

Queensland

Queensland University of Technology

DP0986412 Dr AR Brown; Dr RA Davidson; Prof G Wiggins; A/Prof D Temperley; Prof E Narmour

Approved Project Title **Smart Music: Combining music perception and algorithmic composition**

2009 : \$ 160,000

2010 : \$ 100,000

2011 : \$ 80,000

Primary RFCD 4101 PERFORMING ARTS

Administering Organisation Queensland University of Technology

Project Summary

Music is an important aspect of Australian culture and a key driver of the creative industries. A better understanding of music will provide the basis for enhanced computer music techniques that support creative musicians, result in more efficient music production, and lead to the creation of interesting new music. This project connects Australian and International researchers in a world-leading team to produce "smart" computer software that can make music using many of the same techniques as the human mind. Tools based on this research could be applied to assist with music education or be used by professional musicians to improve their music enterprises.

DP0984178 Prof LD English; Prof RB Lesh

Approved Project Title **Restructuring Statistical Reasoning in the Early School Years: A Longitudinal Study of Data Modelling**

2009 : \$ 140,000

2010 : \$ 95,000

2011 : \$ 95,000

Primary RFCD 3302 CURRICULUM STUDIES

Administering Organisation Queensland University of Technology

Project Summary

Research Priority 2 (the goal, Strengthening Australia's Social and Economic Fabric) is targeted. By providing young learners with the foundations of data modelling, which has been ignored in early curricula, the study will sow the seeds for productive participation in a data-driven society and effective use of its increasingly complex economic and social systems. The foundational statistical ideas and processes to be developed will lay the groundwork for further studies in the key curriculum areas, 'chance and data,' 'probability and statistics,' 'science and society,' and 'life and living.' Professional gains include knowledge of ways to implement mathematical and scientific experiences that capitalise on young children's potential.

DP0987840 Prof P Frijters; Dr JR Foster; A/Prof B Torgler

Approved Project Title **Should rational individuals be optimistic? Theory, survey evidence, experimental evidence, and policy implications.**

2009 : \$ 71,000

2010 : \$ 75,000

2011 : \$ 75,000

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation Queensland University of Technology

Project Summary

This project will help Australian policy makers design better information-revelation policies and will elevate the skill level of Australian research in behavioural economics. Insights we generate about how best to manage the public's expectations will enable policy design that strengthens Australia's social and economic fabric. We will disseminate the recommendations we generate in a policy workshop at the end of our project. In terms of benefits to the level of science in Australia, the project will work with local data and local researchers, and will import into Australia new experimental medical equipment and the knowledge of how to use it. These benefits will help Australia progress to the forefront of behavioural economic research.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0989000 Prof DW Hutmacher; Dr MA Woodruff; Dr R Guldborg; Prof KM Shakesheff

Approved Project Title **Design and Fabrication of an Engineered Bone Graft System (EBGS) by combining a composite scaffold and growth factor delivery system**

2009 : \$ 120,000

2010 : \$ 120,000

2011 : \$ 90,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation Queensland University of Technology

Project Summary

The lifetime risk for long bone fractures in Caucasians over the age of 50 is 17% for women and 6% for men. The prevalence of age-related fractures - and with it higher mortality rates due to complications following bone fractures - is therefore bound to increase over the coming decades. There is clearly a great need for therapies that take age-related changes into consideration, in particular the diminishing capacity of bone to heal with age. In an effort to address the therapeutic challenges of providing bone grafts, we aim to mesh two leading-edge technologies to design and fabricate an Engineered Bone Graft System (EBGS) system.

DP0987953 Dr X Ke; Prof Dr RL Frost

Approved Project Title **Developing high-flux ceramic membranes via in situ synthesis of metal oxide nanofibres for separations of biological substances**

2009 : \$ 50,000

2010 : \$ 40,000

2011 : \$ 40,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation Queensland University of Technology

Project Summary

This project can deliver advanced technology for fabricating ceramic membranes and biological separation, which has considerable commercial prospects in the chemical, pharmaceutical, dairy, food and water industries. The new ceramic membrane and nanofibres are highly-valued end products of metal oxides, which are manufactured commercially on large scale in Australia. The project could bring direct benefits to the existing industries, by fostering their growth into more value-added processes, and exporting highly-valued products abroad. Additionally, efficient ceramic membranes could offer solutions to the large-scale purification of biological substances and to the problems for providing clean drinking water.

