

External Grants and Commercialisation Activities

In 2006, the School's external income exceeded \$21 million. This included competitive research grants from various ARC Schemes (around \$14 million), involvement with Co-operative Research Centres (around \$1.5 million), other Government and non-government grants and direct industry contracts (more than \$6 million). The School's engagement with industry ranged from involvement in the Functional Communication Surfaces Cooperative Research Centre, through successful joint grant applications with industry (ARC Linkage, DITR and AusIndustry), direct industry contracts/joint ventures and involvement with the School's (now four) spin-off companies.

Industry interactions and joint projects assist the School to build long term relationships with the commercial sector that not only stimulate commercialisation of the School's research but provide flow on benefits to the School's more fundamental research. This approach supports the School's strategy of pursuing research that covers both fundamental and applied (pre-commercialisation) activities. Such a broad research profile and overlap between the fundamental and applied programs has resulted in some surprising outcomes in which quite fundamental research has led to important commercial opportunities. For example, there are now four spin-off companies that have all arisen from quite fundamental research in the School. RPO P/L is commercialising innovative polymer/glass composites with a range of applications in optical communications and as smart optical films for displays. This company completed a second funding round of more than \$10 million in early 2006. The commercialisation of novel radioactive nanoparticles that have applications in medical diagnosis and imaging is occurring through Radiosol P/L. This company will be seeking further funds in 2007. WRiota P/L is exploiting applications of novel phase changes resulting from nanoindentation in silicon that can lead to ultra-high density memory, pattern-less lithography and improved flat panel displays: a new funding round was concluded in mid-2006 and there have recently been a number of joint funding applications to government agencies to support further research in the School. The newest School spin-off is Digicore P/L that is currently being established to exploit novel methods for imaging and analysing of porous media with immediate applications for core analysis to aid oil and gas exploration.

The following are some additional applied research projects in the School that are being explored for potential commercialisation. In all of these projects, IP has been secured, including patents granted or provisional patents lodged.

High Brightness Helicon Plasma

This project initially joint with FEI Corporation, leveraged with an ARC Linkage Grant, will continue in 2007 through a subsidiary company. The project is progressing well with the achievement of high brightness in devices designed by the Helicon Plasma Group that are being developed for a plasma focused ion beam (FIB) system. This novel concept

overcomes limitations of current liquid metal ion sources used in FIBs. A commercial prototype is being developed and a developmental machine is envisaged to be ready later in 2007 for testing at ANU.

Spectrometers and Optical Temperature Measurement Instruments

These instruments, that provide a temperature image and other properties of high density plasma streams, have been developed in the School for commercial sale, including broader applications for temperature and material profiling of high temperature industrial processes such as steel production and in smelters. Five instruments have now been delivered to Europe, Korea and Japan. A project, with Bluescope Steel, to develop an industrial radiation thermometer for the assessment of the temperature of streams of molten steel and slag exiting a blast furnace, has progressed very well and a joint application was made for an ARC Linkage grant in 2006.

Visualisation and Modelling of Porous Media

The evaluation and modelling of oil bearing rock and for the general evaluation of porous materials continues to generate huge interest from industry, particularly from the major oil and gas companies world-wide. This is a joint endeavour with the University of New South Wales that utilises a novel micro-CT imaging instrument (three machines are currently in operation) coupled with extensive data collection and analysis software. To provide significantly increased funds for further research and development, an R&D Consortium with around 12 of the largest global companies from the oil and gas sector was established in 2006. Consortium members join for an annual fee that will give access to the technology and some analytical services for core assessment. The immediate success of the Consortium has led to the launch of the analytical spin off company, Digicore P/L.

Carbon and Bn Nanotubes

Sales of Boron Nitride nanotubes continue to be made in small amounts. Although we are able to manufacture large amounts of these materials compared to other methods, we are still limited in our capacity to make them and are exploring avenues for scaling up the technology with industry.

Ion Thruster Rocket

During 2006, strong collaboration continued with both NASA and the European Space Agency (ESA) in an area of innovative plasma technology that has potential for rocket propulsion. The progress has been strong, with a demonstrator successfully tested by ESA in Europe early in 2006. Further development of this technology, as well as commercialisation, will be explored in 2007.

Implant Isolation of III-V Compound Semiconductor Devices

This innovative semiconductor processing technology developed in the School has led to the successful application for an ARC Linkage grant with Epitax P/L as industry partner. The project is progressing well.

Advanced Siloxane Waveguide Devices for Telecommunications

This area of technology was developed in the School and has attracted the attention of one of the School's spin off companies, RPO P/L who successfully applied with us for an ARC Linkage project. This project is progressing well and looks likely to have significant commercial potential that is being exploited by RPO.