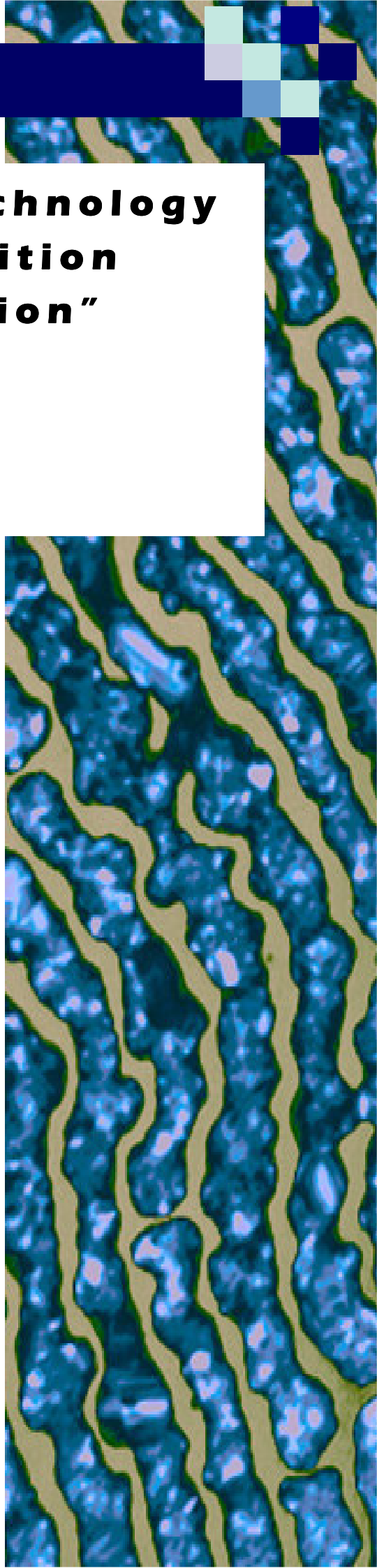
# International Nanotechnology Showcasing Exhibition "Australian Pavilion"

**19-21 November 2003**
**The Hilton Cairns**
**Tropical Queensland**
**Australia**



Australian Government

APNF
Asia Pacific Nanotechnology Forum

# Introduction

## The Hon Peter McGauran, MP Minister for Science

I am delighted to have the opportunity to introduce the first international Nanotechnology exhibition in Australia – the International Nanotechnology Showcasing Exhibition at Asia Pacific Nanotechnology Forum 2003 or "Oz Nano 03".

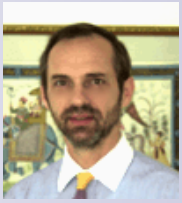
Australian companies and research institutions are discovering and developing a diverse range of expertise in nanotechnologies for many industries including information communications technology, manufacturing, electronics, pharmaceuticals, textiles, agriculture, aeronautics and space exploration, energy and the environment.

Nanotechnology is a leading edge technology for building Australian industries and has been identified in one of the Australian Government's National Research Priorities – "Frontier Technologies for Building and Transforming Australian Industries".

I warmly congratulate all exhibitors featured in this booklet who are showcasing their science and technology at this event.

Peter McGauran MP
**Minister for Science**

## Asia Pacific Nanotechnology Forum Executive Director



The Asia Pacific Nanotechnology Forum evolved over a number of years from discussions with Nanotechnology Entrepreneurs and Thought Leaders in Nanotechnology in Industry, Government, and Academia. The International Nanotechnology Showcasing Exhibition at the 2nd Annual Conference of the Asia Pacific Nanotechnology Forum, APNF 2003 "Oz Nano 03", is the first Nanotechnology exhibition of its kind in Australia.

The Nanotechnology Showcasing Exhibition at APNF 2003 "Oz Nano 03" is a result of the culmination of strategic initiatives which gained their critical momentum in the Australian Nanotechnology community at the joint DISR-CSIRO workshop in March 2001, where for the first time industry, government and representatives from the research community came together to create a "blueprint" for Australian Nanotechnology. On 24 June 2002, the *Australian National Nanotechnology Network* was formed to link the breadth of activity around the country in science (universities, the Australian Research Council, Commonwealth Scientific Industrial Research Organization), government (Federal & State), industry (multi-sector), investment groups, international links, and social impact groups, to ensure the fastest transfer from science to product and to facilitate a leadership position for Australia.

