

Summary of Discovery Projects Proposals for Funding to Commence in 2007

Victoria

RMIT University

DP0773572 Prof SN Bhattacharya; Dr M Rudman

Approved Project Title **Particle transport in turbulent non-Newtonian suspensions in self formed open channels**

2007 : \$60,000

2008 : \$60,000

2009 : \$60,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation RMIT University

Project Summary

An improved understanding of the fundamentals of channel formation and the ability of channels to transport solids in either a natural or created environment will be of benefit to industries employing open channels (or flumes) or stacked tailings as part of their processes. This will lead to better design and operation with reduced water use and reduced volume of waste disposal. This research will build the scientific foundation for the design tools to more accurately predict the behaviour of tailings stacks. The mining industry will benefit from the improved management of their tailings disposal regimes, reduced water usage, lowered cost of disposal and reduced impact on the environment.

DP0770453 Prof SR Davidson; Prof RA Heaney

Approved Project Title **Does Australian Corporate Taxation Matter?**

2007 : \$70,000

2008 : \$70,000

2009 : \$70,000

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation RMIT University

Project Summary

On a GDP-weighted basis the average OECD corporate rate has fallen from 44 percent in 1985 to 31 percent in 2004. Australia operates a flat thirty percent corporate tax rate and this compares well with the current OECD average. Yet, the Business Council of Australia argues that the Australian corporate tax rate is 'uncompetitive'. Certainly, the corporate tax burden (i.e. corporate tax revenue as a proportion of GDP) is very high in Australia, the third highest in the OECD, and the highest in the Asia-Pacific region. This project will evaluate the extent that the corporate tax burden is a hinderance to Australian firms and economic behaviour.

DP0770546 Prof MA Febbraio; Mr RJ Southgate

Approved Project Title **Autophagic vacuole formation in mammalian skeletal muscle; role of FOXO proteins.**

2007 : \$95,000

2008 : \$95,000

2009 : \$95,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

APD Mr RJ Southgate

Administering Organisation RMIT University

Project Summary

Loss of muscle tissue is a hallmark of many common health problems including cancer, HIV-Aids and renal failure. Recently, we identified that a family of transcription factors termed the forkhead box class-O (FOXO) winged helix transcription factors are key regulators of both anabolic (building) and catabolic (wasting) signalling pathways. This project will investigate the molecular regulation of cell integrity by FOXO proteins. Although very basic in nature, these projects will identify how FOXO proteins regulate muscle cell building and wasting and, therefore, present a potential therapeutic target for muscle wasting diseases, making this project highly significant.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0771296 Dr D Grenfell

Approved Project Title **After the Violence: Truth, Reconciliation and National Integration in Timor-Leste**

2007 : \$40,024

2008 : \$42,357

Primary RFCD 3703 ANTHROPOLOGY

Administering Organisation RMIT University

Project Summary

In the aftermath of the Australian military-led intervention in 1999 and through the transition to nationhood in 2002, the Commission for Reception, Truth and Reconciliation in East Timor (CAVR) has represented one of the key institutional attempts at ensuring a stable transition to a peaceful society in Timor-Leste. The internal security of Timor-Leste is of significant interest for Australia, and this project would seek to understand if and how CAVR has succeeded in producing sustainable forms of social cohesion and integration. The project would also provide an understanding of truth and reconciliation processes that could be of value for application in future post-conflict societies.

DP0770537 Prof RA Heaney; Prof BD Grundy

Approved Project Title **Storage and the Hotelling Valuation Principle: Understanding the Dynamics of the Oil Industry**

2007 : \$100,000

2008 : \$115,000

2009 : \$130,000

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation RMIT University

Project Summary

Understanding the economics of the oil market is important for understanding the shift toward smaller, more fuel-efficient motor vehicles and less fuel-intensive farming techniques. A better understanding of fundamental oil price processes will lead to more accurate oil price forecasting and hence more accurate pricing of oil derivatives (options, futures and swaps) and improved risk management (e.g. airlines hedging the cost of their jet fuel needs).

DP0770349 Dr K Kalantar-zadeh; Prof W Wlodarski; Prof Y Li

Approved Project Title **Formation of Nanoporous titanium dioxide (TiO₂) by Anodization of Titanium Thin Films**

2007 : \$60,000

2008 : \$60,000

2009 : \$60,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation RMIT University

Project Summary

The development of nanoporous titanium dioxide (TiO₂), with pore diameter less than 25 nm, represents a significant advance for both R&D and industrial applications. It is an invaluable material for the manufacture of a range of electronic and optical devices. These structures can be employed for the development of efficient thermoelectric coolers, highly sensitive biosensors as well as optical micro-devices with high refractive index. In addition, nanoporous TiO₂ has numerous applications in the fields of nanotechnology, bioengineering, diagnostics, materials science, and in the building industry. Australia will greatly benefit from the research and development of such a product with its promising market.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0771646 A/Prof DG McCulloch

