

Summary of Discovery Projects Proposals for Funding to Commence in 2009

Western Australia

Curtin University of Technology

DP0987851 Prof E Bakker; Prof R De Marco; Prof E Pretsch

Approved Project Title **Calibration Free Coulometric Sensors Based on Polymeric Thin Layer Films**

2009 : \$ 180,000

2010 : \$ 160,000

2011 : \$ 150,000

2012 : \$ 155,000

2013 : \$ 155,000

Primary RFCD 2504 ANALYTICAL CHEMISTRY

APF Prof E Bakker

Administering Organisation Curtin University of Technology

Project Summary

The world faces enormous environmental and clinical challenges that require accurate data from remote deployable and disposable sensors. Many key parameters important to global warming (carbon dioxide cycle) and clinical diagnostics (blood electrolytes) may be assessed with a polymeric membrane sensing technology, but the measurement principle is not sufficiently robust for remote sensing applications. This research will make this possible by adapting calibration free measurement principles (coulometry, or charge counting) to this class of sensors, where a thin layer of sample solution will be depleted by instrumental control. This forms the scientific basis for successfully tackling the measurement challenges of the future.

DP0988955 Prof RJ Donovan; Prof SR Zubrick; Prof DS Cross; Prof PA Howat; A/Prof R Midford; Mr G Jalleh; Ms DL Sullivan; Mr GJ Kirby

Approved Project Title **Do perceptions of morality of alcohol, tobacco & cannabis use influence uptake in high school?**

2009 : \$ 100,000

2010 : \$ 90,000

2011 : \$ 80,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Curtin University of Technology

Project Summary

In Australia, the cost of drug use was estimated at \$34.4 billion in 1998-89. Preventing or delaying alcohol, tobacco and illicit drug use among adolescents is a way of reducing substance use among adults, and therefore, reduces the health, social and economic costs associated with substance use. This study will assess the protective/vulnerability effect of a range of variables on youth substance use including morality and legitimacy concepts. These data will guide the development of curriculum components to enhance the effect of school-based interventions with respect to substance use, and provide practical recommendations for community interventions targeted at substance use.

DP0988959 Prof RJ Donovan; Prof DS Cross; Mr G Jalleh; Dr SF Pettigrew; Ms DL Sullivan

Approved Project Title **What works best for youth smoking prevention messages?**

2009 : \$ 35,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Curtin University of Technology

Project Summary

In Australia, tobacco smoking is the leading cause of preventable death and disease, resulting in over 19,000 deaths annually. The morbidity and mortality associated with smoking costs the community over \$21 billion a year. People who start smoking when they are young are more likely to smoke heavily as adults, to become more dependent on nicotine and to be at increased risk of smoking-related illness or death. This research study will provide practical recommendations for future tobacco control television advertising targeted at youth in terms of the elements featured in tobacco control advertisements that increase advertising effectiveness.

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DP0984879 Prof DL Fisher; Dr RB Koul

Approved Project Title **Using co-teaching and co-generative dialogue to improve teacher-student interactions and students' awareness of their place in the environment**

2009 : \$ 70,000

2010 : \$ 70,000

2011 : \$ 70,000

Primary RFCD 3008 ENVIRONMENTAL SCIENCES

Administering Organisation Curtin University of Technology

Project Summary

The study addresses the political, social agenda of Australia. The findings of the co-teaching/co-generative dialogue research in science environmental education will encourage teachers to implement desirable changes in their teaching, benefiting community through application of research results to education systems, and increasing understanding of effective teaching. Priority research funding is being afforded to several areas of natural science research; there is an imperative that environmental science education in schools progresses commensurately. The long-term ability of universities to conduct their natural science research will be dependent on foundational improvements in environmental science education in schools.

DP0986510 Dr J Galbreath; Mr GJ Nicholson

Approved Project Title **The link between corporate governance and sustainability: A contingency approach**

2009 : \$ 45,000

2010 : \$ 30,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

Administering Organisation Curtin University of Technology

Project Summary

Australian businesses will experience decreased economic growth, more health issues and fewer international opportunities if sustainability is not addressed. Sustainability is business approach seeking long-term value by embracing opportunities and managing risk from economic, environmental and social developments. This study will provide insight into optimal board structures to oversee performance across economic, environmental and social dimensions. It will also identify the conditions whereby firms can adapt to market transformation, and determine resource reconfigurations that respond to sustainability challenges.

DP0986999 Prof JD Gale; Dr P Raiteri; Prof M Parrinello; Dr SL Price; Prof JH Harding; Prof PM Rodger

Approved Project Title **Learning to predict polymorphism through simulation of nucleation and nanoparticle evolution**

2009 : \$ 185,000

2010 : \$ 185,000

2011 : \$ 177,160

2012 : \$ 180,000

2013 : \$ 180,000

Primary RFCD 2506 THEORETICAL AND COMPUTATIONAL CHEMISTRY

ARF Dr P Raiteri

APF Prof JD Gale

Administering Organisation Curtin University of Technology

Project Summary

Many substances are capable of exhibiting a myriad of different structures despite having the same composition. This behaviour can have a significant impact on the production of new pharmaceuticals, since the sudden appearance of a new form can lead to instant withdrawal of the drug. By understanding how different forms grow, rather than focusing on just the stability of the product, this research will lead to more reliable prediction of how pharmaceutical molecules might assemble. The same technology will potentially have impacts in many areas of nanoscience through improvements in efficiency, including the production of minerals, desalination and undersea gas recovery.