DP0988007 A/Prof Y Li; Prof N Zhong

Approved Project Title **Personalised Ontology Learning and Mining for Web Information Gathering**

2009 : \$ 85,000

2010 : \$ 70,000

2011 : \$ 70,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation Queensland University of Technology

Project Summary

The project will provide a flexible framework for a sound theoretical model of personalised systems. It will significantly influence the development of personalised Web services and many leading industry organisations that attempt to deliver personalised services to their valuable customers. The proposed project will also strengthen the pre-existing international collaboration networks. It will establish Australian researchers leading position in the related research fields and communities, and provide an established paradigm for other researchers to follow. In addition, the project will provide significant contributions to Australian National Research Priority in the areas of Smart Information Use.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0986575 Prof M Mahendran

Approved Project Title **An Integrated Thermal and Structural Investigation for the Development of Innovative Lightweight Cold-formed Steel Wall and Floor Systems under Fire Conditions**

2009 : \$ 110,000

2010 : \$ 115,000

2011 : \$ 105,000

Primary RFCD 2908 CIVIL ENGINEERING

Administering Organisation Queensland University of Technology

Project Summary

This research will benefit the Australian building industry by providing a set of design rules that will not only enhance the fire safety standards but also the structural robustness of steel construction, thereby resulting in a reduction in loss of lives and property due to natural or man-made disasters. This will give Australian manufacturers a leading edge both nationally and internationally in developing innovative prefabricated fire resistant LSF wall and floor systems using high strength steels. Australians have an opportunity to become world leaders in fire research and LSF construction. It will provide valuable research training to young Australians and will contribute to the protection of Australia's critical infrastructure.

DP0985726 Prof L Morawska; Dr GA Ayoko; Dr R Jayaratne; Dr GR Johnson

Approved Project Title **Nanoparticle from urban transport: Quantification of formation and dynamics for application for health and environmental risk reduction**

2009 : \$ 100,000

2010 : \$ 95,000

2011 : \$ 95,000

Primary RFCD 2606 ATMOSPHERIC SCIENCES

Administering Organisation Queensland University of Technology

Project Summary

Socio-economic benefits of the project outcomes to Australia: (i) advancing the fundamental understanding of the processes contributing to the adverse environmental impacts of nanoparticles; (ii) provision of vital information on the reduction of the environmental and health risks of nanoparticles, thus contributing to the goal of 'cleaner, safer combustion'; (iii) placing Australian researchers in the frontline of nanoparticle science and technology and international progress towards sustainable development; and (iv) lowering of human exposure to nanoparticles in the cities of tomorrow, thus reducing health care costs and lost productivity.

DP0988124 A/Prof GJ Pettet; Dr DR Epari; Dr R Steck; Dr LS Gregory; Prof MA Schuetz

Approved Project Title **Inter-fragmentary movement in callus formation in the early phase of fracture healing**

2009 : \$ 120,000

2010 : \$ 90,000

2011 : \$ 90,000

Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES

Administering Organisation Queensland University of Technology

Project Summary

Computational models of the early phase of bone fracture healing can provide the means to characterise the biochemical factors that control this process, and subsequently influence successful healing outcomes, with or without surgical intervention. This unique approach, incorporating soft tissue and fixation device contributions to fracture healing, will ultimately provide a sound basis for clinical decision-making, implant design and future experimental studies. Facilitating treatment optimisation, the outcomes of this project will create opportunities to reduce healthcare costs, physical impairment, and productivity losses for the 150,000 Australian patients hospitalised annually with fractures.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0984394 A/Prof S Ritchie; Dr P Hudson; Prof W Roth; Prof KG Tobin

Approved Project Title **Emotional Transitions: Exploring Professional Transitions of Science Teachers**

2009 : \$ 80,000

2010 : \$ 90,000

2011 : \$ 80,000

Primary RFCD 3303 PROFESSIONAL DEVELOPMENT OF TEACHERS

Administering Organisation Queensland University of Technology

Project Summary

Research most needed to inform policy and practice for improving teacher education and the retention of new-science teachers is that which captures the experiences and development of the new teacher, particularly in the critical transition period from university to full-time work in schools. This period is fundamental to becoming a satisfied and effective teacher. Our study contributes significantly to national concerns for quality-teacher education by providing new insights into the emotions and identities of transitioning-science teachers in practice. The proposed study also models innovative procedures that can enrich subsequent longitudinal studies of teacher transitions and impact of teacher-education programs.