The Australian Government has recognised Nanotechnology as one of its National Research Priorities and it is not surprising that with this tremendous support from the community and government a number of outstanding Nanotechnology innovations have made it to the commercialisation phase and are now part of a solid platform of Australian emerging Nanotechnology companies. At this year's International Nanotechnology Showcasing Exhibition at The Hilton Cairns leading Australian Nanotechnology companies have joined to present their products and services in the Australian Nanotechnology Pavilion.

The Australian Nanotechnology Pavilion is supported by the Australian Department of Education Science & Technology and the Australian Department of Industry, Tourism, and Resources through the Australian *Innovation Access Program*.

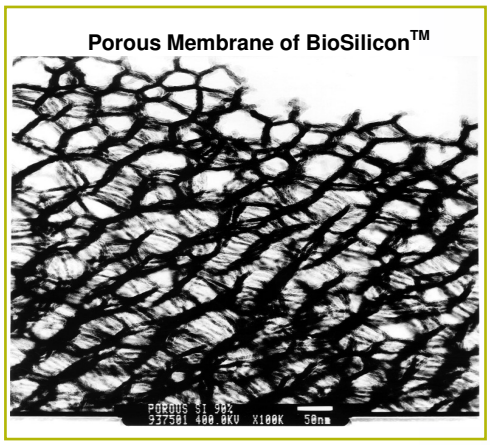
Dr Jurgen Schulte
**Executive Director, APNF**

# Contents

## THE COMPANY

pSivida Limited is an Australian listed public company (ASX: PSD) that is committed to the biomedical nanotechnology sector. Its focus is the development and commercialisation of nano-structured porous silicon (BioSilicon™) for multiple potential applications in human and animal healthcare through a UK operating subsidiary, pSiMedica Limited. pSivida's joint venture partner is the United Kingdom Government Research and Development Agency, QinetiQ Group plc (formerly DERA).

BioSilicon™ retains the key properties of silicon, but is also machineable at a micro level, and is created through a physical change in the silicon at the nano level, as opposed to a chemical change. BioSilicon™ is an element, not a compound, and the resultant porous honeycomb structure from physical nano-structuring mimics porous membrane structures found in nature. As a true platform nanotechnology, BioSilicon™ has multiple potential applications across many sectors of healthcare. Near term applications include slow release drug delivery, targeted in-situ cancer therapies (brachytherapy), conventional vaccine and DNA vaccine delivery, orthopaedics, tissue engineering and diagnostics. Potential longer-term applications for BioSilicon™ include implant packaging, neural interfacing and biofiltration.



**Porous Membrane of BioSilicon™**

**Competitive Advantages of BioSilicon™**

Biodegradable, biocompatible, semi conductor.

Abundant and Low Cost – approx. 28% of the earth's crust.

Scale up and manufacture of silicon proven with over 30years experience in the electronics industry.

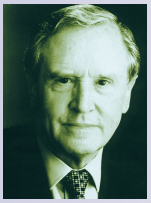
## INTELLECTUAL PROPERTY

The Company's intellectual property position is strong, with core biomaterial patents granted in the valuable US and European markets. Granted patents are held for each of the first three pSiMedica inventions that cover the broad use of BioSilicon™ in healthcare applications and more specifically in relation to the core focus of specialized drug delivery and brachytherapy. pSiMedica owns all intellectual property rights royalty free in relation to BioSilicon™ for which there are six granted patents, 17 patent families with three more in development and 77 patent applications. The core patent, which recognises BioSilicon™ as a biomaterial, was granted in the UK in 2000 and the US in 2001. QinetiQ, as an agency of the UK government, under the terms of the initial IP assignment, is required to assist in the defence of any challenge to the initial core patents. Products protected by patents and patent applications owned by pSiMedica include materials comprising bioactive, resorbable and biocompatible silicon that are of value in the fabrication of new generations of intelligent drug delivery devices, orthopaedic implants, and intelligent diagnostic tools.

## KEY MANAGEMENT

The management team has a powerful blend of international experience in biotechnology commercialisation, the pharmaceutical industry, licensing and capital markets.

