THE **Warren** CENTRE

FOR ADVANCED ENGINEERING

Australian Directory of Nanotechnology Service Providers — 2004

Published by The Warren Centre for Advanced Engineering at The University of Sydney

Australian Government
Department of Industry, Tourism and Resources

Produced with the support of the Australian Department of Industry Tourism and Resources

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– Designer –	Creative HQ
– Published –	June 2004
– ISBN –	1 86487 633 6

– About this Nanotechnology Directory –	This directory lists organisations in Australia that provide nanotechnology related products or services. They are listed alphabetically by organisation name. The Warren Centre intends that this directory will prove to be a useful resource and act as a starting point for people or organisations seeking information in the nanotechnology area. While the Warren Centre has endeavoured to include all companies, research organisations and industry associations that offer nanotechnology products or services, the Centre makes no claim as to completeness. In many cases a contact person is nominated; we urge users to remember that this information was compiled in mid 2004 and will change over time. The entries in this directory have been complied from information supplied by research organisations, industry associations, companies and from public sources. The Warren Centre for Advanced Engineering has accepted the information in good faith and has not attempted to define nanotechnology products or services or rigorously verify the accuracy or completeness of the information supplied. The Warren Centre gives no guarantee concerning information accuracy and does not accept any responsibility for the consequences of relying on any of the material in this publication. **Leong Mar** *Editor*
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Foreword

As the Minister for Industry, Tourism and Resources noted earlier this year, **"Nanotechnology is expected to be as influential in the 21st century as information technology was in the 20th century."** [1]

The science of the very small will have an impact on our lives which we can barely begin to imagine. New and improved products will emerge in the form of smart packaging and clothing, intelligent housing, improved diagnostics for health care and more nutritious foods. Industrial processes will become much more energy efficient.

Australia is equipping itself to be at the forefront of this technological revolution.

We are already producing groundbreaking products integrating nanotechnology, such as the bionic ear, clear UV-resistant sunscreens and glass, and self-cleaning paints.

The Australian Government recognises nanotechnology as a frontier technology for building and transforming Australian industries and is fostering innovation through the $A3 billion Backing Australia's Ability program. Under the program, our nano companies and research institutions are being supported to expand their partnerships with organisations around the world.

The Warren Centre is publishing this booklet, with the assistance of the Department of Industry Tourism and Resources, to help Australian companies. It contributes to positioning Australia at the technological forefront through compiling information on organisations currently able to assist and advise local companies on the development and commercialisation of products incorporating nanotechnology. Use it as a resource to parlay the benefits of the very small into a big future for your business.

Professor Michael Dureau
Executive Director

The Warren Centre for Advanced Engineering
The University of Sydney

May 2004

1. *Ministerial Foreword by the Hon Ian MacFarlane MP to Nanotechnology Australia: Capability and Commercial Potential, The Australian Government Department of Industry, Tourism and Resources, 2004.*

What is Nanotechnology?

NANO IS SMALL – VERY SMALL!

Strictly speaking, nanotechnology is the '-ology' relating to science at the nano-scale. A nanometre, abbreviation 'nm', is equivalent to one billionth of a metre. For comparison purposes, the difference in size between a nanometre and a metre is roughly equal to the size difference between a tennis ball and the earth.

DIFFERENT – NOT JUST SMALLER

Nanotechnology is usually about objects and processes in roughly the 1-100 nm range.

Many definitions of nanotechnology exist, among them: *Nanotechnology is the creation and use of materials, devices and systems that exploit novel properties arising from the structure and function of matter in the nano-metre range.*[1]

Generally, the materials used in microtechnology (1-100µm) behave as they would in 'bulk' objects. This may not be the case with nano-scale objects (< 100 nm), where physical properties may not mimic the behaviours of bulk objects in conductivity, light emission/absorbance, strength, opacity, behaviour in magnetic fields and so on.

Nano-scale materials can thus have novel physical properties different from bulk objects.

POTENTIAL IMPACT

These capabilities will eventually drive change in every human endeavour involving the material world, in our physiology and in information, so it is easy to slip into hyperbole.

It is also easy to think of nanotechnology as a new science, given the recent introduction of the word to public discussion as referring to one big thing. Nanotechnology is however a multi-disciplinary field of research that universities, governments and commercial laboratories worldwide have actively pursued for more than 15 years, developing the insights, tools and techniques being applied today in established industries.

The proponents of nanotechnology argue that the world is entering a new nano-led industrial age. The realists note that nanotechnology uptake will depend on the delivery of improved performance and cost benefits – products that are smaller, cheaper, cleaner, faster and smarter than those already existing.

APPLIED NANOTECHNOLOGY

Scientific research over recent decades has examined matter at the nano-scale, in multi-disciplinary fields such as biology, physics and chemistry. This has in turn inspired new industrial technology in the engineering of matter at the nano-scale, either by making particles uniformly smaller, or scaling up matter using nano-sized building blocks.

In the general sense, there are three broad and extensively overlapping enabling applications in nanotechnology, these being nano-electronics/ photonics, nano-materials/particles and nano-biotechnology.

In early 2002, at least 250 companies world wide were pursuing commercial applications of nanotechnology, although only about 10 percent had products on the market.[2] The total will have grown significantly since then.

1. *This introduction is based on the Department of Industry, Tourism and Resources Emerging Industry Occasional Paper 16, published in June 2002, ISBN 064 721 564.*
2. *See In Realis "A Critical Investor's Guide to Nanotechnology" February 2002 see www.inrealis.com*

ADVANCED NANO TECHNOLOGIES PTY LTD

Address: 112 Radium Street, Welshpool WA 6106
Website: www.ant-powers.com

CONTACT

T (08) 6488 8778
E info@ant-powers.com

Advanced Nano Technologies is the R&D joint venture established by APT and Samsung Corning to develop the MCP™ technology to manufacturing scale processing. ANT has shown that the MCP™ technology can produce high quality nano powders at industrial scale at internationally competitive prices.

ANT has licensed its MCP™ technology to parent companies which are now commercialising products in their respective fields.

ADVANCED POWDER TECHNOLOGY PTY LTD

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Website: www.apt-powers.com

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APT sells nano material-based products utilising its patented nano powder manufacturing technology MCP™.

Key products are:

Cosmeceuticals – ZinClear™ is a transparent dispersion of zinc oxide nano particles for use in sunscreen applications. Alusion™ is fine platelets of alumina used to hide the appearance of fine lines and wrinkles and improve the efficacy of colour cosmetics.

Coatings – transparent functional coating additives which enhance the mechanical and optical properties of coatings and plastics. The NanoZ™ range is used to protect wood, textiles and plastics from UV degradation.

Catalysis – high surface area nano powders and mixed oxide capabilities used in development of the next generation of automotive, environmental and industrial catalysts. APT's first co-developed product is a catalyst that reduces carbon particulate emissions in diesel engines and lowers fuel consumption.

Ceramics – technical ceramics, functional fillers and high temperature lubrication. Platyl™ consists of industrial grade alumina plates with high temperature and chemical stability and enhanced lubricating properties. It is being trialed as a high temperature lubricant and also for enhancing the mechanical properties of plastics and glass.

AMBRI LTD

Address: 126 Greville Street, Chatswood NSW 2067
Website: www.ambri.com.au

CONTACTS

Dr Bruce Cornell — *Senior VP and Chief Scientist*
T (02) 9422 3000

Jonathan Wright — *Managing Director and CEO*
T (02) 9422 3000

Ambri Limited is pioneering the integration of biotechnology, nanotechnology and electronics with a major focus in the human medical diagnostics market. It has developed the Ion Channel Switch (ICS™) technology, a patented self assembling synthetic bio-membrane which has a wide range of potential applications.

Ambri's first commercial application of the ICS™ technology has been in the SensiDx™ System, a point-of-care diagnostic system for the hospital critical care diagnostic market. The system has the potential to detect and measure drugs, hormones, viruses and bacteria in whole blood directly from a standard collection tube in less than five minutes. By providing a fast turn around time for test results and allowing decisions to be made at the point-of-care, the system should improve patient outcomes.

ANSTO

Materials and Engineering Science

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Website: www.ansto.gov.au

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ANSTO's current research areas are:

- particulates for controlled release of active molecules in food, chemical, biocide, pesticide, pharmaceutical and cosmetic applications
- bio synthesis using encapsulated micro organisms
- low-temperature production of optical coatings by atomic layer deposition
- meso-phase materials for applications in microelectronics, optoelectronics, sensors, pharmaceuticals, membranes and catalysis
- cation-selective micro porous materials for metal ion separations.

Synthesis and characterisation capabilities are:

- sol-gel processing
- thin/thick film deposition – spin and dip-coating, atomic layer deposition, screen printing, tape casting
- FTIR, Raman, UV, VIS, NIR analysis
- particle size analysis
- spectroscopic ellipsometry
- atomic force microscopy
- X-ray diffraction
- secondary-ion mass spectrometry
- scanning, transmission electron microscopy
- small angle neutron/X-ray scattering.

