

Summary of Linkage Infrastructure, Equipment and Facilities Proposals

New South Wales

The University of Sydney

LE0882246 Prof MM Bilek; Dr CD Ling; Prof PR Munroe; A/Prof MA Stevens-Kalceff; Dr DP Riley; Dr AS Holland; Prof JF Williams; Prof DR McKenzie; Dr BJ Kennedy; Prof MJ Hoffman; Dr N Valanoor; Prof DG McCulloch; Prof MA Green; Prof CJ Kepert; Dr K Kalantar-zadeh; Prof Dr T Maschmeyer; Dr GJ Conibeer; Dr KA Gross; Prof RP Burford; A/Prof A Mitchell; Prof MW Austin; Dr S Samarin

Approved Project Title **Comprehensive Analysis Facility for Thin Films and Surfaces**

2008 : \$ 750,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Partner Organisations & Collaborating Organisations

The University of Sydney
The University of New South Wales
The University of Melbourne
The University of Western Australia
RMIT University

Administering Organisation The University of Sydney

Project Summary

The provision of infrastructure for the analysis of thin films will enhance Australia's capabilities in creating new materials and in creating new devices that meet needs in medicine, communications, the environment and security. As devices become smaller, surfaces and interfaces dominate their performance. The new facility will enable researchers to understand the structure and composition of the interior and interfaces of thin films as well as mapping local variations in their key properties. Instruments with unique capabilities will measure elemental composition, crystallographic phase, defect and void distributions and spatially resolved stress, electrical, mechanical and magnetic properties.

LE0883030 Dr JM Cairney; Prof SP Ringer; A/Prof FC Braet; A/Prof M Ferry; Prof CC Sorrell; Prof L Ye; A/Prof AJ Ruys; A/Prof GW Barton; Dr AT Harris; Dr G Ranzi; Prof BJ Eggleton; Dr C Grillet; Prof DR McKenzie; Prof PA Lay; A/Prof AF Masters; Dr AR Parker; Prof RL Overall; Prof AS Weiss; Prof CR Murphy; Dr IM Ramzan; Prof LJ Copeland; Prof DT Potts

Approved Project Title **High-Resolution Field Emission Scanning Electron Microscopy (FESEM) Platform for Characterisation at the Nanometre-Level**

2008 : \$ 450,000

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Partner Organisations & Collaborating Organisations

The University of Sydney
The University of New South Wales

Administering Organisation The University of Sydney

Project Summary

The Field Emission Scanning Electron Microscope (FESEM) is designed to provide fundamental insights into physical and biological systems through characterisation and analysis of structures on nanometre length scales. This versatile instrument will support a wide range of research projects covering all four national research priorities. These range from the characterisation of light alloys to boost and intensify Australia's aluminium, magnesium and titanium alloy industries, to tissue engineering for the repair of human elastic tissues in skin, artery, bladder and lung, to the study of microtubules in plant cells for genetic manipulation of plants to withstand environmental stresses such as drought or salinity.

Summary of Linkage Infrastructure, Equipment and Facilities Proposals

LE0883068 Dr BD Hambly; Dr S Bao; Dr GA Bishop; Prof J Black; Prof IL Campbell; Dr Q Dong; Dr MD Gorrell; Prof GE Grau; Prof NH Hunt; Prof NJ King; Dr R Markham; Dr DJ Marsh; Dr KL McDonald; Dr SV McLennan; Dr KJ Rodgers; Dr D Seth

Approved Project Title **Dako ACIS III Cellular Image Acquisition and Analysis System**

2008 : \$ 150,000

Primary RFCD 3202 IMMUNOLOGY

Partner Organisations & Collaborating Organisations

The University of Sydney

Administering Organisation The University of Sydney

Project Summary

The scientific advances that will be possible with the acquisition of this novel, cutting-edge instrument will enhance the research outputs of all investigators using it. The ability to visualize and analyze cells and tissues from many different animal species, to elucidate both normal and abnormal functions, will be enhanced by the use of this technology. This will lead to production of quantitative statistical data that in turn will inform new approaches to improve and maintain the health of humans and other animals.

LE0883078 Prof DJ Handelsman; Prof RJ Norman; A/Prof GP Risbridger; A/Prof PY Liu

Approved Project Title **Liquid Chromatography Tandem Mass Spectrometry Steroid Analysis Facility**

2008 : \$ 356,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Partner Organisations & Collaborating Organisations

The University of Sydney

Monash University

The University of Adelaide

Administering Organisation The University of Sydney

Project Summary

This first of a new generation of ultra-sensitive analytical mass spectrometers for small molecules will be established as a national assay facility allowing all Australian researchers open access to a new dimension of highly accurate and simultaneous measurements of multiple bodily chemicals such as steroids, vitamins and hormones. It is crucial to developing new knowledge in basic, developmental and pathological cell biology and for underpinning commercial developments of new molecular targets for therapeutic drugs for many diseases including cancer, cardiovascular disease and reproductive disorders. This facility is pivotal to maintaining international competitiveness in many areas of biological research in national priority areas.

LE0883036 Prof PA Lay; Prof D McNaughton; Prof Dr T Maschmeyer; Prof DT Potts; Prof MV Swain; Prof GE Grau; Prof TC Sorrell; Dr IM Ramzan; Prof J Beardall; Prof CC Bernard; Dr CP Marshall; Dr A Dutkiewicz; Dr DA Penny; Dr BR Wood; Dr W Yang; Dr L Soon; Dr D Traini; Dr EA Carter

Approved Project Title **Integrated Vibrational Spectroscopic Mapping for Archeological, Biological, Geological, Materials, and Medical Research**

2008 : \$ 400,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Partner Organisations & Collaborating Organisations

The University of Sydney

Monash University

Administering Organisation The University of Sydney

Project Summary

The expected benefits that will arise will include: green chemical processes with improved environmental and economic impacts; improved treatments and diagnoses of diseases; understanding of fundamental geological processes; identification of the earliest forms; studies of archaeological artefacts; evolution of life on Earth; the design of improved dental materials. Ultimately, this research will include economic and social benefits in; industrial processes; the mining industry; medicine; and dentistry. An understanding of the origin and early evolution of life on Earth also has many social implications.