DP0986766 Prof IW Turner; Prof VV Anh; Prof PG Perré

Approved Project Title **A multi-scale approach for modelling coupled transport in heterogeneous and anisotropic porous media**

2009 : \$ 75,000

2010 : \$ 50,000

2011 : \$ 60,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation Queensland University of Technology

Project Summary

Mathematical Sciences foster interdisciplinary collaboration and underpin fundamental understanding of significant national/international research priorities in science and technology. This world-class team will advance knowledge in modelling complex systems ensuring the competitiveness of Australian research in this important field. A key outcome is a multi-scale computational strategy that can be used by engineers in Australia and France to simulate transport phenomena in porous media, which have significant environmental impact. The research will lead to publications in scientific journals and communications at national/international conferences. Research training of postdocs and PhD students is another excellent outcome of the project.

DP0984349 A/Prof JJ Watters; Prof CM Diezmann

Approved Project Title **The role of subject-matter knowledge in teaching science and mathematics: Practices of teachers with advanced qualifications in the sciences**

2009 : \$ 70,000

2010 : \$ 50,000

2011 : \$ 50,000

Primary RFCD 3303 PROFESSIONAL DEVELOPMENT OF TEACHERS

Administering Organisation Queensland University of Technology

Project Summary

High quality science and mathematics education is central to economic prosperity. This study will achieve two outcomes. Firstly it explores the importance of subject matter knowledge in teaching. Much has been studied about the knowledge of teachers but limited research has been conducted with teachers who have substantial subject-matter knowledge. These findings will inform the current debate about the appropriate models of teacher education and the balance of emphasis on content knowledge and pedagogical knowledge. Secondly, given a number of attempts to attract mid career professionals with high qualifications to teaching, the study will provide evidence on how these people transition to their new careers and what support is needed.

Summary of Discovery Projects Proposals for Funding to Commence in 2009

DP0988254 Dr Cl Wilson; A/Prof B Torgler; Prof R Gifford; A/Prof M Garcia-Valinas
Approved Project Title **Determining urban water conservation and management strategies: a novel approach using field experiment and survey data**
2009 : \$ 130,000
2010 : \$ 60,000
2011 : \$ 90,000
Primary RFCD 3402 APPLIED ECONOMICS
Administering Organisation Queensland University of Technology

Project Summary

The project's national benefits are consistent with the research priorities that evaluate an environmentally sustainable Australia through efficient and sustainable water use. The project explores how households react to different demand side instruments and identifies water saving strategies preferred by the public. The findings can be used by decision-makers to select effective instruments to enhance water conservation, reduce water consumption and therefore use water sustainably according to Australia's ecological means.

DP0986853 Dr F Zare; Prof PJ O'Shea; Prof GF Ledwich; A/Prof BW James; Dr RJ Carman; Prof H Akiyama; Prof F Blaabjerg
Approved Project Title **Improving the efficiency of silent discharge plasma systems through an effective high voltage power converter design match**
2009 : \$ 85,000
2010 : \$ 85,000
2011 : \$ 60,000
Primary RFCD 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS
Administering Organisation Queensland University of Technology

Project Summary

The proposal seeks to develop important new technologies which will have an impact on our environment. Australia suffers from water resource scarcity and SDPSs represents an accepted solution for waste-water treatment. The project has significant implications for improving the cleanliness and efficiency of our energy production systems. Improved operation of SDPSs will enable better filtering of vehicle exhaust emissions and through the capture and sequestration of carbon dioxide which reduces green gas emission. This will improve the efficiency of ozoniser systems which has many benefits as ozone is one of the most useful and environmentally friendly oxidising agents.