ARTIMECH PTY LTD

Address: 1 Dalmore Drive, Scoresby VIC 3179
Website: www.artimech.com.au

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Description of nanotechnology products or services:

- Mechanical engineering design of larger scale structures which support the development of nanotechnology or microtechnology devices
- Primary skills include materials selection, engineering design/analysis and tolerancing, 3D and 2D CAD modelling, testing, development/manufacture of testing fixtures and associated machinery
- Experience in plastic injection moulding, casting technologies, sensing technologies and control systems, testing and high-end automotive component design – Formula 1 and touring cars.

ASHWYN INNOVATIONS PTY LTD

Address: 448 Wilson Street, Darlington NSW 2008

CONTACT

Dr Vimala Sarma — *Chief Executive Officer*

T (02) 9699 4414 **M** 0409 690 220

E vsarma@bigpond.com

Ashwyn provides business consulting services to the nanotechnology industry, including:

- accessing relevant government R&D programs
- business and market planning
- commercialisation planning and route to market
- R&D planning – resources, budgets, milestones and Gantt charts
- technical writing, reports and information memoranda
- accessing venture capital and developing partnerships
- draft contracts, intellectual property management strategies
- identification of key partners, customers, competitors, suppliers and alliances.

ASIA PACIFIC NANOTECHNOLOGY FORUM (APNF)

Address: Suite 1, Level 2, 533-539 Kent Street, Sydney NSW 2000

Website: www.apnf.org

CONTACT

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T (02) 9748 6596

E schulte@apnf.org

The Asia Pacific Nanotechnology Forum is a regional coordinator for science and technology development. The Forum facilitates cross regional collaboration among government policy makers, industry, R&D institutions and leading researchers.

It offers a number of platforms for communication, ideas exchange and networking - each platform represented by a small panel of experts and thought leaders. The Asia Pacific Nanotechnology Forum also hosts an annual conference and a number of special topic symposia and workshops across the region.

ATA SCIENTIFIC PTY LTD

Address: Woods Centre, ANSTO Technology Park, New Illawarra Road, Lucas Heights NSW 2234

Website: www.atasci.com.au

CONTACT

Tony McDonagh — *Manager*

T (02) 9543 0477

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ATA supplies and services scientific instrumentation for the production of sub-micron emulsions and for the measurement of nano particle size and zeta potential.

Avestin high pressure homogenisers with dynamic homogenising valve produce sub-micron emulsions with narrow particle size distributions. The range of modela covers throughput from lab to full production with guaranteed scale up.

Nano particle sizing and zeta potential are measured by the Malvern Zetasizer-nano series, using the principle of Dynamic Light Scattering. Non-invasive backscatter optics provide exceptional sensitivity over the particle size range of 0.6 to 6000nm.

AUSINDUSTRY

Department of Industry, Tourism and Resources

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AusIndustry offers grants and business incentive schemes including:

- Commercialising Emerging Technologies – a merit based grant utilising private consultants to assist with venture capital fundraising for commercialising innovative technologies.
- R&D Start – competitive merit-based grants to support Australian businesses undertaking research and development.
- R&D Tax Concession – allows companies to deduct up to 125% (and up to 175%) of their qualifying R&D expenditure when lodging their tax return.
- R&D Tax Offset – Australian businesses with a turnover less than $5M per annum and R&D expenditure of up to $1M per annum are eligible to receive a cash offset equivalent to 37.5 cents per dollar of eligible R&D expenditure.
- Innovation Access Program – discretionary grants to organisations positioned to expand Australian industry (particularly SME) access to global, leading-edge research technologies that can improve their innovativeness and competitiveness.
- Textiles, Clothing and Footwear Strategic Investment Program – grants to promote investment in innovation and value-adding in the industry.
- Automotive Competitiveness Investment Scheme – providing import duty credits to registered automotive industry participants to encourage new investment and innovation in the automotive industry.

AUSTRALIAN INSTITUTE FOR BIOENGINEERING AND NANOTECHNOLOGY (AIBN)

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Website: www.aibn.uq.edu.au

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Professor Peter Gray — *Director*

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The University of Queensland's Australian Institute for Bioengineering and Nanotechnology (AIBN) is Australia's first integrated research institute in these two scientific disciplines.

AIBN scientists and engineers undertake research in four main areas: nanotechnology for energy and the environment; cell and tissue engineering; systems biotechnology; and nano biomaterials and devices. The research focus includes development of artificial human organs and tissues; biomedical delivery; biodevices; tissue regeneration and cell therapies; clean energy; value-added manufacturing; and biopolymers.

The AIBN provides opportunities for Australian industry to solve important practical problems and for the next generation of scientists to undertake research training.

AUSTRALIAN NANOBIOMATERIALS NETWORK

Website: www.uow.edu.au/research/researchgrantreports/gwallace/

The Australian NanoBioMaterials Network (ANBN) is an amalgamation of three Australian Research Council initiatives: the 'Advanced Electromaterials from Nanomaterials and Biomaterials' network, the 'Integrated Nanoscale Biosystems Network' and the 'Biodevice Fabrication Through Intelligent Surface Modification Network'. The ANBN will foster innovative research to produce novel intellectual property, facilitate collaborative research with international scientists and industry, and train the next generation of scientists for this emerging discipline.

The ANBN will provide the basis for the design and manufacture of materials with nanoscale architecture (nanomaterials and nanodevices) that can interact directly with biological cells and macromolecules, and also nano-objects that can be assembled to construct complex electronic circuits. The use of biomimicry to advance areas involving charge transfer processes includes targets such as artificial muscles or artificial enzymes and biologically derived energy conversion/storage systems. An understanding and development of unique prevention mechanisms for biofouling, biocorrosion, new biosensing technologies and cellular communication protocols is expected to emerge from the Network activities.

The Network will also enable the establishment of national characterisation facilities with instrumentation that will enable in-situ, real time characterisation of electromaterials, nano components and nanostructures.

AUSTRALIAN NANOTECHNOLOGY NETWORK

Website: www.ausnano.net

CONTACT

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The Australian Nanotechnology Network brings together groups from across Australia working in nanotechnology (physical sciences based) and related areas (eg micro electronics, micro photonics). It aims to substantially enhance Australia's research outcomes by promoting effective collaboration and exposing researchers to alternative and complementary approaches from other fields.

The Network will:

- promote international links
- create forums for students, young researchers and entrepreneurs
- enhance awareness of existing infrastructure
- actively seek to enhance nanotechnology infrastructure in country areas
- conduct out-reach activities to improve public awareness of nanotechnology.

Other networks with similar interests are welcome to join the Australian Nanotechnology Network.

AUSTRALIAN NATIONAL UNIVERSITY

Research School of Physical Sciences and Engineering

Address: Building 60, ANU Campus, Canberra ACT 0200
Website: www.rsphysse.anu.edu.au

CONTACT

Professor Jim Williams — *Director*
T (02) 6125 2476 E director.RSPSE@anu.edu

Located within the Institute of Advanced Studies at the Australian National University, the Research School of Physical Sciences and Engineering has around 200 staff, including more than 70 academic research staff and 60 PhD students. Research ranges from the fundamental to the applied, and includes a broad range of both experimental and theoretical work. The School's primary research thrusts are:

- materials science and engineering
- lasers, nonlinear optics and photonics
- nanotechnology and mesoscopic physics
- the physics of atoms, molecules and the nucleus
- plasma physics and surface science
- physics and the environment.

The School's world-class facilities are supported by mechanical and electronic workshops capable of fabricating a wide range of sophisticated equipment and instruments.

AUSTRALIAN SYNCHROTRON RESEARCH PROGRAM

Address: c/- ANSTO, Building 58, Private Mail Bag 1, Menai NSW 2234
Website: www.ansto.gov.au/natfac/asrp.html

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The Australian Synchrotron Research Program provides Australian researchers with access to state-of-the-art synchrotron radiation research capabilities at overseas synchrotron light source facilities. Many synchrotron X-ray techniques provide unique capabilities on the nano-scale, eg:

- X-ray diffraction
- X-ray absorption spectroscopy (EXAFS, XANES)
- small angle X-ray scattering
- X-ray photoelectron spectroscopy.

Time on ASRP facilities is granted on the basis of peer-reviewed proposals. Grants to cover travel and subsistence costs are included.

AZONANO.COM (THE A TO Z OF NANOTECHNOLOGY) AND AZOM.COM (THE A TO Z OF MATERIALS)

Address: 139 Hudson Parade, Clareville NSW 2107
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AZoNano.com was formed with the aim of increasing the use of nanotechnology by the science, engineering and design communities worldwide by acting as a nanotechnology information resource and publicist. All educational, informative and news content on AZoNano.com is easy to access and is provided free of charge.

AZoNano.com is a collaborative project involving AZoM.com and the Institute of Nanotechnology.

A new concept in the field of material science publishing and information, AZoM.com provides free access to an online materials knowledge base, news source and supplier and expert directory. Information is presented in an easy-to-read format and has been tailored for the end user.

AZoM is a collaborative project involving professional materials institutions and related trade associations.

