

## Physics Industry Day

Eighty physicists from University departments, government organisations and private companies gathered at the National Measurement Laboratory at Bradfield Park on the 27<sup>th</sup> September this year for the fifth Physics Industry Day organised by the NSW Branch of the Australian Institute of Physics (AIP) and sponsored by CSIRO Division of Industrial Physics, AusIndustry and the National Measurement Institute (NMI). Theme of the day and major topic addressed by all thirteen presenters of talks in the Lehany Theatre was “***Is manufacturing in Australia viable?***”, a question that was answered with a definite YES, if correct decisions are made regarding the kinds of manufacturing that are to be done in Australia. Various posters, including sixteen student posters, describing particular topics in Applied Physics research were displayed in the Foyer area outside the Lehany Theatre. An important part of each Physics Industry Day has been the Postgraduate Poster Competition for students who are reading for a M.Sc or Ph.D degree on a topic in Applied or Industrial Physics. This year there were sixteen entries, all of high standard. into this competition with prizes of \$1,000, \$500 and \$250 available for first second and third prizes, respectively.

Bob Lundie-Jenkins, CEO of AusTool began proceedings with a 40 minute talk in which he gave a brief overview of what AusTool is and outlined the kinds of short run, highly automated, high technology areas in which manufacturing in Australia is viable, as opposed to the low technology areas of commodity product manufacturing that is done at much lower cost in China and elsewhere. He pointed up the following problems:

- There is a lack of strategic planning and direction from both State & Federal Governments for skills training of University & TAFE graduates.
- There is poor understanding of manufacturing amongst High School Teachers and students; There is a poor image of manufacturing in High Schools and in the community in general.
- HECS costs for students studying for degrees in Engineering & Science are high, contributing to the nation's skills shortages in these areas.
- The NSW Department of State & Regional Development should be more pro-active in encouraging R & D in manufacturing industries.

Following Bob's introductory lecture there were twelve 20 minute talks dispersed throughout the day, an Industry Forum and tours of CSIRO & NMI Laboratories. Six of the 20 minute talks were delivered by representatives of companies that maintain manufacturing facilities in Australia.

1. Warren King outlined the development by Cap-XX of super capacitors for use in domestic products. At present Cap-XX fabricates about 100,000 super-capacitors per month at its manufacturing facility in Sydney and has recently opened a manufacturing facility in Malaysia to meet expected increase in demand for super-capacitors.

2. Phil Timbrell from Preformed Line Products described the electrical power distribution components made by his company in their manufacturing facility at Glendenning and an equivalent manufacturing facility in Bangkok. A good advantage of such an arrangement is that when a problem arises with respect to component manufacture in Bangkok tests can be run on an equivalent product line at Glendenning to identify the cause of the problem in Bangkok (and vice-versa).
3. Adrian Rispler described the history of Hawker de Havilland and the aircraft components currently manufactured at Bankstown NSW and Fisherman's Bend in Victoria for Boeing. Hawker de Havilland has a number of research projects underway in collaboration with The Universities of Sydney, Melbourne, Wollongong, NSW and Monash University and the company is financially viable because it forms part of the Boeing global network and exports 95% of its manufactured products.
4. Jim Patrick, Chief Scientist at Cochlear, outlined the development of the cochlear implant that has been manufactured in Australia from 1982 up to the present. The current design incorporates a detachable magnet to allow implantees to undergo Nuclear Magnetic Resonance Imaging scans.
5. Tony Wallis from Bishop Technology spoke mainly about the automotive steering system developed by Arthur Bishop and the manufacturing theory & procedures devised by the Bishop group of companies which facilitated manufacture of the steering system. Bishop Technology has entered into joint manufacturing ventures with several automotive manufacturing companies around the world and maintains more than 400 world wide patents to cover intellectual property developed in Australia.
6. Greg Lang from ResMed described the products manufactured by his company to correct sleep disorders such as sleep apnea. ResMed has sales offices in many countries around the World but has established a large single campus manufacturing facility at Bella Vista NSW where all of its products are manufactured and from where most of its products are exported. ResMed firmly believes that the best way to retain intellectual property connected with a product is to retain 100% of the manufacturing of the product within ResMed.

The other six speakers were drawn equally from Government Institutions and University Departments as described below.

1. Cathy Foley, Vice President of the AIP, presented an overview of the diverse range of skills and current research interests of the CSIRO Division of Industrial Physics. The Division is committed to providing assistance to Australian Manufacturing Industry and Cathy described several projects involving collaboration with private companies such as the development of coatings for products made by Fisher & Paykel.

