

Queensland

The University of Queensland

FT0991479 Dr AM Abbosh

Approved Project Title **Hybrid Imaging System for Breast Cancer Detection**

2009 : \$ 85,800
2010 : \$ 171,600
2011 : \$ 171,600
2012 : \$ 171,600
2013 : \$ 85,800

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Queensland

Project Summary

Due to the ever increasing number of breast cancer mortalities in Australia, there is an urgent need for an efficient and reliable diagnostic imaging system. This research utilises a novel method to build an imaging system, which is accurate and reliable in the early detection of tumours. The work of this fellowship will improve quality of life of Australian women and put us at the international forefront of research in medical imaging, enhancing our already significant international presence in the area. The project will potentially lead to valuable intellectual property for commercialisation opportunities besides strengthening key international collaborations.

FT0991611 Prof K Alexandrov

Approved Project Title **High throughput engineering of genetically encodable fluorescent sensors of intracellular signalling networks**

2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Administering Organisation The University of Queensland

Project Summary

Understanding of biochemical processes in living organisms is central to biological research and drug discovery. At present, the field suffers from a chronic paucity of adequate observation methods. The proposed project represents an interdisciplinary effort to create approaches for real-time monitoring of complex cellular chemistries. This work will deliver novel technologies for use in diagnostics and drug development. It will provide vital information on the changes in cellular processes induced by malignant transformation, viral infection and aging. This work will generate both health and economic benefits for the community and have a positive impact on the international visibility of Australian biomedical research.

FT0991052 Dr H Baumgardt

Approved Project Title **Advanced computer simulations of star cluster evolution**

2009 : \$ 98,600
2010 : \$ 197,200
2011 : \$ 197,200
2012 : \$ 197,200
2013 : \$ 98,600

Primary RFCD 2401 ASTRONOMICAL SCIENCES

Administering Organisation The University of Queensland

Project Summary

The topic of this fellowship is dynamical simulations of star clusters using high-end graphics cards originally developed for the computer gaming industry. The proposed fellowship will thereby enhance Australia's capacity in the exploitation of high-performance computing and will give it a strong position in the new field of graphics card based simulations. The computer cluster built during the fellowship will also be an outstanding environment for the training of students. In addition, while Australia has a strong tradition in star cluster astronomy, it has so far not captured a leadership role in the theoretical analysis. The four years of this fellowship will allow it to establish a world-leading position in star cluster simulations.

Summary of ARC Future Fellowships Proposals for Funding to Commence in 2009

FT0991525 Prof MW Blows
Approved Project Title **Genetical Genomics of Mutational Variance**
2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400
Primary RFCD 2702 GENETICS
Administering Organisation The University of Queensland

Project Summary

Mutation is the ultimate source of all genetic variation. Understanding the nature of mutation, its frequency, the distribution of effects, and the forces of selection that remove mutational load from populations is therefore a central concern of genetics. The accumulation of mutational load both in endangered species and human populations, where the natural forces of selection tend not to operate, has the potential to create serious problems in these populations. The goal is to understand what types of mutations are targeted by selection at the gene expression level and why.

FT0991468 A/Prof R Cunnington
Approved Project Title **The human mirror system and the perception of others' actions**
2009 : \$ 98,600
2010 : \$ 197,200
2011 : \$ 197,200
2012 : \$ 197,200
2013 : \$ 98,600
Primary RFCD 3801 PSYCHOLOGY
Administering Organisation The University of Queensland

Project Summary

This research will provide greater understanding of how the human mirror system operates for the perception of actions, a crucial first-step toward understanding disorders of action perception such as autism and apraxia. The research program will also contribute greatly to building national capacity in cognitive neuroscience research, using advanced brain imaging methods. The fellow actively encourages and mentors young scientists, organises advanced workshops that bring brain imaging researchers around the world to Australia, and builds international collaborations based around high-field brain imaging. The Future Fellowship will substantially enhance these activities, building capacity and enhancing Australia's reputation in cognitive neurosciences.

FT0991634 Dr GI de Zubicaray
Approved Project Title **The articulate brain**
2009 : \$ 85,800
2010 : \$ 171,600
2011 : \$ 171,600
2012 : \$ 171,600
2013 : \$ 85,800
Primary RFCD 3801 PSYCHOLOGY
Administering Organisation The University of Queensland

Project Summary

Language is essential to human interaction, yet we know comparatively little about the mental processes involved and how they are represented in the brain, how genetic and environmental factors contribute to the development of language, or how effective treatments of language disorders work. The significance of this program of research lies in its capacity to enhance our understanding of a range of mechanisms responsible for a fundamentally human ability, and provide information that will ultimately inform clinical practice. In particular, new knowledge about the brain mechanisms involved in language processing and recovery will inform clinicians about the optimal choice of treatment to maximise outcomes for the individual patient.