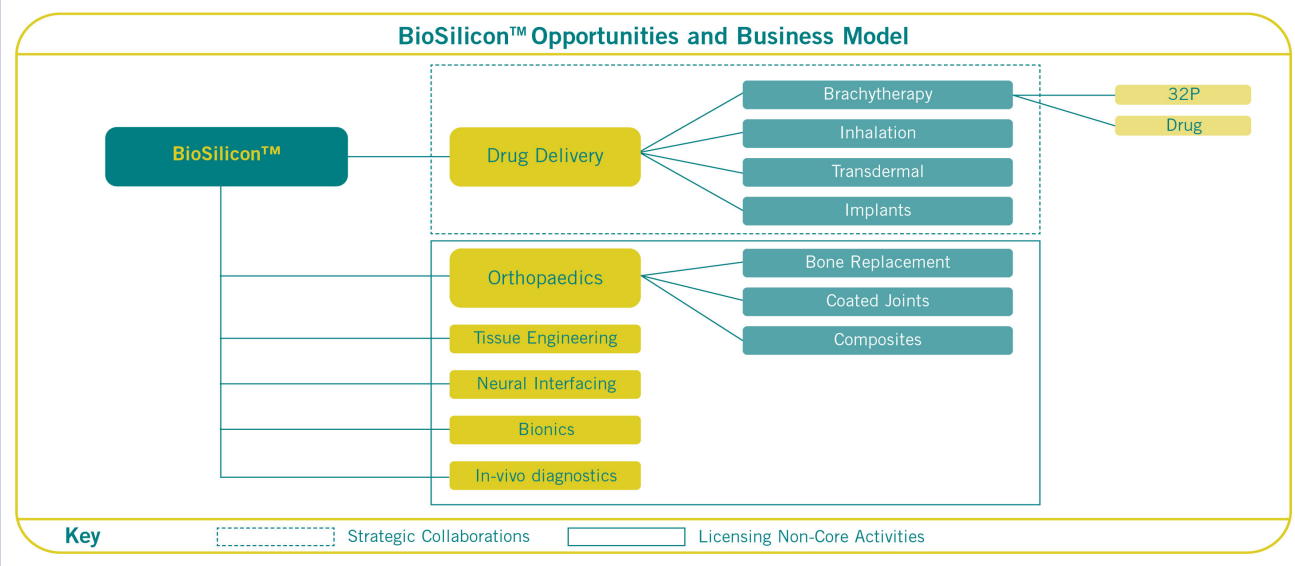
**Mr Gavin Rezos**
Managing Director – pSivida Ltd
Director - pSiMedica Ltd
Director - pSiOncology Pte Ltd (Singapore)
Mr Rezos has extensive Australian and international investment banking experience. He is Principal of Viaticus Capital, a specialist biotechnology corporate advisory, venture capital and investment arranging company.



**Dr Roger Brimblecombe**
Non Executive Chairman – pSivida Ltd,
pSiMedica Ltd and pSiOncology Pte Ltd
(Singapore)
Dr Brimblecombe is a former chairman of Smith Kline and French Research, Chairman of MVM Ventures (the Venture Capital arm of the UK Medical Research Council), a Director of Vertex Pharmaceuticals Inc. in the US and the Consultant Editor of Drug Discovery World. Dr Brimblecombe is a respected international pharmaceutical and biotechnology industry figure.

**Dr Roger Aston**
Director, Research and Commercialisation – pSivida Ltd
CEO – pSiMedica Ltd and pSiOncology Pte Ltd
Previously at the UK's Wellcome Foundation, Dr Aston has more than 20 years experience in the pharmaceutical and biotechnology industries. His previous positions include CEO Peptech Ltd (Australia), Director of Cambridge Antibody Technology Ltd (UK) and Cambridge Drug Discovery Ltd (now BioFocus plc).

**Professor Leigh Canham**
Chief Scientific Officer – pSiMedica Ltd
Professor Leigh Canham has spent the past 20 years conducting research on differing aspects of silicon technology. He has made two seminal discoveries; that nanostructured silicon can emit light efficiently (1990); and that silicon can be rendered biodegradable (1995). Professor Canham is the world's foremost authority on porous silicon.



## SHORT TERM COMMERCIALISATION

**pSiOncology**
For its short term commercialisation strategy, pSivida has created the pSiOncology joint venture with Singapore General Hospital to develop brachytherapy products for the treatment of operable and inoperable tumors. Both radio and chemotherapy products are being developed. The lead product is based on a radioactive 32-phosphorous form of BioSilicon™ called BrachySil™.

Brachytherapy is the 'short range' treatment of cancer 'in situ', through the direct delivery of active agents into cancerous cells. The brachytherapy market (circa US$600M) is currently dominated by the use of radioactive 'seeds', mainly for the treatment of hormone non-responsive prostate cancer. These products are both expensive and cause significant trauma on application. BrachySil™ will offer clinicians a short-range longer life isotope that can be delivered through a fine bore needle making it a more user friendly product for both patient and physician. BrachySil™ is being developed principally for patients with primary or secondary liver cancer where current therapeutic regimens have limited value.