2. Mike Cortie from the Department of Applied Physics at UTS argued that Australia should work to improve its strengths and seek to value add to commodities that we currently export. He then discussed current research at UTS involving application of nano-particle doped coatings to silica glass for various applications including selective absorption of visible light that is converted into heat with corresponding reduction in reflected visible light.
3. Paul Dastoor described research within the Department of Physics at the University of Newcastle into protective coatings for metals and the development of a portable infusion device called the "**Mobi-drip**" that has been developed to deliver small accurately measured volumes of solution to patients. This multi-disciplinary project has resulted in the formation of a company called Keystone Product Developments to develop and manufacture the Mobi-drip.
4. Michael Lerch, Chairman of the NSW Branch of the AIP, provided an overview of two research areas at the University of Wollongong, Superconductivity & electrical materials and Medical radiation physics, that have significant interaction with private industry. Several radiation dosimeters have been and are being developed for medical and mineralogical uses.
5. Bob Harrison, acting head of the Division of Materials & Engineering Science at ANSTO, described the kinds of commercial projects that have been carried out using HIFAR and will be possible using OPAL, the new research reactor, when it is in full operation late this year. He then discussed various research underway within Materials & Engineering Science including collaborative work for private industry involving materials testing.
6. John Miles delivered the final talk of the day on behalf of the new National Measurement Institute (NMI) which, as a separate entity, is only two years old. John described the various standards of measurement of physical, chemical and biological quantities that NMI maintains and the kinds of research undertaken by NMI to maintain those standards. Currently NMI is developing standard measurement procedures for determining sizes of nanoparticles using Scanning Electron Microscopy, Atomic Force Microscopy and Dynamic Light Scattering and is setting up a nanoparticle measurement laboratory to facilitate this.

During the lunch break there were tours of several CSIRO and NMI Laboratories and then following lunch there was a thirty minute industry forum in which David Price from the Department of Industry, Tourism & Resources described two AusIndustry funding schemes, Grant Nicholson from IP Australia explained what can and what can't be patented, Tony Wallis provided historical background to outline the difficulties experienced by Bishop Technology to maintain patent protection and John Miles argued that only a small fraction of Australian Industry pays proper attention to measurement skills and Standards.

## Postgraduate Student Poster Competition

There were sixteen excellent entries for the postgraduate student poster competition this year making this competition the largest and best that been held at a Physics Industry Day. A summary of the participating students is given in Table 1.

**Table 1:** Summary of students and their postgraduate poster titles for Physics Industry Day, 2006

<b>STUDENT</b>	<b>UNIVERSITY</b>	<b>POSTER TITLE</b>
Martin AMS	Macquarie	Realistic photonic circuitry for future optical networks
Hemant BHATTA	Macquarie	Analysis of fluorescence microscopy images to characterise pure & mixed yeast populations.
Dean CUTAJAR	Wollongong	Development of a new monitoring system for prostate cancer treatment.
Ben DUCK	Newcastle	Photonic band response in polymeric photovoltaic devices
Marco FRONZI	Sydney	Stability & Chemistry of cerium oxide surfaces: first-principles investigations.
Shane HENGST	NSW	Optimisation of diesel engine power source for operation at high altitude at low temperature.
Ben JOHNSTON	Macquarie	Laser micromachining for photonics, optics & industrial applications.
Nemanja JOVANOVIC	Macquarie	Development of high power visible fibre lasers.
Tom McGREGOR	Macquarie	Colour: A new dimension in high speed imaging.
Graeme MELVILLE	Western Sydney	Production of $^{225}\text{Ac}$ for cancer therapy by photon induced transmutation of $^{226}\text{Ra}$ .
Joel O'DWYER	Wollongong	On-line mineralogical analysis using energy dispersive X-ray diffraction spectrometry.
Serhiy PYSARENKO	Wollongong	Multilayered deposition and its role in the enhancement of $\text{YBa}_2\text{Cu}_3\text{O}_7$ film performance.
Olga SHCHERBAKOVA	Wollongong	Advanced processing of $\text{MgB}_2$ superconducting wires with drastically enhanced current-carrying performance.
Aloysius SOON	Sydney	Catalysis at the sub-nano scale: characterising the copper-based catalyst for the water-gas shift reaction.
Benjamin TREMAIN	Newcastle	Molecular spacers in powder

		coatings.
Fang XIE	Macquarie	Homogeneous Au-core Ag-shell nanoparticles on glass substrates & their application for fluorescence enhancement.

Judging of the student posters was done in the evening by Tony Murphy (CSIRO Industrial Physics), Bob Harrison (ANSTO, Materials & Engineering Science) and myself. This was a difficult task with marks being awarded for the physics content and the commercialisability of the project on a roughly equal basis. After some two hours of discussion with students and subsequent deliberation we decided to award first prize of \$1,000 to Aloysius Soon from the University of Sydney, second prize of \$500 to Dean Cutajar from the University of Wollongong and third prize of \$250 to Serhiy Pyserenko also from the University of Wollongong.

Thanks to Cathy Foley, Scott Martin and Michael Lerch for assisting greatly with the planning and organisation of Physics Industry Day, to Tony Murphy & Bob Harrison for assisting with the poster judging and to all of the presenters who all gave excellent talks.

Images of Physics Industry Day can be viewed at <http://www.nsw.aip.org.au/>

Ken Doolan  
Physics Industry Day Co-ordinator  
NSW Branch of the AIP