BOTTLE MAGIC AUSTRALIA PTY LTD

Address: 521 South Road, Regency Park SA 5010
Website: www.bottlemagic.com.au

CONTACT

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Bottle Magic Australia Pty Ltd are glass bottle decorators who provide a wide range of bottle coatings for the packaging industry.

Bottle Magic also produce coatings with functional as well as aesthetic qualities and worked with the CSIRO to create a Premium Product Protection solution. This patented technology blocks out the UV and critical visible light wavelengths that have deleterious effects on packaged food or beverages. It is based on a coating composition that includes a carrier and a pigment dispersed in the carrier.

Bottle Magic won the 1999 Australian Packaging Innovation Award.

CAP-XX PTY LTD

Address: Units 9 & 10, 12 Mars Road, Lane Cove NSW 2066
Website: www.cap-xx.com

CONTACT

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CAP-XX develops, manufactures and sells advanced supercapacitors – high power energy storage devices based on nano-structured carbons and interfaces and the nano-scale movement of charged ions.

The combination of power and energy in CAP-XX supercapacitors fills a gap in energy storage systems for industries as diverse as telecommunications, power and automotive. Currently Cap-XX is targeting miniaturised wireless communication, notebook computer and digital camera applications where supercapacitors can extend battery life and device useability over a wide range of operating conditions and enable some new functions.

The high performance of CAP-XX supercapacitors is enabled by nano-structured carbon electrode materials with an extremely large surface area (greater than 1000 m^2 per gram) and pores that are on average less than two nanometres in diameter. Applying a potential allows controlled, rapid and reversible adsorption and desorption of charge carrying ions (sub-nanometre in size) within the carbon nano-pores that gives the high power and energy capability of CAP-XX supercapacitors. These nano-scale properties allow high power devices, the size of a postage stamp, to be used in miniaturised electronic devices.

CARL ZEISS PTY LTD

Microscopy Business Group

Address: Unit 13, 2 Eden Park Drive, North Ryde NSW 2113
Website: www.zeiss.com.au

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LSM 5 PASCAL is the budget-priced system for single users and small groups, that includes dedicated configurations for biomedical and materials research and testing. LSM 5 PASCAL provides the user with an efficient and compact system with confocal technology and laser scanning procedures that permits fast and non-contact recording of three-dimensional microstructures down to the sub-micrometer range.

Many aspects of the high-end LSM 510 system have been implemented in LSM 5 PASCAL:

- scanning fields of unparalleled size
- single images with more than 4 million pixels in up to 4096 gray levels
- high flexibility in selecting scanning modes and the powerful
- user-friendly software.

The LSM 5 PASCAL user can get the full benefit from the perfect interaction between the fully motorized Axioplan 2 research microscope and the Laser Scanning Microscope.

COHERENT SCIENTIFIC

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Coherent Scientific provides sales and service support for the following related nano- and micro-technology products:

- scanning probe microscopes
- scanning near field-optical microscopes
- undergraduate nano-educator packages
- nano identation systems
- optical microscopes
- confocal microscopes
- digital imaging systems
- ultra fast, pulsed and CW fixed wavelength and tuneable laser systems
- turnkey laser micro-machining systems
- active vibration control
- precision motion control systems
- micro-scale flow visualisation systems.

CSIRO

Nanotechnology Centre

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Twelve CSIRO Divisions are involved in nanotechnology, including:

- nano biotechnology – new technologies for diagnosis, catalysis and separation in biological systems. Design of self-assembling systems for drug uptake and delivery.
- biochip technologies for the next generation of diagnostics – the design of novel, high-throughput assays recognising early molecular signatures of diseases involving alterations in cell membrane signaling.
- new physical phenomena – exploring new physics arising from nano scale phenomena by exploiting the "bottom-up", directed assembly of molecular and nano-scale components.
- new materials design, processing and fabrication technologies – polymer composites and nanomaterials for the aerospace, automotive, transport and building and construction sectors and food packaging.
- particle processing – focusing on the development of inorganic materials and processes for applications in plastics, cosmetics/sunscreens, paints and coatings, inks, textiles and minerals industries.

CURTIN UNIVERSITY OF TECHNOLOGY

Nanochemistry Research Institute, Department of Applied Chemistry

Address: GPO Box U1987, Perth WA 6102

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CONTACT

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The Nanochemistry Research Institute carries out fundamental and applied research based on three core areas of expertise:

- computational chemistry research – members have ongoing involvement in the development of several simulation software codes that are in demand worldwide and have significant computing hardware
- nano characterisation expertise, encompassing a world-class scanning probe microscopy facility, microscopy and analytical facilities for the real-time observation of nano particulate growth processes, with unique in situ capabilities
- nano reactions, including the use of nano containers for molecular recognition, chemical storage, or to direct reactions on an extremely small scale. Capabilities in supramolecular and synthetic chemistry ensure that target compounds can be tailored to a specific size, shape and functionality for particular applications, such as additives for crystal growth modification, scale mitigation or product improvement.

The Institute has strong industry support from the minerals, oil and gas industry as well as the biomedical and agricultural sectors.

DEAKIN UNIVERSITY

School of Engineering and Technology

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- Extrusion of nano-composite fibres
- Electro-spinning of nano fibres
- Production of nano particles
- Production of nano-porous materials
- Production of nano-shells
- Production of conducting nano fibres
- Production of carbon nano tubes and carbon nano fibres
- Micro-contact printing for nano-patterning
- Polymer modification with nano particles
- Production of nano metal powders by mechanical alloying
- Microforming from nano metal/alloy particles
- Nanoindenter and AFM facilities
- Use of nano materials in waste water treatment
- Research training in nanotechnology and nano material preparations.

ECOSTEPS PTY LTD

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EcoSTEPS provides services in sustainability training, education, practices and strategies. A catalyst for change, EcoSTEPS assesses the benefits and adverse impacts of organisations and products from internal and external perspectives, from conceptual design through to operations and eventual decommissioning.

Services cover such areas as:

- sustainability review
- materials and energy input
- wastes and emissions
- innovative thinking skills
- triple bottom line reporting
- sustainability indicators and metrics
- corporate social responsibility
- socially responsible investment
- ecological footprint
- life cycle analysis.

EIFFEL TECHNOLOGIES LIMITED

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Eiffel Technologies uses Supercritical Fluid (SCF) technologies to re-engineer pharmaceuticals and proteins to improve their bioavailability and delivery. By applying its expertise in the four SCF technologies, alone or in combination, Eiffel Technologies has the capacity to deliver a customised re-engineering solution to enhance the performance and delivery of drug formulations with wide-ranging physicochemical properties.

Eiffel Technologies can rectify problems that interfere with the optimal performance of approved pharmaceuticals and hamper the progress of those under development. Importantly, Eiffel's proprietary SCF technology offers patent protection to branded products.

FLINDERS UNIVERSITY

School of Chemistry, Physics and Earth Sciences

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Flinders University was the first university in the world to offer an undergraduate degree in nanotechnology. The Bachelor of Science in Nanotechnology (Honours) requires four years of full-time study (or the equivalent part-time), including the compulsory honours year.

Flinders University is a research leader in new materials development and characterisation and incorporates one of Australia's largest research clusters in polymer science.

Nanotechnology research activities encompass areas such as: Surface Science and Scanning Probe Microscopy, Controlled Polymer Production, Designed Capsule Molecules, BioNanotechnology (Sensors) and Biomaterials.

FUTURE MATERIALS

Address: National Innovation Centre, Australian Technology Park, Eveleigh NSW 1430
Website: www.future.org.au

CONTACT

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Future Materials has been established to ensure Australian companies have access to a national network of materials capabilities. A not-for-profit organisation funded by the Commonwealth Government, it assists companies requiring independent advice on nanotechnology and also helps in selecting the most appropriate research provider.

Future Materials' state managers have both research and industrial experience and can provide independent advice both from a strategic and technology point of view.

The state office telephone contact numbers are:

- Brisbane (07) 3365 3829
- Sydney (02) 9385 7996
- Canberra (02) 6125 3525
- Melbourne (03) 9905 5791
- Adelaide (08) 8302 3684
- Perth (08) 9382 5777

GRIFFITH UNIVERSITY

Faculty of Science, Faculty of Engineering and Information Technology

Address: Kessels Road, Nathan, Brisbane QLD 4111

CONTACT

Evan Gray — *Associate Professor*

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- Undergraduate degree with embedded honours in photonics and nanoscience
- Postgraduate degree projects in nanoscience and nanotechnology
- Research in nanoscience and nanotechnology, focusing on:
  - functional nano structures – forces of cohesion and adhesion in nanostructures
  - micro fluidics and nano fluidics – fluids in nano structures, nano fluid control technology, Lab on a Chip
  - nano sensors – bio-recognition sensors, smart sensors
  - memories – next-generation (silicon-carbide) and future-generation (silicon-dioxide) memories).

