Australian Government
Australian Research Council

RESEARCH *in the national interest – enabling the future*

Examples of new *Discovery Projects* in 2010

Engineering and Environmental Sciences

The University of Sydney (Contact: 02 9114 0748)

Strongly Transient Processes in Turbulent Combustion (DP1097125)

Summary: This project will investigate strongly transient effects in turbulent flames and will ultimately enhance the capabilities of engineers in the design and optimisation of clean and efficient combustion technologies. The new knowledge generated will contribute to Australia's commitment to reduce the carbon footprint and facilitate the transition to a low carbon economy. It will also keep Australia at the leading edge of research in energy efficiency and environmental sustainability, a national research priority.

Chief Investigator: Professor Assaad Masri

ARC funding: $653,545 over 3 years

Monash University (Contact: 03 9903 4840)

Paper fluidics - A novel approach to low cost printable microsensors (DP1094179)

Summary: Printing is perhaps the cheapest means of mass production available, yet it is used almost exclusively to mass produce only one thing, i.e. the printed word! This project will enable the development of disposable printed sensors for assessing the quality of water or the health of an individual. Sensors are generally relatively expensive, but the ability to print them on paper by the thousand will bring down the cost to a few cents. Such cheap, portable, easy-to-use sensors if widely available could profoundly affect the lives of people living in remote areas and developing countries.

Chief Investigator: Dr Wei Shen

ARC funding: $500,000 over 3 years

The University of Queensland (Contact: 07 3365 1120)

The role of learning in conservation management: developing adaptive approaches for the conservation of biodiversity in a changing climate. (DP1092732)

Summary: Biodiversity underpins several major industries: agriculture, tourism, forestry and fisheries. To mitigate the loss of biodiversity, there have been significant investments from all levels of government, including $2.2 billion dollars to manage biodiversity and $138 million simply to gather data on the impact of climatic changes. Despite this well intended funding, the key questions of how to best allocate this money between the many threatened species and regions of Australia, and how to adapt this allocation in light of climatic changes, remain unanswered. This research will develop explicit and practical frameworks.

Chief Investigator: Professor Hugh Possingham

ARC funding: $340,000 over 3 years

Macquarie University (Contact: 02 9850 7456)

Novel coding and decoding in suspension arrays for accelerated biomolecular discovery and personalised medicine (DP1095465)

Summary: This project will establish an advanced multiplexing technique to rapidly analyse complex biological mixtures, such as cell lysates, food samples or body fluids. It will enable the analysis of not tens, but thousands or more distinctive molecular targets in a single test. This will build the foundations for future generation bioassays, paving the way to emerging personalised medicine. This will lead to new personal diagnostics tools for rapid genotype profiling, to better tailor therapy to the individual patient's specific characteristics. As well as the potential to improve health outcomes, the project will generate significant intellectual property and the opportunity for development of new diagnostic instrumentation in Australia.

Chief Investigator: Professor James Piper

ARC funding: $335,125 over 3 years

University of Wollongong (Contact: 02 4221 5942)

Laboratory and Theoretical Investigation of Soft Clay Behaviour under Cyclic Loading Stabilised by Prefabricated Vertical Drains (DP1092483)

Summary: Coastal Australia is under increasing pressure from rapid population growth that requires continual capital investment in civil infrastructure such as road and rail links, ports and buildings. Many regions have soft compressible clays that present challenges for infrastructure design and construction. The use of prefabricated vertical drains (PVDs) in stabilising soil can reduce construction and maintenance costs, and increased soil strength will enhance the performance of infrastructure. In this project, the soil behaviour under cyclic loads stabilised by PVDs will be thoroughly investigated. Extensive laboratory testing will result in more efficient design and construction on soft soils, including roads, railways and airport runways.

Chief Investigator: Professor Buddhima Indraratna

ARC funding: $366,000 over 3 years

Griffith University (Contact: 07 3735 6458)

Environmental fingerprints of biogeochemical cycles embedded in tree rings: Linking global climate change to local long-term forest productivity (DP1092470)

Summary: Forests cover one-third of the Earth's land surface and account for 80 to 90 per cent of plant carbon and 30 to 40 per cent of soil carbon. Forest carbon stocks and dynamics respond to and interact with global climate change (GCC). Recent tree ring research highlights the worsening impact of GCC and acid deposition on long-term forest productivity in central Europe. This project seeks to develop and apply novel tree ring technologies for linking biogeochemical cycles of carbon and nutrients to long-term forest productivity in different regions, and to provide a scientific basis for accounting for long-term forest productivity and carbon stocks in response to future GCC.

Chief Investigator: Professor Zhihong Xu

ARC funding: $450,000 over 3 years