Summary of Linkage Infrastructure, Equipment and Facilities Proposals

LE0882926 Dr X Liao; A/Prof X Wang; Prof Y Mai; Prof L Zhang; Dr JM Cairney; Prof SP Ringer

Approved Project Title **Transmission Electron Microscope-Nanoindenter for Nano-Mechanical Testing**

2008 : \$ 100,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Partner Organisations & Collaborating Organisations

The University of Sydney

University of Wollongong

Administering Organisation The University of Sydney

Project Summary

A transmission electron microscope (TEM)-nanoindenter enables us to record simultaneously the mechanical behaviour of materials under force and their structures and structural evolutions at sub-nanometre resolution. The acquisition of a TEM-nanoindenter will significantly enhance the capability of investigating the structural effect on the behaviour of materials under applied force, which is a key issue in materials science and engineering. The results obtained using the TEM-nanoindenter will reveal the fundamental origins of materials mechanical properties and will be used to improve materials processing procedures and to guide the design of stronger and lighter materials for structural applications.

LE0883032 Dr JP Mackay; Prof G Otting; Prof PW Kuchel; Dr JM Matthews; Dr DA Gell; Prof J Trehwella; Dr PJ Rutledge; A/Prof BA Messerle; Prof MA Vadas; Prof RM Graham; Dr JI Vandenberg; Dr D Stock; Dr GE Ball; A/Prof BD Fazekas de St Groth; Prof J Shine

Approved Project Title **800 MHz NMR spectrometer for biomolecular structure-function analysis**

2008 : \$1,300,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Partner Organisations & Collaborating Organisations

The University of Sydney

The University of New South Wales

The Australian National University

Centenary Institute for Cancer Medicine and Cell Biology

Victor Chang Cardiac Research Institute

Garvan Institute for Medical Research

Administering Organisation The University of Sydney

Project Summary

An understanding of how organisms function at the molecular level is central to developing the ability to fight many diseases in a rational way. This equipment will provide the capability for many different laboratories around NSW and the ACT to advance our knowledge at this fundamental level, primarily by examining the structures and functions of biomolecules such as proteins.

LE0883111 Prof AR Masri; Prof GJ Nathan; A/Prof B Moghtaderi; A/Prof TA Langrish; Dr BB Dally; Prof KD King; Dr ZT Alwahabi

Approved Project Title **A Laser Facility for Imaging the Time Evolution of Scalars in Turbulent Flows**

2008 : \$ 570,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Partner Organisations & Collaborating Organisations

The University of Sydney

The University of Adelaide

The University of Newcastle

Administering Organisation The University of Sydney

Project Summary

Establishing this facility will maintain Australia's position at the international leading edge of research in energy, the environment, combustion, and fluid mechanics. The new diagnostics capabilities will advance science through projects that serve the first National Research Priority and assist industry in the design and development of clean combustion devices and energy efficient technologies. The new facility will also be made available to researchers from non-participating institutions at operating costs and will provide the training platform for graduates from all Australian Universities. This will ensure the continuity of future research and developments in these and related fields in Australia.

Summary of Linkage Infrastructure, Equipment and Facilities Proposals

LE0883055 Prof SJ Simpson; Prof R Shine; Prof MB Thompson; Dr F Seebacher; Dr AJ Pile; Dr C McArthur; A/Prof RA Coleman; Dr M Beekman; Dr A Ward; Dr GA Sword; Dr RC Brooks; Dr AG Poore; Dr R Bonduriansky; Prof G Cassis; Prof MM Olsson; Prof DJ Booth; Dr SB Williams

Approved Project Title **Video analysis suite for the integrative analysis of resource acquisition behaviour in animals**

2008 : \$ 170,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Partner Organisations & Collaborating Organisations

The University of Sydney

University of Wollongong

The University of New South Wales

University of Technology, Sydney

Administering Organisation The University of Sydney

Project Summary

How do animals find food, choose places to live and select mates? How do insect swarms and fish schools make collective decisions without leaders? These are fundamental questions in understanding the ecological roles and environmental impacts of endangered native and damaging invasive animals. The video analysis suite will be used to analyse the behaviour of such animals in environments from the land to the deep-sea floor; track exceptionally fast movements during courtship and predator escape; study how animals achieve temperature balance in complex habitats; understand the dietary choices of herbivores, and discover the rules that govern the behaviour of swarms.

LE0882935 Dr CR Warren; Prof MA Adams; Prof JP Conroy; Prof DS Ellsworth; Prof DT Tissue

Approved Project Title **Tuneable diode laser for field and laboratory measurement of stable isotopes of CO2**

2008 : \$ 110,000

Primary RFCD 2704 BOTANY

Partner Organisations & Collaborating Organisations

The University of Sydney

University of Western Sydney

The University of New South Wales

Administering Organisation The University of Sydney

Project Summary

The tuneable diode laser system will facilitate projects with major environmental benefits to Australia. Projects will provide major insights into Australia's CO2 balance. This will improve our ability to predict whether ecosystems are net sources or sinks for CO2 -- information that underpins Australia's greenhouse gas balance. The tuneable diode laser system will also benefit Australia's economy via enhancing understanding of agricultural and forest production, a key portion of our GDP. These economic benefits will stem from new knowledge about the limitations to plant growth and the water-use efficiency of plants.