INTELLIGENT MANUFACTURING SYSTEMS

Australian Regional IMS Secretariat

Address: PO Box 290, St Leonards NSW 1590

Website: www.au.ims.org

CONTACT

Tony Strasser — *Manager*

T (02) 9928 2366 **E** IMSAustralia@au.ims.org

IMS is an industry-led, international R&D program established to develop the next generation of manufacturing and processing technologies. Emerging technologies such as nanotechnology are a priority area (see also the n-ABLE listing).

Companies and research institutions from Australia, Canada, the European Union, Japan, Korea, Switzerland and the USA participate in the program.

IMS provides a support structure for conducting R&D projects within specific arrangements for the protection of intellectual property rights (IPR). The IPR provisions enable small businesses to cooperate effectively and on an equal footing with large firms.

The IMS Australia Secretariat welcomes inquiries on how to join IMS projects and any ideas that might benefit from the IMS platform.

INVEST AUSTRALIA - ADVANCED MANUFACTURING AND SERVICES

Address: Level 4, 40 Allara Street, Canberra ACT 2600 *and* GPO Box 9839, Canberra ACT 2601

Website: www.investaustralia.gov.au *and* www.nanotechnology.gov.au

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Shelley Brooks — *Investment Manager*

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Invest Australia promotes Australia's nanotechnology strengths to the global marketplace. It supports local nanotechnology companies and research institutions to expand their alliances with organisations and businesses around the world. Invest Australia includes profiles on Australian companies and organisations in its promotional materials; and provides prospective foreign investors with the government and industry intelligence needed to establish or expand a nanotechnology business in Australia.

Invest Australia can:

- arrange site visits
- link investors with potential joint venture partners
- offer expert advice from a range of industry specialists and help to identify potential investments
- provide information on investment regulations, streamlining project approval processes and provide contacts with key government agencies
- provide information on business costs, skills availability, taxation, research and development and other business related infrastructure
- identify any relevant government industry assistance schemes and possible incentives.

LATROBE UNIVERSITY

Faculty of Science, Technology and Engineering

Address: Latrobe University, Bundoora VIC 3086
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A/Professor Paul Pigram
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The faculty of Science, Technology and Engineering offers a double degree in the area of Nanotechnology (Bachelor of Nanotechnology/Bachelor of Science). The course offers core studies in Physics, Chemistry and Mathematics which are taken at year levels one to three together with specialised studies in nanotechnology in all years. In the second year units, Nanotechnology subjects include scanning probe microscopies, while third year units comprise synchrotron science, molecular biology, semiconductor technology sensors and devices. There is also a Nanotechnology project in the third year. Graduates will be eligible for accreditation with the Australian Institute of Physics and the Royal Australian Chemical Institute. Entry to the degree requires VCE (or equivalent) Units 3 and 4 with a study score of 25 in English, Chemistry and Mathematical Methods or a study score of 20 in Specialist Mathematics or Physics.

LEHMANN PACIFIC SOLAR PTY LTD

Address: 25 Leighton Place, Hornsby NSW 2077

CONTACT

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E rex@skycool.com.au

Lehmann Pacific Solar supplies SkyCool, a liquid coating for the external surface of metal roofs.

SkyCool employs nano particles to help radiate absorbed heat from the sun and from inside the building at the 8-13 micron wavelength which enables the heat to essentially bypass the atmosphere. The net result is an interior temperature 4-6 degrees below the prevailing ambient temperature under a clear sky – day and night. In addition to non-mechanical cooling within free-flowing buildings, the use of SkyCool also results in air conditioning power saving within the range 40-50% on standard supermarkets.

The types of structures which can benefit from SkyCool include low-rise metal roofed buildings and external storage facilities such as volatile liquid tanks.

MACQUARIE UNIVERSITY

Centre For Lasers And Applications and Laser Micromachining Solutions

Address: Department of Physics, Macquarie University NSW 2109
Website: www.ics.mq.edu.au/cudos/ *and* www.lasermicro.com.au

CONTACTS

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David Baer —
Manager, Laser Micromachining Solutions
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The Centre for Lasers and Applications (CLA) and Macquarie University node of the ARC Centre of Excellence: CUDOS has a range of major research projects in micro-fabricating and characterising photonic devices. The group draws on over 10 years of expertise developed within the CLA in miniaturisation engineering and laser physics. Interests include the fabrication of 2D photonic crystals, integrated optics, waveguides, optoelectronic components and radiation dynamics. Features as small as 300nm in size are fabricated using advanced femtosecond laser machining techniques.

Laser Micromachining Solutions is a commercial venture of the CLA undertaking strategic research and developing advanced laser micro machining and micro structuring techniques. These techniques have been used to process features down to 1 micron in size in metals, ceramics, polymers, glasses and crystalline materials, for a range of scientific applications.

MICRONISERS PTY LTD

Address: 8 England Street, Dandenong VIC 3175
Website: www.micronisers.com

CONTACT

Michael Boss
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Micronisers develops and commercialises nano scale nucleating agents for polypropylene and nano scale zinc oxide powder for use in plastics, sunscreens and clear coatings. In addition, an extensive range of nano zinc oxide and titanium dioxide dispersions for personal care have been developed coupled with a range of coated talcs for cosmetic applications.

Micronisers works closely with CSIRO in new product development. Ultra fine additives for sunscreens and other personal care products developed collaboratively by the two organisations have captured 60% of the Australian sunscreen additive market through the patented Nanosun™ and Sunsorb™. The company also has patented technology for milling, encapsulation and coatings.

MINIFAB (AUST) PTY LTD

Address: 1 Dalmore Drive, Caribbean Park, Scoresby VIC 3168
Website: www.minifab.com.au

CONTACTS

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Dr Erol Harvey — *Chief Executive Officer*
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MiniFAB offers micro and nano fabrication processes with particular emphasis on polymer and laser related machining, but also micro and nano replication, micro fluidics, lithography and synchrotron LIGA. MiniFAB is also able to provide custom manufacture to pre-production volumes of components or devices as appropriate.

Working with customers, MiniFAB has developed devices and components including micro chemical reactors, bio fluidic handling systems, micro fluidic connectors and integrated active components such as valves, pumps, electrodes and optical elements. MiniFAB provides a system approach to product development, with a range of capabilities incorporating design, micro manufacture, electronics and precision machining.

MONASH UNIVERSITY

Centre for Advanced Materials Technology

Address: School of Physics and Materials Engineering, Monash University VIC 3800
Website: www.spme.monash.edu.au

CONTACTS

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Dr Astrid Nordmann — *Project Manager*
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The School of Physics and Materials Engineering maintains leading edge research programs in:

- nano-structured materials, including nano-particulate, and nano-crystalline and nano-composite materials
- semiconductor thin films and multi layers
- functional interfaces in nano structures
- structure and stability of nano structures, including quantum dots
- computational materials science
- high resolution X-ray imaging, 3D imaging and tomography
- nano fabrication and characterisation.

The School's advanced instrumentation includes a 3D position-sensitive atom probe field ion microscope; a low energy electron microscope with in-situ MBE facilities; FEG-TEM, FEG-SEM and HREM; solid state NMR and Mössbauer spectroscopy; and advanced X-ray characterisation facilities, including micro focus SAXS.

The Centre for Advanced Materials Technology coordinates contract R&D and consulting activities in these areas, and also manages a strategic interaction between the University and Nanotechnology Victoria Limited. It represents the Victorian node of the Australian Materials Technology Network.

MURDOCH UNIVERSITY

Division of Science and Engineering

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CONTACT

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The Division of Science and Engineering at Murdoch University provides a surface analytical service using:

- high resolution X-ray Photoelectron Spectroscopy (XPS) with state-of-the-art systems, including systems interfaced to electrochemical cells
- imaging XPS using the Kratos Ultra system
- ambient and UHV STM
- electrochemical STM
- ambient AFM.

N-ABLE NANOTECHNOLOGY IN MANUFACTURING - COMMUNITY OF COMMON INTEREST

Address: Suite 1, Level 2, 533-539 Kent Street, Sydney NSW 2001
Website: www.n-able.org

CONTACT

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The Community of Common Interest Nanotechnology in Manufacturing, called n-ABLE, is a global network of organisations and individuals with a common interest in meeting the challenges of manufacturing nanotechnology-based products. It has been established under the IMS program (see separate IMS listing).

By developing a technology roadmap and using the IMS program as a framework for subsequent R&D efforts, n-ABLE will address the priority needs of the nanotechnology manufacturing sector, namely:

- manufacturing of input materials
- manufacturing of new nanotechnology products
- metrology
- education and training
- understanding and managing new risks.

Members of n-ABLE will benefit by:

- developing relationships across the global nanotechnology manufacturing industry
- shaping the future of the industry by participating in the development of the n-ABLE roadmap
- gaining access to the roadmap and early access to the results of related research.

NANOCHEM HOLDINGS PTY LTD

Address: Level 6, Gehrmann Building, Research Road, St Lucia QLD 4067
Website: www.nanochem.com.au

CONTACT

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NanoChem uses nanotechnology to create useful materials for practical applications in the chemical and wastewater treatment industries. Its products have been developed in conjunction with the University of Queensland and other Australian research institutions.

NanoChem also provides technical and after sales service.