Recent radiotherapy pre-clinical trials using animal models bearing human tumours have successfully demonstrated the product's efficacy and follows on from the successful pre-clinical animal trial of a chemotherapy BioSilicon™ product using a generic cytotoxic drug. Phase IIa human clinical trials are scheduled to commence in early 2004. The targeted launch date of this product is 2006, although some sales may be made after Phase IIb trials in 2005.

In brachytherapy treatment, BioSilicon™ has many significant advantages.
- Bio-degradable Device - repeat treatments (vs ceramic beads and titanium)
- Toxicology - safety of silicon by-products following biodegradtion (silicic acid)
- Versatile Device - application in both radiotherapy and chemotherapy
- Short Range - P32 (vs Y90) having less side effects on other tissue
- Range of Tumors - application not just restricted to liver and prostate cancers
- Direct Delivery - minimizes side effects and maximize dose size
- Inexpensive Device - low cost and abundant availability of silicon, with scale up proven
- BioSilicon™- radiation hard

## PARTNERING STRATEGY

The company's broader commercialisation strategy involves a high degree of partnering at various levels to lever the expensive development process. The R&D process is progressed and coordinated through pSiMedica and its strategic partner QinetiQ's as well as through collaborative partnerships. Non-core applications will be sold or licensed out, providing interim cash flow and allowing the company to focus on its core commercialisation strategy.

## STRATEGIC PARTNER

**QinetiQ Group plc (UK)**
QinetiQ Group (formerly the Defence Evaluation and Research Agency) is Europe's largest research and development organisation with an annual turnover of £800 million. pSiMedica enjoys use of the world class QinetiQ facilities and access to scientists, many of whom are world leaders in their chosen fields.

## FOCUS AREAS

**Drug Delivery / Brachytherapy**
Drug delivery remains a core focus for the group and the expertise gained from the pSiOncology joint venture will complement existing collaborations. BioSilicon™ has properties that make it an ideal drug delivery platform:
• high drug loading rates (up to 95%)
• excellent control on change in release timing (hours/days/weeks/months)
• structural protection from dose dumping
• micro machining can vary nano pores to accommodate different drug sizes
• conduction of charge - charge can be altered to regulate drug delivery
• intelligence - potential microchip incorporation and diagnostics

**Drug Delivery Collaborations:**
• PowderJect Pharmaceutical plc (USA & UK)
• Birmingham University / Nanoscale Physics Group (UK)
• Purdue University (USA)
• EpiTan Ltd (Aust.)

## WIDER APPLICATIONS

**Orthopaedic Collaborations:**
• Texas Christian University (USA)
(Aust)
• Implex Corporation (USA)
• University of London / St Thomas Hospital (UK)
• Nottingham University (UK)

**Tissue Engineering Collaborations:**
• McComb Foundation / Clinical Cell Culture

• Cytomatrix (USA)
• Singapore General Hospital

## DIAGNOSTICS
pSivida has recently signed a worldwide exclusive licence with pSiMedica for the use of BioSilicon™ in diagnostic applications as implants in the body of humans and animals utilising the biodegradable, sensor, charge bias and drug monitoring capabilities of BioSilicon™. pSivida also has the first right of refusal from pSiMedica to develop products using skin patches and topical applications for “on” the body diagnostics. These applications are currently being progressed in pSiMedica. The ‘smart’ applications using micro-sensors and chips are reserved by pSiMedica for collaborations with global electronics and chip technology companies who have already expressed an interest in developing such products.

## LICENSING STRATEGY
The range of applications permit early stage licensing for non core activities and near term revenue. Furthermore the platform has now been developed to a stage where licensing to large pharma and biotech companies in the core area of slow release drug delivery is being advanced. In addition licensing opportunities to utilise BioSilicon™ as a biomaterial in orthopaedics, tissue engineering and regenerative medicine are also being pursued.

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# Ian Wark Research Institute
University of South Australia

## Introduction

The Ian Wark Research Institute ('the Wark'), University of South Australia, is the Australian Research Council Special Research Centre (SRC) for Particle and Material Interfaces. The Wark is also the National Centre for Nano and Bio Materials, with support from the Australian Federal Government.

The Wark performs a special blend of fundamental and applied research, has a global client base of companies and government agencies, and a world-class research effort provides the basic science that supports technologies in existing and emerging industries. The Wark also acts as an intellectual resource via technology transfer activities.

With 140 staff and students, activities include research projects, specialist consulting and testing, postgraduate education and short courses for technology transfer in the following areas: minerals processing, interparticle forces and adhesion, wetting and particle adsorption, nanotechnology and nanolubrication, biotechnology, bio and polymer interfaces, biomedical and biodental implants, pharmaceutical, metals, ceramics, composite materials, surface modification and coatings, surface engineering, molecular modelling, computational colloids, food, pigments, and environmental.