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DP0984686 Dr Z Lu; Prof M Hallin

Approved Project Title **Nonlinear spatial and spatiotemporal econometrics: theory with applications**

2009 : \$ 35,000

2010 : \$ 35,000

2011 : \$ 35,000

Primary RFCD 3404 ECONOMETRICS

Administering Organisation Curtin University of Technology

Project Summary

Modern societies like Australia have major challenges in the forecasting, measuring and managing of risks associated with global economic and environmental/climate changes. These tasks require advanced econometric techniques in modelling and forecasting of complex nonlinear spatiotemporal variability in economic and social systems. This project will develop frontier econometric technologies that enable more accurate economic and climate forecasts. The tools produced will provide Australia's scientists and policy-makers with a greater capacity to manage the risks associated with these challenges. A side-benefit of the research will be high-quality publications that enhance the nation's reputation in this cutting edge research.

DP0987089 Dr L Meuleners; Prof J Semmens; Dr J Ng; Ms DV Hendrie

Approved Project Title **Cataract and crash risk for older drivers: evidence from a population based study**

2009 : \$ 60,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Curtin University of Technology

Project Summary

Older drivers are the fastest growing segment of the driving population, which has implications for road safety. The removal of cataract is a common surgical procedure for older drivers, therefore, it is necessary to determine the effects of cataract surgery on crash risk. This project will be the largest population based study to examine crash risk for older drivers with cataract and the cost-effectiveness in terms of a reduction in crashes. The development of effective countermeasures will have direct relevance for road safety, medical practitioners and licensing authorities in Australia and is also pivotal to reducing the financial burden associated with older driver crashes.

DP0985410 Prof PW Newman; Dr SG Bond

Approved Project Title **Drivers and barriers to sustainability in residential and commercial buildings**

2009 : \$ 50,000

2010 : \$ 50,000

Primary RFCD 3101 ARCHITECTURE AND URBAN ENVIRONMENT

Administering Organisation Curtin University of Technology

Project Summary

In acknowledging that climate change is one of the greatest moral and economic challenges of our time, the federal Government is committed to Australia's internationally agreed target of limiting greenhouse gas emissions. In its efforts to achieve this, the Government is supporting various initiatives including the development of renewable energy technology. In Australia, buildings contribute almost one-quarter of our greenhouse gas emissions. This research will identify methods that assist in the nationwide uptake of sustainability practices, including the use of micro-generation technology, to help improve building performance and reduce greenhouse gas emissions.

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DP0984258 Prof B Rasmussen; Dr IR Fletcher; Prof A Bekker

Approved Project Title **Biogeochemical characterisation of Archaean microfossils, biomarkers and organic matter: Probing the nature and diversity of early life on Earth**

2009 : \$ 100,000

2010 : \$ 90,000

2011 : \$ 80,000

Primary RFCD 2603 GEOCHEMISTRY

Administering Organisation Curtin University of Technology

Project Summary

Recognizing biological signatures in ancient rocks poses the single greatest challenge to our understanding of the origin and evolution of life. This Project will use new advanced technology to reveal when and where life first appeared and assess its impact on the environment, atmosphere and climate. Results are essential for understanding the transformation of our planet into a suitable habitat for humankind. The work will place Australia among world leaders in one of the most exciting topics of current scientific research, raising Australia's reputation in this high profile and competitive field. The Project tackles profound questions and seeks to attract, inspire and train future scientists in an ideal location and research environment.

DP0987155 A/Prof PC Taylor; Prof DL Fisher; Dr E Settelmaier

Approved Project Title **'Sustainable' sustainability: Preparing Australia's future citizens for informed decision-making through socially responsible science education**

2009 : \$ 35,000

2010 : \$ 40,000

2011 : \$ 40,000

Primary RFCD 3302 CURRICULUM STUDIES

Administering Organisation Curtin University of Technology

Project Summary

This educational study addresses sustainability as a national priority. It focuses on secondary students as future decision makers through developing their ability to respond effectively to national sustainability issues by engaging in dilemma-based science and values learning. Socially responsible science education promotes knowledge and scientific literacy skills. Benefits to the community include application of research results to schools, education systems, and universities whose long-term ability to conduct world-class scientific research will partly be dependent on improvements in school science. Since priority research funding promotes science and sustainability research, science education in schools should progress commensurately.

DP0986694 Prof DF Treagust; Prof BG Waldrip; Prof VR Prain; A/Prof MG Zadnik

Approved Project Title **Using multiple representations for systematic assessment to improve learning in secondary school science**

2009 : \$ 100,000

2010 : \$ 70,000

2011 : \$ 70,000

Primary RFCD 3001 SOIL AND WATER SCIENCES

Administering Organisation Curtin University of Technology

Project Summary

Coupled with the priority of future prosperity and health of Australia; this project aims to establish a body of research that facilitates excellence in assessing learning. Research studies have identified concerns about the nature and effectiveness of assessment practices. This project, by taking an innovative perspective on assessment issues in secondary science, when student future plans germinate, has the potential to lay the foundation for more effective learning, increased retention into post-compulsory science and enhanced science literacy. By focusing on effective representational assessment strategies, the project has the capacity to enhance teachers' pedagogy and student learning, resulting in a more scientific literate society.