NANOMICS BIOSYSTEMS PTY LTD

CONTACTS

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M 0416 270 121

Professor Matt Trau
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Nanomics Biosystems Pty Ltd is a spin off company from the University of Queensland focused on commercialising a versatile nanotechnology platform spanning the fields of genomics, proteomics, drug discovery and human diagnostics. The technology provides a method of bar-coding libraries of tiny ceramic beads with labels to create unique optical signatures and hence the ability to track individual chemicals attached to their surfaces. Nanomics' 'colloidal bar-coding' approach will make available massive libraries of identifiable chemical entities that can be economically and easily utilised for a variety of tasks including DNA sequencing, SNP analysis discovery, gene expression analysis, drug discovery, pharmacogenomics, diagnostics and therapeutics.

NANOQUEST PTY LTD

Address: Level 27, Central Plaza One, 345 Queen Street, Brisbane QLD 4001

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NanoQuest is a privately owned company with a focus on development and commercialisation of nano materials for sustainable energy and environmental applications. Its objective is to commercialise innovations through strategic investment in nanotechnology research and intellectual property development on projects with sound commercial potential.

Business activities include:

- strategic development and commercialisation of targeted products and platforms by supporting, advancing and improving technical research
- market research, commercial assessments and technology promotion
- the linking of emerging technologies with emerging markets; investment and management of development projects
- provision of training and consultation to the nano materials industry.

NANOSTRUCTURAL ANALYSIS NETWORK ORGANISATION (NANO)

Address: Head Office - Madsen Building, University of Sydney NSW 2006
Website: www.nano.org.au

CONTACTS

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The Nanostructural Analysis Network Organisation is an unincorporated joint venture between university, industry, state and federal governments. It is the peak Australian facility for nanometric analysis of the structure and chemistry of materials in both physical and biological systems and operates state-of-the-art facilities for the characterisation and manipulation of matter at the atomic and molecular scale.

With a primary focus on microscopy and microanalysis, the network organisation will create collaborations to explore and define the structure-function relationships which enable innovation in nanotechnology and biotechnology. It will develop and support a commercial-arm to provide a vehicle for the rapid commercialisation of results.

The core nodes are: the Australian Key Centre for Microscopy & Microanalysis at the University of Sydney, the Electron Microscope Unit at the University of NSW, the Centre for Microscopy & Microanalysis at the University of Queensland, the WA Centre for Microscopy & Microanalysis at the University of Western Australia and the MicroAnalytical Research Centre at The University of Melbourne.

NANOTEC PTY LTD

Address: 7 Miami Place, Frenchs Forest NSW 2086
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Nanotec Pty Ltd have a range of self-cleaning/easy-to-clean products for pavers and concrete and a product which gives glass dirt-repellent, water repellent self cleaning properties through selective surface treatment with nano particle solutions. Products have been tested to withstand 10,000 hours of weathering in several tests and are UV stable.

Nanotec sees potential in the treatment of surfaces with nano impregnations and nano coatings because of the significantly reduced cleaning cycles, savings in water and maintenance costs and the environmentally friendly nature of the water-based products.

NANOTECHNOLOGY SYSTEMS

Address: 24 Louis Street, Greensborough VIC 3088
Website: www.nanotechsys.com.au

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nanoTechnology Systems supplies and supports products including:

- electron microscopes
- focused ion beam systems
- DualBeam™ systems – tools for nano fabrication, nano diagnostics and nano failure analysis
- nano tube furnaces
- nano manipulators, nano motors and nano robotics
- sample preparation equipment.

nanoTechnology Systems also offers a consulting service to customers on global commercialisation of nano technologies.

NANOTECHNOLOGY VICTORIA LTD

Address: Strip 1 (Building 75), Monash University, Clayton VIC 3800
Website: www.nanovic.com.au

CONTACTS

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Dr Bob Irving — *Scientific & Commercial Director*
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Nanotechnology Victoria is a consortium of Monash University, the CSIRO, Swinburne University of Technology, and RMIT University funded by a Grant of $12 million from the Government of Victoria. Its purpose is to invest in the commercialization of emerging nanotechnologies to support Victorian and Australian industry. Nanotechnology Victoria has made investments (total $3.35 million to end May 2004) in nanotechnology capabilities to support the textiles, automotive component, aerospace materials, pharmaceutical, agribusiness and environmental industries and is seeking further product investment opportunities which leverage the capabilities of its Members and other Victorian R&D providers.

PLANTIC PTY LTD

Address: Unit 2, Angliss Park Estate, 227-231 Fitzgerald Road, Laverton North VIC 3026

Website: www.plantic.com.au

CONTACTS

James Steele — *Sales*

T (03) 9353 7900

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General enquiries:

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Plantic produces a biodegradable polymer nano-composite material that was invented, developed and produced in Australia by the Cooperative Research Centre for International Food Manufacture and Packaging Science. Made from corn, the material can be tailored to various packaging applications and is already used by Cadbury in Australia.

Plantic is suitable for rigid thermoformed products for dry goods packaging including biscuit and confectionery trays, blister packaging and trays for electronic components.

Plantic materials match or exceed petrochemical plastics in terms of strength, stability and shaping characteristics but, unlike plastics, break down to stable and safe carbon dioxide and water in virtually any outdoor environment.

POLY OPTICS AUSTRALIA PTY LTD

Address: 18 Leda Drive, Burleigh QLD 4220

Website: www.fiberopticlight.com

CONTACT

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Poly Optics manufactures a range of large core polymer fibre optic cable, including end emitting and side emitting fibres, for a diverse range of lighting applications.

A recent innovation is called super side light, which is a high extraction side emitting fibre optic, designed to be coupled to energy efficient LEDs. This fibre optic is specially formulated with special micro spheres, which facilitate the side light scattering. This fibre is a unique product and has a wide range of energy efficient commercial lighting applications including:

- Step and aisle lighting
- Safety and emergency lighting
- Consumer products
- Refrigeration lighting
- Fluorescent replacement
- Neon replacement.

The super side light technology was developed by Poly Optics in conjunction with the Applied Physics Department of University of Technology, Sydney.

Other Poly Optics fibre optic technology includes the piping of sunlight into domestic and commercial buildings, using a high attenuation end lit fibre.

Poly Optics has been recognized for its innovative technology recently, in winning the 2004 DuPont Innovation Award for the category of Construction and Architecture.

PRO-M TECHNOLOGY PTY LTD

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CONTACTS

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Pro-M Technology Pty Ltd provides a range of photomask, phasemask and product design services, distributes photolithographic masking products and provides electron beam lithography device fabrication capabilities for the micro-electro mechanical systems and nanotechnology markets.

An important consideration for Pro-M Technology is to ensure that the product is targeting the key deep-submicron to nano metre minimum feature size technology.

PROTEOME SYSTEMS LTD

Address: Unit 1, 35-41 Waterloo Road, North Ryde NSW 2113
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CONTACT

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A proteomics technology, diagnostics and discovery company, Proteome Systems has developed and commercialised a proteomics platform, ProteomIQ™, which is the first high throughput, integrated proteomics discovery network of instruments and informatics. ProteomIQ™ is being marketed as part of a global alliance with IBM. In collaboration with the Japanese company Shimadzu Biotech, the company has developed a proprietary platform technology for proteome analysis and characterisation using nano fluidics – the Chemical Inkjet Printer.

Proteome Systems' Discovery team applies proteomics to the discovery of biomarkers, drug targets, and other commercially important proteins and has skills in solubilisation and array technologies, new identification and characterisation technologies based on micro printing techniques and informatics.

Proteome Systems was awarded the Frost & Sullivan Technology Innovation Award in the Proteomics Automation Market in 2003 for demonstrated technological superiority within its industry. It has manufacturing and R&D operations in Sydney, Australia and Boston, USA, as well as joint ventures in Japan and the USA.

PSIVIDA LTD

Address: Level 12, BGC Centre, 28 The Esplanade, Perth WA 6000
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Dr Roger Aston —
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T (08) 9226 5099

pSivida Limited is an Australian listed public company committed to the biomedical nanotechnology sectors. Its core focus is the development of nano-structured porous silicon (BioSilicon™) for multiple potential applications in human and animal healthcare through its UK operating subsidiary, pSiMedica Limited. These applications include brachytherapy, orthopaedics and delivery platforms for drugs, peptides, genes, proteins, radionuclides and other therapeutics.

QUANTUM PRECISION INSTRUMENTS PTY LTD

Address: 69 Alma Street, West Footscray VIC 3012
Website: www.quantium-pi.com

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QPI develops atomic precision sub-nanometer and sub-nanoradian positioning metrology devices and related MEMS sensors for microelectronics. These devices are used in the medical, aviation, defence, automotive, seismic, mining and other industries.

Practical applications for QPI *nanoTrek*™ devices include:

- mask alignment in the micro-electronics industry
- profiling of semiconductor wafers in microelectronics (wafer flatness metrology)
- optical switches (optical telecommunication)
- flow meters in medicine and in polymer micro-moulding
- acoustic applications in the medical and defence industries.