## ARC Special Research Centre

In January 2000 the Ian Wark Research Institute became the Australian Research Council Special Research Centre (SRC) for Particle and Material Interfaces, a status conferred by the Federal Government.

The Special Research Centre occupies a unique research area in Australia, and concentrates on outstanding fundamental research on static and dynamic processes involving soft and hard interfaces. Practical examples include soft, deformable emulsion droplets in pharmaceutical formulations and hard, mineral particle surfaces in mineral slurries. Successful outcomes from this research solve difficult environmental problems concerning acid mine drainage, reduce energy consumption in minerals processing, improve the quality of medical and dental implants and result in new printing technologies, as examples. The four main themes are:

- Multiple-Bubble Interactions and Flotation Modelling
- Macroscopic Fluid-Fluid and Fluid-Solid Interfaces
- Graded Interfaces
- Static and Dynamic Wetting of Interfaces

## National Centre for Nano and Bio Materials

The Ian Wark Research Institute, University of South Australia received $1 million in Federal Government funding to work with overseas researchers to develop new products and materials using nano and bio technology. The Nano and Bio-Materials Centre was funded by AusIndustry through an Innovation Access Program – International Science and Technology, delivered by the Department of Education Science and Training.

Federal Science Minister Peter McGauran said 'The funding is aimed at scientists working with leading edge overseas partners to develop science and technology, and increase opportunities for taking new ideas to the market place'.

Professor John Ralston, Director of the Ian Wark Research Institute, said 'This is a great opportunity for Australia to form links in some of the very best research networks in Europe, to take Australian Industry to the leading edge of research in nano and bio-materials.'

This Nano and Bio-Materials Centre builds on existing internationally-competitive research strengths, and involves world-leading research capability in nano- and bio-materials, coupled to a proven ability to disseminate research outcomes to Australian industry/community for commercial and strategic benefit. There is strong national participation from Australian sponsors, including AMIRA International, and the international partners, from Europe and North America, bring highly complementary specialist expertise and specific facilities necessary for the project. To further strengthen ties with Australian scientists and researchers, leading overseas researchers are participating in a series of international workshops and conferences. Three new postdoctoral staff members have been appointed from Germany, India and Canada

The National Centre for Nano and Biomaterials is supported by six Australian companies, Monash and Sydney Universities, and nine European laboratories.

**International Conference & Workshop: Physical Chemistry of Biointerfaces.**
**23-26 May 2004. South Australia, Australia**

This international conference and workshop will focus on physico-chemical considerations of bio-interfaces. Held immediately following the 7th World Biomaterials Congress (17-21 May, 2004, Sydney, Australia), it is intended as a satellite workshop devoted to the study of bio-interfaces using physico-chemical methods and aimed at providing fundamental mechanistic insights, and to provide the opportunity for in-depth discussions facilitated by the workshop format, on topics such as interfacial forces and properties involved in protein/surface interactions, non-fouling surfaces, molecular kinetics of drug delivery, and others. Invited and contributed talks will be selected for their ability to progress fundamental understanding relevant to biomaterials, bio-diagnostics and drug delivery applications.

This workshop will provide an interdisciplinary forum for the presentation and discussion of experimental and theoretical studies of bio-interfaces and biomolecule-surface interactions. Increased understanding of interactions between biomolecules and surfaces, the behaviour of complex macromolecular systems at materials interfaces, and biomolecule-biomolecule interactions, will contribute to the rapid growth in biomedical research, biotechnology, diagnostics, proteomics, genomics, dentistry and medicine. Advances in materials science, molecular biology, surface and interface analysis methods, and theoretical and modelling approaches to biological systems will feature in this workshop, as well as experimental tools and theoretical models to describe bio-interface phenomena with physical concepts and rules that allow predictive, model-driven research. For further information see - www.iwri.unisa.edu.au/conferences.htm

## ADCOAT
## Australian - European Advanced Coating Program: Wetting of Structured Interfaces by Simple and Complex Liquids

The Ian Wark Research Institute, University of South Australia, is leading a four-year international R&D project on advanced coatings that involves access to a network of leading European academic laboratories with specific expertise in advanced coating phenomena.
The $1M advanced coatings project is funded through AusIndustry, via the Innovation Access Program under International Research and Development Technology Access

Now in operation for eighteen months, it involves four European Universities and, importantly, five major EU companies. Direct financial support is also provided by four Australian companies. This program has a major emphasis on clever coatings and involves research coupled with excellent technology transfer mechanisms, including international workshops.