Summary of ARC Future Fellowships Proposals for Funding to Commence in 2009

FT0991283 Dr AF Dexter

Approved Project Title **Designed peptides as functional surfactants**

2009 : \$ 85,800
2010 : \$ 171,600
2011 : \$ 171,600
2012 : \$ 171,600
2013 : \$ 85,800

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Queensland

Project Summary

Surfactants are essential in many applications for making oil-water mixtures, e.g. in dissolving drugs, extracting crude oil or spraying crops. However, chemical surfactants are toxic and can accumulate in the environment. This work will develop biodegradable surfactants that can be switched "on" and "off" as needed and do not cause toxicity to living organisms. One of many potential applications is in vaccines for use in remote Aboriginal communities. In these communities, skin infections from scabies and streptococcus are epidemic, and can lead to kidney failure and heart disease. A non-damaging skin cream based on the peptides could both treat short-term discomfort and deliver a vaccine to prevent long-term health consequences.

FT0990685 Dr M Fine

Approved Project Title **Changing Seas at Cellular to Cross-Ocean Scales**

2009 : \$ 98,600
2010 : \$ 197,200
2011 : \$ 197,200
2012 : \$ 197,200
2013 : \$ 98,600

Primary RFCD 2705 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

Australia relies greatly upon its rich natural environmental resources for goods, services and for economic growth (tourism, fisheries, and recreational industries). Climate change is one of the biggest threats to the natural marine environment. As the climate warms and oceans become more acidic, corals, the framework builders of reefs, experience unfavourable conditions. This project aims to better understand the processes by which ocean acidification and climate change affect corals, and to develop management tools for the mitigation of, and acclimation to, climate change. By so doing, this project will enable managers of Australia's Great Barrier Reef to better respond to the threatening challenges that climate change poses.

FT0991982 Prof MA Kendall

Approved Project Title **Optimising the body's immune response with a Nanopatch that delivers biomolecules to the skin**

2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The team is developing a new improved way to vaccinate against deadly infectious diseases such as influenza and malaria. They believe their Nanopatch technology will boost the power of seasonal influenza vaccination and could even solve vaccine shortages in an influenza pandemic. This is because the Nanopatch needs much less vaccine per person than a conventional syringe. They also predict that vaccines delivered with a Nanopatch will require less refrigeration than conventional vaccines and can be safely administered by individuals without medical training, making the benefits of vaccination accessible to more people more cheaply, even in remote areas.

Summary of ARC Future Fellowships Proposals for Funding to Commence in 2009

FT0991606 Dr BG Knols

Approved Project Title **Novel control strategies for mosquitoes threatening Australia**

2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400

Primary RFCD 2708 BIOTECHNOLOGY

Administering Organisation The University of Queensland

Project Summary

Increased global transport and human mobility have led to the spread and establishment of potential disease vectors and pathogens of public health importance in many parts of the world from which these were absent or had been eradicated. Aversion of this risk can be more effective when applying area-wide rather than focal (e.g. insecticide) control efforts. We will further the development of genetic and biological control tactics. We aim to reduce the risks posed by two important dengue-vectoring mosquitoes: the yellow fever and the Asian tiger mosquito. This will lead to environmentally friendly and sustainable mosquito control and protect the Australian population and its regional neighbours against the threats of mosquito-borne disease.

FT0990978 A/Prof MJ Monteiro

Approved Project Title **Transformer 3D Nanostructures: Stimuli Responsive Polymers**

2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

This research program will develop smart nanostructures that will be capable of producing high value added products using cheap polymer materials but achieving a much greater design capacity for end-use functions. The knowledge gained from this project will have potential applications in many areas where nanomaterials and polymers are used, including high strength coatings, conducting coatings for the electronic industry, drug and vaccine delivery devices, tissue scaffolds, nanosensors, and gene delivery. These polymer techniques will enable Australian Industry to significantly improve product performance by providing advanced features and capabilities previously unavailable.