QUANTUM TECHNOLOGY PTY LTD

Address: 5 South Street, Rydalmere NSW 2116
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Quantum Technology are research and manufacturing engineers of polymer Braille cells and actuators.

QUEENSLAND UNIVERSITY OF TECHNOLOGY

Applied Nanotechnology Collaboration

Address: Centre for Built Environment and Engineering Research, GPO Box 2434, Brisbane QLD 4001
Website: www.bee.qut.edu.au/research/nanotechnology

CONTACTS

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Characterisation and preparation of nano scale particles and surfaces for high surface area applications. Specific materials include semiconducting, insulating and conducting particles for use in photo-activated device applications. These applications include photo voltaics, photo catalytic production of hydrogen from water and waste water streams, and photo catalysis of organic pollutants and micro organisms from waste water.

The techniques for materials production include sol-gel processing (both organometallic and colloidal precursors) and physical vapour deposition. Characterisation methods include AFM, STM, SEM, TEM and spectroscopy, as well as measurement of photo catalytic properties and electronic properties of the nano particle structures.

QUEENSLAND UNIVERSITY OF TECHNOLOGY

Centre for Built Environment and Engineering Research

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Fabrication of nanostructured materials using physical vapour deposition and surface modification using ion implantation, focussing on electronic and optical materials is the key focus of this research. The key materials under investigation include diamond-like carbon, for a variety of applications including opto-electronic applications, and as ultra-thin wear resistant coatings, and titania, for photocatalytic applications (see Applied Nanotechnology Collaboration). There is also a new film fabrication technique under investigation – atmospheric pressure plasma deposition.

Surface modification is also targeting biomedical materials applications, in particular the development of bioactive surfaces for use in orthopaedic implants. The key techniques in use for this research are ion implantation (for surface modification) and AFM and cell growth studies coupled with microstructural characterisation for characterisation of the material interaction with cells and proteins.

RAUSTECH PTY LTD

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E raustech@ozemail.com.au

Raustech is developing a Nanotechnology Educational Experiments Kit for the teaching of nanotechnology principles. The hands-on high school educational kit is due for release late 2004 early 2005.

Raustech has filed patents on a disruptive platform technology for the surface synthesis or placement of materials at predetermined locations with micron/nanometer precision and dimensions. The platform technology resulted from research on a novel manufacturing process for user-writable DNA chips undertaken with government grants. The DNA chip research is ongoing. Future objectives are to harness the full capabilities of the platform technology with the fabrication of sub-micron DNA chip features of 400nm.

Commercial application of the technology to the DNA chip (single use consumable) will enable cost reductions essential for universal chip use in pharmacogenomics and diagnostics.

RMIT UNIVERSITY

Faculty of Applied Science

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The Faculty of Applied Science offers a Bachelor of Applied Science in Nanotechnology. The program has a strong interdisciplinary focus. In all three years there are key Nanotechnology courses. Following a common first year, students elect to follow a major discipline (Biology, Physics or Chemistry) for their second and third years. Students who choose Physics as their discipline, for example, will study courses in Quantum and Statistical Physics, Fields Waves and Light, and Materials and Radiation Physics. Third year includes a nanotechnology research project which may be carried out in collaboration with external organisations.

RPO PTY LTD

Address: Innovations Building, 124 Eggleston Road, Acton ACT 0200

Website: www.rpo.biz

CONTACT

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RPO is a high-tech company that supplies polymer materials, polymer films and fabricated polymer devices.

Products include:

- photocurable polymers (custom properties)
- ultra flat films (nano smooth)
- specialist optical devices – especially planar integrated optics.

Services include:

- semiconductor spin coating, lithography
- characterisation – film thickness down to nanometer range, index, birefringence
- sputter coating (aluminium, gold).

SCIENTEX PTY LTD

Address: Unit 4, 109 Whitehorse Road, Blackburn VIC 3130

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CONTACT

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Scientex has progressively built up a range of instruments suitable for nanotechnology research applications and is able to advise scientists on options to log the most data from experiments.

Separation and quantification is an important consideration in the characterisation of nano particles. Field Flow Fractionation (FFF) has become an important technique for characterisation. Separation of similar species is preferable to batch application where techniques such as Dynamic Light Scattering (DLS) cannot resolve particles less that 2.5 times their hydrodynamic radii. DLS and Raleigh light scattering may be used as detectors online to give particle size distribution to 1nm and/or Molecular Weight. The Postnova range of asymmetric FFF and precision DLS and Rayleigh light scattering detectors offer many options to suit varied applications.

SCITECH PTY LTD

Data Acquisition

Address: Unit 4, 72-74 Chifley Drive, Preston VIC 3072

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SciTech Pty Ltd is one of Australia's most experienced data acquisition companies. Products include:

- InstruNet – direct to sensor, low cost data acquisition systems
- Microstar Laboratories – for networked data acquisition and control and digital signal processing
- DASYlab – software for data acquisition and control
- Addi-data – embedded platform over plug-in PC boards for the PCI, CompactPCI or ISA bus up to measurement and controlling software
- Measurement Computing (ComputerBoards) – PC-based data acquisition, control, and GPIB hardware and software.

Free, no-obligation demonstrations can be arranged at any time. A product evaluation service is also available to ensure clients receive the equipment which is most suitable for their application.

SCITECH PTY LTD

Scientific Digital Imaging

Address: Unit 4, 72-74 Chifley Drive, Preston VIC 3072

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SciTech Pty Ltd is one of Australia's most experienced companies in scientific digital imaging. The product range includes:

- high resolution and high sensitivity digital, line scan and video cameras
- quantitative and qualitative image capture and analysis software
- gauging software
- high magnification lenses and microscopes
- image capture boards for video, digital and line scan cameras
- adapters to coupler cameras to microscopes
- laboratory instrumentation – plate readers and plate washers
- gel documentation and analysis systems and software.

Training and installation is conducted by SciTech's knowledgeable scientists and engineers.

A product evaluation service is also available to ensure clients receive the equipment which is most suitable for their application.

STARPHARMA

Address: Level 6, Baker Heart Research Building, Commercial Road, Melbourne VIC 3004
PO Box 6535, St Kilda Road, Central VIC 8008

Website: www.starpharma.com

CONTACTS

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E john.raff@starpharma.com

Tim Grogan — *Manager, Commercial Development and Intellectual Property*
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E tim.grogan@starpharma.com

Starpharma is an ASX listed company which develops polyvalent nano scale molecules called dendrimers in pharmaceutical applications.

Starpharma's drug discovery and development activities are focused around a range of anti-viral, angiogenesis inhibition and anti-toxin applications. The company has also partnered with AGT Biosciences to develop novel treatments for diabetes, and with Industrial Research Limited (NZ) to develop opportunities at the dendrimer-carbohydrate interface.

The company is developing a female-controlled topical microbicide gel to prevent HIV infection under an FDA Investigational New Drug application which is currently undergoing phase I trials.

SWINBURNE UNIVERSITY - TAFE

Centre for New Manufacturing

Address: John Street, Hawthorn VIC 3122

Website: www.tafe.swin.edu.au

CONTACTS

John Cawley — *Manager*
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E jcawley@swin.edu.au

Warwick Howland — *Project Officer*
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E whowland@swin.edu.au

- Cleanroom training
  - Training for operators, researchers, contractors, and maintenance personnel in microelectronics, micro photonics, MEMS, nano tech operations.
- Micro/nano awareness programmes
  - Information sessions for schools, universities, TAFE's and SME's on micro and nano technology and their impact and potential.

UNIVERSITY OF MELBOURNE

Micro-Analytical Research Centre (MARC)

Address: The School of Physics, The University of Melbourne, VIC 3010

Website: www.ph.unimelb.edu.au/marc/

CONTACT

A/Professor David N Jamieson — *Director*
T (03) 8344 5376
E d.jamieson@ph.unimelb.edu.au

The Micro-Analytical Research Centre is part of the School of Physics at the University of Melbourne. The School is a dynamic research and teaching department that attracts considerable research funds in the areas of Materials Science and Condensed Matter Physics, X-ray, Visible, Atom and Neutron Optics; Experimental Particle Physics; Theoretical Physics; High Resolution Electron Microscopy; Astrophysics and Nuclear Physics. The School of Physics has extensive experimental facilities in these areas and also has a major program in experimental particle physics at CERN, Switzerland and KER, Japan. The School is also a node of the Special Research Centre for Quantum Computer Technology.

UNIVERSITY OF MELBOURNE

Nanoparticles Group, Chemistry School

Address: University of Melbourne, Parkville VIC 3010

Website: www.nanoparticle.com

CONTACT

A/Professor Paul Mulvaney

T (03) 8344 6486

E mulvaney@unimelb.edu.au

Nanotechnology research programs/activities:

- synthesis and reactions of novel nano crystals
- spectroscopy of single molecules and quantum dots in the gas-phase and in solution or on surfaces
- fast photochemical relaxation processes in nano-structured systems
- artificial photosynthesis
- nano-bubble dynamics and spectroscopy
- nano-porous media for catalysis
- nano mechanics
- surface forces, nano tribology
- OLED-based display technology.