**Contact Details:**

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## Lu Papi & Associates

2002 WINNER INNOVATION
Western Sydney Industry Awards

Nanotechnology offers dazzling opportunities for creation of new or improved products. For the past two years Lu Papi & Associates has been working on behalf of a client to improve polymer performance through the addition of nanoparticles to the composite. The aim was to enhance the mechanical, thermal and chemical properties and improve dimensional stability. To do this we first identified the most suitable nanoparticles for achieving our specific requirements for the polymer. We also had to ensure that the product produced with the resulting polymer could be processed using the existing up and downstream equipment. We then developed an efficient and practical way to apply this knowledge to manufacture the product.

Our first step was to carry out a worldwide search to examine the various available nanoparticles, determine which ones were most likely to meet our needs and find suppliers of the nanoparticles. We worked with materials specialists to develop a polymer using the nanoparticles. We tried three different types: our tests showed that nanoclays met our requirements most closely.

We achieved a prototype which proved that he concept was sound. However more in depth scientific work was needed to find the best way to exfoliate the nanoparticles into the polymer. We turned to the University of Western Sydney for assistance and UWS came on board through their recently established Nanotechnology Project led by Professor Michael Wilson. The University has set up a Nanotechnology Network in which Lu Papi & Associates is a participant. Work on the project is continuing.

Lu Papi & Associates is also working on another biomedical product that uses smart nanomaterials. We are examining the possibilities offered by shape memory alloys in nanomachines. Our aim is to achieve a small, highly portable version of a piece of equipment that normally can only be used in a fixed position. Our worldwide search has narrowed our choices to two fields using nanotechnology: low voltage operation and microfluid operation. We are currently developing methods to make prototypes using both types of operation.

Lu Papi & Associates has recently entered into collaboration with the University of Western Sydney. The University will use its scientific and technical resources to assist industry to develop new products using nanotechnology. Lu Papi & Associates will work with both University and industry to support their scientific work from the inception of a new development with engineering and manufacturing know-how.

We will also be available to assist business to examine whether there is a way that nanotechnology can be employed to improve an existing product or develop a new one. We will act as the interface between a company and the University when the company decides that a nanotechnology project offers a profitable road for them to follow.

# Lu Papi & Associates

Lu Papi & Associates is a small, flexible, widely networked company that specialises in new product development and the introduction of new processing techniques. We have developed a very successful philosophy aimed at achieving the best possible product in the shortest possible time at the lowest possible cost. We believe that our main product is innovation.

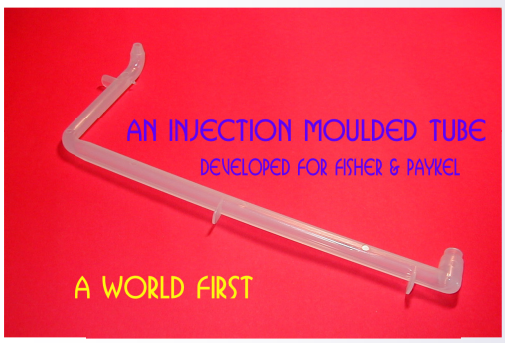
Lu Papi & Associates works with associates in order to offer a service that covers all aspects of new product development from design through manufacture of the final product. We are able to assist clients with products at all stages of readiness, those with only a sketch of an idea as well as clients with well-developed products that need to be produced more efficiently. Lu Papi established Lu Papi & Associates as a platform to provide clients with access to the experience and know-how he has accumulated through 25 years of work in Australia and overseas as a manufacturing and R&D executive. The company uses that experience to create a method of dealing with the difficulties that normally beset new product development or major change within a company by identifying the risks and preparing strategies to avoid them before they occur.

We make it a practise to include from the outset of a project all the expert individuals or companies who will be involved at some point along the course of the development. This concurrent engineering method avoids the reworking that often results when the requirements of one part of the process are in conflict with those of another. Knowledge sharing with a common goal helps to reduce lead time by ensuring that the path is prepared for each successive step and eliminates unnecessary delays. Companies around the world have cut cycle time by evaluating their manufacturing processes and workload fluctuation step by step as the only way to eliminate bottlenecks and increase productivity. We believe that through balancing the various disciplines involved in a project, by managing the flow of information and by knowledge broking to get the most valuable input from all concerned we can achieve the same type of streamlining of product and process development.

We have had some excellent results using this innovative method. We have brought to completion products that are world leaders in their fields and have done so within time frames that are as much as 50% less than the norm for such developments. The awards and recognition these projects have received is a clear demonstration that an efficient methodology of this kind does not stifle innovative creativity.

