response to pro-oxidative myoglobin**
2008 : \$ 140,000
2009 : \$ 140,000
2010 : \$ 140,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY
Administering Organisation The University of Sydney

Project Summary

The heart is vulnerable to oxidative damage as specialised muscle cells termed myocytes are unable to regenerate. Oxidative damage to myocytes decreases cell viability and in turn heart muscle function. Pro-oxidative forms of the protein myoglobin are present in the heart and may play a role in damaging myocytes. This study will determine whether a series of novel synthetic antioxidants inhibit myoglobin-mediated damage to heart muscle and preserve function. This may lead to new therapies to combat cardiovascular disease and enable ageing Australians to maintain productive and independent lifestyles.

DP0880013 Dr JG Wood; Dr PA Caley
Approved Project Title **Modelling and estimation techniques for the transmission and control of Tuberculosis with new and existing vaccines.**
2008 : \$ 75,000
2009 : \$ 72,000
2010 : \$ 69,000
Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES
Administering Organisation The University of Sydney

Project Summary

Most Tuberculosis in Australia is seen in foreign-born people. Australia has an important role in providing leadership in the Asia-Pacific region in Tuberculosis control, which will have flow-on benefits to TB control in this country. Using mathematical models, this project will assess the use of vaccines for Tuberculosis in the developing world. Rising levels of extremely drug resistant infections make this a timely and important study with significant policy implications, both externally and in the Australian context.

DP0880291 Prof AD Woodland
Approved Project Title **International Trade Policy Evaluation, Economic Growth and Demographics**
2008 : \$ 172,205
2009 : \$ 167,348
2010 : \$ 173,935
2011 : \$ 179,285
2012 : \$ 155,285
Primary RFCD 3402 APPLIED ECONOMICS
APF Prof AD Woodland
Administering Organisation The University of Sydney

Project Summary

The research will strengthen our understanding of Australia's place in the region and the world. Given Australia's dependence upon international trade, the importance of economic growth and demographic change, the relevance of inter-generation welfare and the challenges arising from globalization and the international trade policy environment, knowledge of the power and implications of international trade policies is crucial. This research will provide an analytical framework that will better inform policy makers and analysts and contribute to better understanding of Australia's options and role in the international trade policy arena. The result will be better trade policy choices.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881038 Dr BD Yabsley

Approved Project Title **A programme to study quarkonium-like states at ATLAS**

2008 : \$ 125,000
2009 : \$ 124,000
2010 : \$ 119,000
2011 : \$ 110,000
2012 : \$ 110,000

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

ARF Dr BD Yabsley

Administering Organisation The University of Sydney

Project Summary

Particle physics, the study of the fundamental building blocks of matter, has pioneered the use of large collaborations --- hundreds of scientists working in dozens of countries --- to solve difficult research problems. Australian groups have contributed to several such experiments, studying cosmic rays, neutrinos, and broken symmetries, as well as developing ATLAS, a vast experiment dedicated to understanding the origin of mass. This project seeks to use ATLAS for a new purpose: searching for exotic mesons. Our existing commitment to ATLAS provides an opportunity to develop this as a new avenue of fundamental research in this country.

DP0880433 Prof L Ye; Dr Z Yu

Approved Project Title **Fundamental roles of nano-particles in composite-fibre/epoxy-polymer (CF/EP) composites**

2008 : \$ 103,000
2009 : \$ 100,000
2010 : \$ 100,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation The University of Sydney

Project Summary

There is a significant demand for value-added, innovative epoxy resins for various applications. Australia has a well established aerospace industry and world-leading expertise in synthesising and processing inorganic nano-particles. The outputs of this project will be beneficial to both material manufacturers and design engineers. Understanding the fundamental roles of functional nano-fillers will stimulate scientific and technological interests for future research and development of multifunctional engineering materials with improved properties and structures designed in the nano-scale. The project will give Australian researchers a technological edge over their competitors in materials science and engineering.

DP0880492 Prof L Ye

Approved Project Title **Fundamentals of active sensor network for damage identification in engineering structures**

2008 : \$ 130,000
2009 : \$ 125,000
2010 : \$ 120,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation The University of Sydney

Project Summary

The development of active sensor network techniques for Australia's vast civil and defence infrastructure will improve operational safety, reduce maintenance costs and extend the residual life of many of our engineered assets. The resulting cost-efficiencies will advantage Australian producers in competitive global markets; our companies will be well placed to produce and install active sensor network techniques and to provide training in the associated asset management systems. Australian industry will have a unique opportunity to collaborate with the world-class research networks on emerging areas such as damage diagnosis, prognosis and control, and structural repair.

Summary of Discovery Projects Proposals for Funding to Commence in 2008

DP0881708 Dr PM Young; Dr D Traini

Approved Project Title **Engineering of co-crystal drug molecules for pharmaceutical aerosols**

2008 : \$ 100,000

2009 : \$ 100,000

2010 : \$ 100,000

Primary RFCD 3205 PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

This project will enable Australia to become a world leader in treatment of respiratory diseases. The Australian financial burden of respiratory diseases is currently estimated as \$900m with significant impact on infrastructure (through regular clinical visits, hospitalisation and workforce loss). The global market for the treatment of COPD is currently \$32 billion and is expected to increase significantly by 2010. The positioning of an Australian research as a world leader in the development of new treatments will have significant national benefit, whilst the sector will benefit for scientific advancements that arise during this project.

DP0881385 Prof L Zhang; Ms YA Chen; A/Prof W Gao

Approved Project Title **An innovative manufacturing technology enabling new generations of hip joint prostheses**

2008 : \$ 390,000

2009 : \$ 390,000

2010 : \$ 340,000

2011 : \$ 380,000

2012 : \$ 360,000

Primary RFCD 2903 MANUFACTURING ENGINEERING

APF Prof L Zhang

Administering Organisation The University of Sydney

Project Summary

The success of the present project will revolutionise the way we produce hip joint prostheses, resolve the critical issues caused by the wear of the hip joint bearing surfaces, and dramatically improve patients' life quality. The project will open an entirely new application field for the Australian made materials which have a very limited market so far. With the innovative technology and the new generations of hip joint prostheses, the international competitive edge of the Australian industry will be markedly sharpened. Patients, and the Australian economy, are expected to benefit greatly from successful developments in this project.