UNIVERSITY OF NEWCASTLE

Surface and Nanoscience Group

Address: University Drive, Callaghan NSW 2308

Website: www.newcastle.edu.au/school/math-physical-sci/research/surface.html

CONTACT

John O'Connor — *Head, School of Mathematical and Physical Sciences*

T (02) 49215439

E John.Oconnor@newcastle.edu.au

The Group offers services and projects involving a range of analysis tools:

- Ultrahigh Vacuum Variable Temperature Scanning Tunnelling Microscope (Omicron) – a versatile instrument for specialist applications. It can operate from 20K to 500K and measure with angstrom lateral resolution and sub 0.1 angstrom vertical resolution.
- Near Field Scanning Optical Microscope (Nanonics) – an instrument which combines the capability of Atomic Force Microscopy with optical analysis of materials on the nanometre scale. Materials can be analysed in air.
- Surface Profilometer (Tencor) – a stylus instrument capable of mapping the topography of surfaces in air with a vertical resolution of 50nm and a lateral resolution of one micron.
- Low Energy Ion Scattering – a surface analysis technique which can probe the structure and composition of the outermost atomic layers of materials. It can locate surface atoms relative to their neighbours with a precision of 10 picometres.

UNIVERSITY OF NEW SOUTH WALES

Electron Microscope Unit

Address: Sydney NSW 2052

Website: www.srv.emunit.unsw.edu.au/

CONTACT

Professor Paul Munroe

T (02) 9385 4435

E p.munroe@unsw.edu.au

The Electron Microscope Unit operates 13 frontline electron microscopes that provide structural, chemical and crystallographic analysis of a wide range of materials. Instruments include both scanning and transmission electron microscopes, scanning probe microscopes and two focused ion beam millers.

The Unit is a core member of the Nanostructural Analysis Network Organisation.

UNIVERSITY OF NEW SOUTH WALES

Centre For Quantum Computer Technology

Address: School of Physics, The University of New South Wales, Sydney NSW 2052
Website: www.qcaustralia.org

CONTACTS

Professor Robert Clark — *Director*
T (02) 9385 4574
E r.clark@unsw.edu.au

Dr Richard Sharp — *Managing Director, Qucor Pty Ltd*
Chief Operations Officer (CQCT)
T (02) 9385 5511
E r.sharp@qucor.com.au

The Centre for Quantum Computer Technology is focused on delivering the key scientific and engineering solutions for quantum computing at the multiple qubit (the quantum equivalent of a conventional 'bit') prototype level.

The Centre's research has two main strands: electronic silicon-based solid state quantum computing in which the qubits are comprised of single phosphorus atoms embedded in a silicon host, and linear optics quantum computing.

The Centre involves 18 research programs across Australian universities. It has close links to several universities, institutions and industry in the US and elsewhere.

UNIVERSITY OF NEW SOUTH WALES

Surface Science and Materials Technology Group

Address: School of Chemistry, The University of New South Wales, Sydney NSW 2052
Website: www.chem.unsw.edu.au

CONTACT

Professor Robert Lamb — *Head of School*
T (02) 9385 5087
E r.lamb@unsw.edu.au

Nanotechnology Research Strengths and Expertise:

- Critical researcher mass required to develop concept through, creation of new materials, properties analysis and demonstrable application using simple device/prototyping
- Surface/Interface Chemistry/Physics/Engineering
- Surface characterisation
- Synthesis of functional molecules
- Multiscale surface modification using range of physical and chemical techniques
- Manipulation and observation of nanocrystal structures in thin films.

Nanotechnology Research Programs/Activities:

- Manipulation of nanocrystals in powder laser applications
- Fabrication of nanostructured superhydrophobic and lyophobic interfaces
- Synthesis of "soft", variable density, piezoelectric materials through nanotechnology
- Nanoscale manipulation of mineral surfaces
- Controlled growth of ordered semiconductor nanofilms through simple single source deposition
- Simple thin film optical fiber and waveguide device applications of novel thin film technologies
- Bio interactions on surface of superhydrophobic materials
- Photocatalytic and superhydrophobic processes in the nanoscale in thin films
- Organometallic synthetic routes to creation of new single source precursor materials
- Nanocoatings on textiles
- Laser modification and potential patterning of oxide surfaces.

UNIVERSITY OF NEW SOUTH WALES

School of Materials Science and Engineering

Address: Sydney NSW 2052

Website: www.materials.unsw.edu.au

CONTACT

Professor Paul Munroe

T (02) 9385 4435

E p.munroe@unsw.edu.au

The University of New South Wales runs an undergraduate program in nanotechnology. This is a four-year specialist science program leading to the degree of BSc (Nanotechnology). The degree is jointly taught across several schools in the Science Faculty including the Schools of Physics, Chemistry and Materials Science and Engineering.

The degree program is suitable for those students with an interest in science and a desire to discover more about the principals and applications of nanotechnology. The degree program encompasses a major research project in the fourth year.

UNIVERSITY OF QUEENSLAND

ARC Centre Functional Nanomaterials

Address: Level 5, Hawken Engineering Building, University of Queensland, Brisbane QLD 4072

Website: www.nanomac.uq.edu.au

CONTACTS

Professor Max Lu *FTSE* — *Research Director*

T (07) 33653735

E maxlu@uq.edu.au

Steve Coombs — *Chief Operating Officer*

T (07) 3365 7534

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The Centre brings together leading researchers from the universities of Queensland, New South Wales and Western Sydney and the Australian National University and aims to become a world class centre of excellence in nano materials.

The Centre's research focuses on nano materials with functional properties in adsorption, ion-conducting, separation, catalysis, bio materials and bio sensing. Specifically, the Centre aims to:

- carry out fundamental and applied research into synthesis, characterisation and application of nano particles, carbon nano tubes, thin films and membranes, and nano-composite bio materials
- establish close links with leading international groups and end user groups.

These programs will lead to innovative technologies that will underpin new materials and products for applications in clean energy, environmental, and health care industries.

UNIVERSITY OF QUEENSLAND

Brisbane Surface Analysis Facility and Future Materials (Queensland Office)

Address: St Lucia QLD 4076

Website: www.chemistry.uq.edu.au/bsaf

CONTACTS

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E b.wood@uq.edu.au

Dr Peter A Kambouris — *Qld State Manager*

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E p.kambouris@future.org.au

The Brisbane Surface Analysis Facility is a major materials characterisation centre for industry, universities and R&D laboratories.

The Facility provides physical and chemical analysis of bulk materials, surfaces and interfaces at the nano scale. The major analysis techniques offered include:

- X-ray photoelectron spectroscopy (XPS or ESCA) – chemical imaging with micron level resolution
- secondary ion mass spectroscopy
- scanning auger microscopy
- scanning probe microscopy (includes AFM, STM) – imaging with nano scale resolution
- X-ray diffraction
- gas thermal analysis mass spectrometry.

UNIVERSITY OF QUEENSLAND

Nanotechnology & Biomaterials Centre

Address: The Department of Chemistry, The University of Queensland, Brisbane QLD 4072

Website: www.chemistry.uq.edu.au/nbc

CONTACT

Professor Matt Trau — *Centre Director*

T (07) 3365 3816 E m.trau@uq.edu.au

The Nanotechnology & Biomaterials Centre focuses on the formation of novel materials and devices for medical and diagnostic needs. Examples of these include devices for rapid DNA sequencing, genetic screening, and drug discovery. Other devices of interest are artificial tissue matrices for human bone, liver and pancreas tissue.

The overall goal of the research within the centre is to develop biologically related materials and devices which will ultimately improve human health. The research work is divided into two main categories:

(i) Biodiagnostic & Drug Discovery devices, and

(ii) Artificial tissue matrices for implants into the human body.

Both of these areas require the preparation of novel materials and devices, usually microscopic/colloidal in nature, which have been fashioned to contain designed nanostructure (i.e, structure on the nanometer size scale).

UNIVERSITY OF SOUTH AUSTRALIA

Ian Wark Research Institute

Address: Mawson Lakes Campus, Mawson Lakes SA 5095

Website: wwww.unisa.edu.au/iwri

CONTACT

Madelene Pierce — *Administrator*

T (08) 8302 3694 E Madelene.Pierce@unisa.edu.au

The Ian Wark Research Institute is primarily concerned with nano-size studies – colloid stability (aggregation, dispersion), adsorption on surfaces and rheology but also with modification of their surface (adsorption of organic and inorganic reagents) and calculation of interaction forces.Services offered include R&D, consulting, testing and training. Selected research projects in nanotechnology include:

- optimisation of silica and alumina treatment of titanium dioxide particlestitania pigment surface modification for improved plastics dispersion and opacity
- ultra-hydrophilic treatment for titania pigments
- optimising aggregate structure for effective mine tailings dewatering and disposal
- interfacial chemistry and water minimisation in tailings treatment
- polymers in mineral processing.