Approved Project Title **Synthesis and Optimisation of Ultra-Thin Metal Oxide Coatings**

2007 : \$90,000

2008 : \$80,000

2009 : \$70,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation RMIT University

Project Summary

Metal oxides are a rich class of materials in terms of their electronic, optical and chemical properties. The emergence of nanotechnology has renewed the drive for miniaturisation and given new urgency to the synthesis of ultra-thin metal oxide films for use in new electronic devices, sensors and functional coatings. This project will generate valuable intellectual property in the form of optimised ultra-thin metal oxide coatings with properties tailored to meet this rapidly growing set of new applications. The innovative combination of advanced plasma synthesis, high resolution microscopy and accurate theoretical modelling will ensure success.

DP0771460 A/Prof JW McCulloch

Approved Project Title **Silicosis on South African Gold Mines: The History and Politics of an Occupational Disease, 1950 to 2005**

2007 : \$93,956

2008 : \$86,158

2009 : \$97,017

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation RMIT University

Project Summary

This study of occupational disease has relevance to the mining industry which routinely publishes statements on Sustainable Mining as part of their corporate governance. Triple Bottom Line reporting includes reference to the industry's social, economic and environmental impacts. The hazardous work practices in developing countries shift the costs of production back onto labour thereby under-cutting those producers who provide safer work environments. Those realities, which impact directly upon Australian industry, publics and governments, are explored in detail in this project.

DP0770027 Dr A Mitchell; Dr DN Neshev

Approved Project Title **Active Control of Light for Nonlinear Photonic Devices**

2007 : \$85,000

2008 : \$150,000

2009 : \$140,000

Primary RFCD 2404 OPTICAL PHYSICS

Administering Organisation RMIT University

Project Summary

In free space, light travels in a straight line, but since ancient times mankind has always sought to direct its propagation. Controlling light is an enduring problem in modern photonic technologies. The ultimate goal is to actively manipulate light propagation in space and time with a great accuracy. With this project we will investigate the fundamental science of active control of light in periodic structures and will provide a unique platform for exploration of ground breaking optical physics, ensuring Australia remains a world leader in the field. Precision manipulation of light will form the basis of new techniques for all-optical signal processing and computing, with great impact on Australian photonic and defense industries.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0773070 Prof TC Nairn

Approved Project Title **The changing nature of national identity and its relationship to other forms of identity**

2007 : \$40,000

2008 : \$38,000

Primary RFCD 3701 SOCIOLOGY

Administering Organisation RMIT University

Project Summary

By providing a cultural understanding of the relationship between nationalism and other forms of identity, this project sets the background for understanding the nature of Australian identity as we embark upon the difficult passage from a post-imperial peripheral jurisdiction to a potentially more open, generous and constructive polity. The project contributes to the recently added National Research Priorities category, 'Safeguarding Australia: Understanding our Region and the World' - not in the sense of identifying 'the threat' to Australia, but rather in the much more important long-term sense of understanding ourselves in a global, historical and comparative context.

DP0770543 A/Prof SP Russo; Prof IK Snook; Prof K Binder

Approved Project Title **Understanding and controlling the processes underlying self assembly of nanostructures on surfaces**

2007 : \$80,000

2008 : \$70,000

2009 : \$50,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Organisation RMIT University

Project Summary

Efficient clean fuel technology, new classes of nano- and bio-materials, bio specific drug delivery systems, efficient environmental remediation technologies, advanced catalytic applications, namely every area of technology would benefit from the ability to control self-assembly of matter at the atomic level during fabrication of nanodevices. This proposal seeks to understand the processes driving self-assembly of nanomaterials and how to control these processes.

DP0773893 Prof DM Stalker

Approved Project Title **Dissecting the Indigo Pathway in Natural Indigo Producing Plants: Intricate Pathway Engineering for the Generation of Blue-Fibre Cotton**

2007 : \$90,000

2008 : \$88,000

2009 : \$85,000

Primary RFCD 2708 BIOTECHNOLOGY

Administering Organisation RMIT University

Project Summary

Australian cotton growers must maintain a sustained competitive advantage in the future to compete within the global cotton market by commanding higher margins for specialty cotton lint over and above current revenues. Development, via biotechnology, of naturally-colored, 'blue' lint cottons is the technical goal, where novel environmentally-benign textile products could be produced without the use of toxic synthetic dyes or caustic dyeing processes. Success will provide a unique opportunity to re-establish an Australian cotton/textile industry by allowing direct participation in the development, branding and marketing of novel Australian textile products, generating potential revenue upwards of \$10B/year.