Our clients have come to us with products from many different industry sectors, for example:

- Electrical
- Automotive Accessories
- White Goods
- Defence industry
- Printing and Packaging
- Furniture
- Medical
- Biomedical
- Food/ Pet food
- Building industry
- Radar /Vision system
- Gaming
- Consumer durables
- Consumer products
- Photonics



**CAPABILITY OVERVIEW**

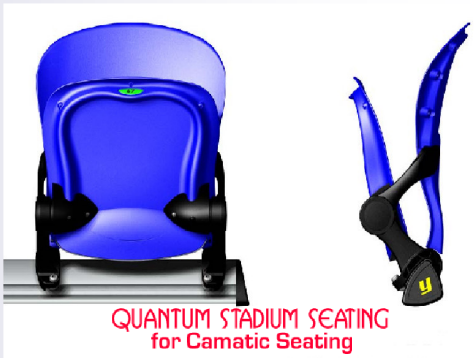
- Product innovation process management
- Project Management
- Engineering assistance to industrial design companies engaged in product design, advising on process requirements and structural requirements.
- Re-engineering of manufacturing processes, evaluation of workflows, processing equipment and plant lay out. Preparation of alternative manufacturing solutions and identification of processing equipment to improve efficiency and profitability.
- Design and development of specialised equipment to support innovative products, either those researched and developed by us, or for products developed by the client.
- Identification and selection of raw materials, including all types of plastic resins. Our specialised software has a database holding information on over 38,000 resins.
- Sourcing of tooling and equipment for the processing of plastic resins, using a set of Standards developed in house, to support products developed for our clients.
- Specific expertise in the design and development of micro-mouldings, such as those used in medical and bio-medical products.
- Specific expertise in the field of technology management and integration of new technology into the workplace.
- Specific experience with applied nanotechnology

Lu Papi & Associates has won a number of awards for its innovative work:

- the Most Outstanding Innovator in the Innovation Category of the 2002 Western Sydney Industry Awards
- Macarthur Industry Award 2000 for Innovation in Industry
- a Highly Commended Award in the 2001 Western Sydney Industry Awards in the Biotechnology category
- In 2002 The Macquarie Graduate School of Management gave Lu Papi its Award for Alumnus of the Year for Outstanding Professional Achievement

Products whose development was managed by Lu Papi & Associates have also received awards:

- The Australian Design Award in 2000 for a new line of stadium seating;

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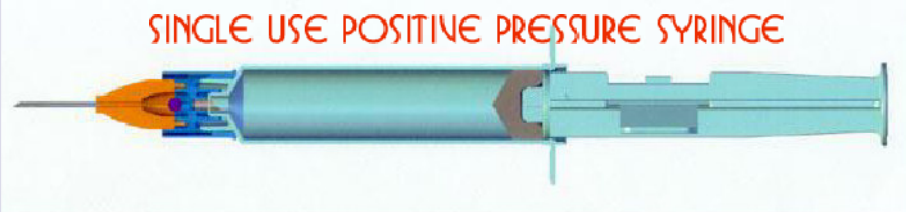
- The Gold Medal at the International Exposition of Inventions in Geneva in 2000 for a pre-filled single use positive pressure syringe.



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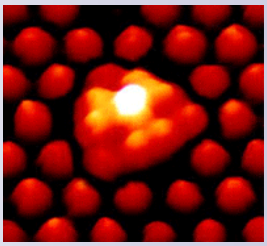
*Developing tomorrow's nanoproducts today*

## NANOQUEST AT A GLANCE

NanoQuest Pty Ltd (NanoQuest) is a privately owned company dedicated to developing revolutionary nanoproducts by identifying, acquiring, developing and commercialising high-potential innovations in the field of nanotechnology materials and processes, through strategic investments in various stages of the technology development cycle.

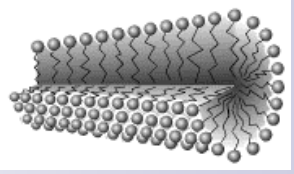


Nanotechnology refers to technologies involving materials, devices and systems designed and built with nanometer building blocks- atoms and molecules. New properties and processes exhibited at the nanoscale enable materials to be designed and fabricated with enhanced properties for novel commercial applications. Nanomaterials such as carbon nanotubes, high surface area nanoporous materials, nanoparticles and nanocomposites have great commercial potential for applications in: new generations of supercomputers; smart sensors for industrial use; cost-effective membrane technologies for clean energy supply, such as $H_2$ for fuel cells and chemical applications; and water quality enhancement.