FT0991722 Dr AJ Richardson

Approved Project Title **The resilience of marine ecosystems and fisheries to climate change: exploring adaptation strategies**

2009 : \$ 98,600
2010 : \$ 197,200
2011 : \$ 197,200
2012 : \$ 197,200
2013 : \$ 98,600

Primary RFCD 3007 FISHERIES SCIENCES

Administering Organisation The University of Queensland

Project Summary

This project will underpin Australia's commitment to maintaining environmental biodiversity and sustainability in the face of climate change. The Fellowship investigates the consequences of climate change on marine plants and animals, harvested resources and ecosystem functioning by identifying vulnerable species and habitats. It will provide management advice on balancing biodiversity and economic output under climate change. This information is of immediate use to a range of stakeholders including national, state and local government agencies. With its focus on ecological, economic and social impacts, this project will put Australian scientists at the forefront of research on the adaptation of marine ecosystems to climate change.

Summary of ARC Future Fellowships Proposals for Funding to Commence in 2009

FT0991576 Dr KJ Stacey
Approved Project Title **Foreign DNA is a danger signal for mammalian cells**

2009 : \$ 85,800
2010 : \$ 171,600
2011 : \$ 171,600
2012 : \$ 171,600
2013 : \$ 85,800

Primary RFCID 3202 IMMUNOLOGY

Administering Organisation The University of Queensland

Project Summary

This project investigates how cells normally respond to foreign DNA, and is relevant to understanding how the body fights infections, particularly by viruses. The results will help us to design more effective treatments for infectious disease. Studying responses to DNA will also promote the design of new treatments for the autoimmune disease lupus, and help improve technologies or treatments where DNA is introduced into cells or tissues. This includes gene therapy, new strategies for vaccination, and the production of proteins as drugs by biotechnology. The project will promote National Research Priorities in the areas of preventative healthcare, ageing well ageing productively, breakthrough science and new technologies.

FT0991552 Prof R Thomas

Approved Project Title **Understanding and regulating autoimmune disease through the nuclear factor kappa-light-chain-enhancer of activated B cells (NF-kappaB) family transcription factor, v-rel reticuloendotheliosis viral oncogene homolog B (RelB).**

2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400

Primary RFCID 3202 IMMUNOLOGY

Administering Organisation The University of Queensland

Project Summary

This program is well-aligned with the national research priority: Promoting and Maintaining Good Health. The disabling conditions rheumatoid arthritis and type 1 diabetes affect over 1% of Australia's population. They are incurable, so disability and the need for treatment persist into old age and life expectancy is reduced. The program focuses on more effective and safer treatment, and future disease prevention, with immune therapy. This will have social and economic benefits to Australia. The research will advance Australia's intellectual leadership in Immunology, providing research training and career opportunities, and will lead to strong collaborations between basic scientists, clinicians and industry.

FT0991224 Dr C Yu

Approved Project Title **Novel Synthesis and Bio-applications of Functional Macroporous Ordered Siliceous Foams**

2009 : \$ 98,600
2010 : \$ 197,200
2011 : \$ 197,200
2012 : \$ 197,200
2013 : \$ 98,600

Primary RFCID 2906 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project will lead to advances in materials science and nanotechnology, providing high efficiency separation and purification for viruses or plasmid deoxyribonucleic acid (DNA), which are important in modern gene engineering for the treatment of genetic and acquired diseases. Application benefits also include developing a new protocol in the detection of trace amount proteins, which will afford a significant improvement in diverse fields such as health care. Through this project, novel macroporous materials will be fabricated using an economically and environmentally sustainable approach. These new materials will have unique structures and properties compared to conventional macroporous materials, advancing Australia's intellectual position in this discipline.

Summary of ARC Future Fellowships Proposals for Funding to Commence in 2009

FT0990356 A/Prof J Zou

Approved Project Title **Understanding the role of catalysts in the growth of epitaxial semiconductor nanowires and their hierarchical heterostructures**

2009 : \$ 111,400
2010 : \$ 222,800
2011 : \$ 222,800
2012 : \$ 222,800
2013 : \$ 111,400

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This Fellowship aims to comprehensively determine the role of catalysts during nanowire growth, solving the bottle-neck problem for growing device-applicable nanowires. In order to address this complicated scientific challenge, the project plans to collaborate with several world-leading researchers in different areas, such as growth, property measurements and modelling. The outcomes of this Fellowship will not only provide new science in terms of nanowire growth, but also provide guidelines for designing, developing and manufacturing nanowire-based nanostructures for future nanodevices and nanosystems. This is strategically important to place Australia at the forefront of developments on nanoscience and nanotechnology.