UNIVERSITY OF SYDNEY

Australian Key Centre for Microscopy and Microanalysis

Address: Madsen Building, The University of Sydney NSW 2006

Website: www.emu.usyd.edu.au

CONTACTS

A/Professor Simon P Ringer — *Director*

T (02) 9351 2351

E simon.ringer@emu.usyd.edu.au

Rosie Hicks — *General Manager*

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The Key Centre for Microscopy and Microanalysis, based at the University of Sydney and was established in 1995, funded by a grant from the Australian Research Council. The EMU boasts the country's most comprehensive array of specimen preparation and imaging and analysis equipment. While the unit prides itself on its state-of-the-art instruments it supports a full range of conventional instruments for optical, electron and x-ray imaging.

The centre's aims:

- to become a premier resource and training centre for the industry, the research and the education sector
- to provide outstanding microscopy and microanalysis services to industry and the education community
- to establish a national network of equipment and expertise
- to promote microscopy and microanalysis in all sections of the community.

UNIVERSITY OF TECHNOLOGY, SYDNEY

Institute for Nanoscale Technology

Address: PO Box 123, Broadway NSW 2007
Website: www.nano.uts.edu.au

CONTACTS

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E michael.cortie@uts.edu.au

A/Professor Michael Ford — *Assoc. Director*
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E mike.ford@uts.edu.au

The Institute for Nanoscale Technology conducts both fundamental and applied research into nano scale processes and products. It has a state-of-the-art microscopy facility and access to additional laboratories in the faculties of Science and Engineering. Research is focussed on technologically useful coatings and thin films, lipid membranes and bio-sensors, the optical properties of materials at the nanoscale, modelling nano scale systems, and on magnetic materials.

The Institute also delivers a nanotechnology undergraduate degree program within the university.

UNIVERSITY OF TECHNOLOGY, SYDNEY

NanoHouse Project, Institute for Nanoscale Technology

Address: 1/1617, 1 Broadway, Ultimo NSW 2007
Website: www.nano.uts.edu.au/nanohouse.html

CONTACT

Carl Masens — *Project Coordinator*
T (02) 9514 2188
E nano@uts.edu.au

- Advice on appropriate nanotechnologies for use in specific applications
- Advice on where to find appropriate nanotechnologies
- Advice on how to find appropriate R&D expertise in nanotechnology for a given problem
- Education resources for teaching about nanotechnology.

UNIVERSITY OF WESTERN SYDNEY

College of Science, Technology and Environment (CSTE)

Address: Locked Bag 1797, Penrith South DC, NSW 1797
Website: www.uws.edu.au

CONTACTS

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Professor of Nanotechnology
T (02) 4620 3336
E w.price@uws.edu.au

Professor Michael A Wilson —
Dean, CSTE
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The University of Western Sydney offers a three-year BSc (Nanotechnology) course with opportunities to specialise in nanobiotechnology, nanomaterials or nanophysics.

The University also conducts research in a number of areas including:

- biomolecular association and dynamics using NMR spectroscopic techniques
- nano composites, eg thin layers of apatite (bone)
- magnetic nano particle fluids
- nano-composite plastics.

UNIVERSITY OF WOLLONGONG

ARC Centre for Nanostructured Electromaterials, Intelligent Polymer Research Institute

Address: University of Wollongong, Northfields Avenue, NSW 2522
Website: www.uow.edu.au/science/research/nsem/

CONTACTS

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Dr Chee Too — *Chief Operating Officer*
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E chee@uow.edu.au

The aim of the ARC Centre for Nanostructured Electromaterials (ARC-CNE) is to explore the science of nanomaterials having an electron or charge transfer functionality; to prepare such nanomaterials, study and develop theories for their behaviour, and exploit these new behaviours in useful applications.

Our specific aims are to:

- create new nanostructured electrode materials based on organic materials such as ICPs, carbon nanotubes, fullerenes or hybrid nanocomposites containing these
- determine the effect of nanostructure on ion transport as relates to ionic conductivity in solids and ionic liquids
- develop and apply theory and computer modelling techniques in order to understand structure and transport behaviour of nanocomponents and nano-assemblies
- apply this knowledge and fabrication protocols to deliver greatly enhanced performance for energy conversion/storage systems and novel energy transfer systems in bioapplications.

The ARC-CNE also invites commercial organisations to become Associate Members at the Centre. Membership benefits include:

- Free attendance at Centre biannual symposia, giving an opportunity to stay at the forefront of this exciting area of research
- Quarterly news letters from the Centre
- Access to state-of-the-art nano-characterisation facilities
- Free attendance to workshops on characterisation techniques run by the Centre
- Opportunities to participate in commercialisation of Centre intellectual properties.

VERY SMALL PARTICLE COMPANY PTY LTD (VSPC)

R&D

Address: 31 Westgate Street, Wacol QLD 4076 *and* PO Box 1022, Mt Ommaney QLD 4074
Website: www.vspc.com

CONTACT

Dr Jose A Alarco — *Director / Scientist*
T (07) 3879 4777
E jose@vspc.com

VSPC designs and manufactures nano-scale, complex metal oxides using a unique nanotechnology platform with a combination of attributes comprising:

- continuous process technology, which allows homogeneous, low cost production
- highly generic technology
- a high degree of microstructure control and nano-scale features of products
- applicable to rapid product development
- products with enhanced properties
- demonstrated at commercial scale using industrial equipment
- production line can be replicated or scaled-up quickly, and relatively cheaply.

VSPC's flexibility allows the tailoring of products to meet customer requirements relating to composition, purity, particle sizes, pore sizes, surface area and thermal stability.

VSPC is ideally suited to fast-track development of new complex oxide materials and, for new products with potentially high demand, will consider joint development arrangements with end-user companies.

VITA MEDICAL LTD

Address: Building 75, ANSTO Technology Park, New Illawarra Road, Lucas Heights NSW 2234
Website: www.vitamedical.com.au

CONTACT

David Rundell — *Chief Executive Officer*
T (02) 9541 0411
E drundell@vitamedical.com.au

Suppliers of:

- Technegas: Carbon/Technetium nano particle aerosol that is used within nuclear medicine primarily for the diagnosis of pulmonary embolism.

V-KOOL HOLDINGS PTY LTD

Address: 296 Parramatta Road, Auburn NSW 2144
Website: www.v-kool.com

CONTACT

Stephen Ward — *General Manager*
T (02) 9748 6842
E stephenward@bigpond.com

V-Kool uses a patented nanotechnology process to embed a metallic coating only a few hundred atoms thick onto an optically clear and durable polyester film. When applied to windows, this product screens out over 90% of the infra-red rays which are responsible for heat build up while letting in over 70% of visible light. It also cuts out 98% of UV radiation, the main source of fading.

Unlike conventional tints, V-Kool is virtually transparent and maintains the clear, low reflective look of glass. The product, which has residential and commercial applications, can be applied either as a film on windows or laminated between sheets of glass.

WARSASH SCIENTIFIC PTY LTD

Address: Unit 7, 1 Marian Street, Redfern NSW 2016
Website: www.warsash.com.au

CONTACTS

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Brett Delahunty — *Director Sales and Marketing*
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E brett@warsash.com.au

Suppliers of:

- nano positioning stages and nano automation equipment
- vibration isolation tables, workstations and platforms
- lasers and laser accessories
- NSOM / AFM / SEM Raman / CL / PL micro spectroscopy
- cryogenic and pressure environmental cells
- reflectance spectroscopy accessories
- UV spectrometers and UV-IR fibre spectrometers.

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The Warren Centre for Advanced Engineering

The Warren Centre for Advanced Engineering is the leading Australian forum for advanced engineering issues, recognised for its inclusive, forward-looking approach and the wide impact of its many achievements.

The Centre is a self-funding, independent, not-for-profit institute operating within the Faculty of Engineering at the University of Sydney, controlled by representatives from industry.

It has three principal objectives:

- to stimulate the application and further development of new engineering technology.
- to encourage the integration of innovation and engineering technology into the development of Australia's public policy and wealth creation.
- to provide independent comment and advice to government and industry on these and related issues.

The Warren Centre:

- identifies and supports major projects that bring together people at the leading edge in selected fields of engineering technology to develop new technical insights and knowledge in those technologies and accelerate their application in Australian industry.
- holds industry forums for companies in specific industry segments to explore opportunities of common or joint interest that will accelerate the development and/or exploitation of technology.
- organises events such as seminars, lectures and conferences that explore contemporary technology issues and disseminates the results of the Centre's activities.
- produces electronic and printed material to promote discussion and build awareness of contemporary, advanced engineering issues.
- recognises people and projects that make a unique contribution to encouraging excellence and innovation in all fields of advanced engineering.

Since opening in 1983, the Centre has gained wide recognition for its unique approach and its achievements in diverse fields of engineering technology and industry development.

Visit www.warren.usyd.edu.au

THE **Warren** CENTRE

FOR ADVANCED ENGINEERING

Engineering Link Building J13 Sydney University NSW 2006 Telephone 02 9351 3752 Facsimile 02 9351 2012

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THE **Warren** CENTRE established in 1983 to mark 100 years of engineering education at The University of Sydney