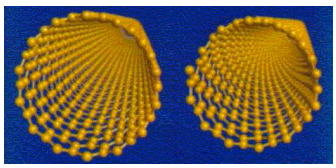
## OUR PEOPLE

NanoQuest is managed by a team of six business and research specialists, with complimentary skills in business development, technology management and nanomaterials research. The company is strategically guided by a Board of six directors: Professor P.F. Greenfield, Chairman (Sr Deputy Vice Chancellor, Research, at the University of Queensland); Dr P. Massarotto, Chief Executive Officer; Dr G.Q. Lu (Director, NanoMac Centre, UQ); Dr V. Rudolph (energy & environment technology, UQ); Dr J. Biswas (energy); and Dr J. da Costa (membrane & nanomaterials R&D). Professors Greenfield, Lu and Rudolph are internationally renowned experts in the fields of advanced energy and environment technologies. They are co-inventors of several nanostructured materials useable for air purification, fuel cells, solar energy and water quality applications (patents-pending). Dr Massarotto has over 32 years of experience in the international energy industries and infrastructure engineering, with particular skills in strategic & business development, multi-disciplinary technology management and financial management.

## OUR BUSINESS & FOCUS



NanoQuest's business is to identify, acquire, develop and commercialise nanomaterials directed particularly towards innovative applications in the energy and environmental sectors. The business activities of NanoQuest include: acquiring market intelligence and conducting market research; performing feasibility studies and commercial assessments; strategic development and commercialization of targeted product families and platforms, by supporting, advancing and improving applied research; linking emerging technologies with emerging markets; investing in and managing development projects; promoting and marketing controlled technology; and providing training, technology transfer and consultation services as a follow-up to licensed technology. NanoQuest assists and participates in value creation through commercialization of nanomaterials innovations within its principal focus areas.



nanomac
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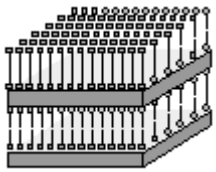
*Developing tomorrow's nanoproducts today*

## OUR COMPETITIVE ADVANTAGES

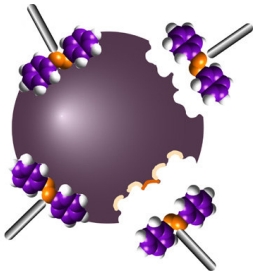
NanoQuest is a unique combination of expertise of prominent researchers and experienced technology & business management professionals, aimed at developing leading technologies in nanomaterials for emerging markets. Through strategic investment in selected R&D and the three stages of intellectual property development, NanoQuest adds value to early-stage nanotechnology innovations, capturing commercial value early in the process. Associated with this are traditional technology transfer activities of patenting, licensing and technical support. Initial stage funding is greatly facilitated by grants from various government agencies, providing excellent leverage to equity capital.

A second major competitive advantage of NanoQuest is its alliance with and access to nanomaterials researchers in universities. For instance, NanoQuest has a strategic alliance with the Nanomaterial Centre at the University of Queensland, the first such center in Australia. It has over 25 qualified researchers engaged in the leading edge research in nanomaterials and an advisory board of internationally prominent experts in various areas of nanomaterials. Another alliance is developing with the Hong Kong University of Science and Technology. Such strategic alliances allow NanoQuest early access to the latest findings on nanomaterials development and preferential access to the intellectual property developed by their researchers.



NanoQuest has recently acquired a world-wide exclusive license (field delimited) to the metal oxide nanoparticles (MOP) technology, which has applications for air purification, advanced catalysis, water cleanup (potable and ultra-pure) and gas sensing applications. Markets for these applications have been researched indicating at least $200 million/yr of accessible market. The metal oxides nanocomposites include titanium oxide, iron oxide, zirconium and nickel/zirconium mixed oxide, tin and chromium and cerium. The company is also developing a supply of other IP from the University of Queensland. Currently, negotiations are underway for accessing five more technologies: carbon nanotubes for hydrogen storage, heterogeneous fenton catalysts for water treatment, new clay-based adsorbents and catalysts and molecular sieve silica membranes. These materials have been proven in lab-scale studies to be highly promising for water quality clean-up, advanced materials for cost-effective gas separation, and hydrogen fuel cell applications. As part of its strategic plan, NanoQuest will undertake scale-up production and demonstrations for selected technologies, following sound market research investigations.

## COLLABORATION WITH NANOQUEST



NanoQuest is interested in collaborating with both industry and researchers in the field of nanotechnology materials and processes. NanoQuest is particularly Interested in working with potential industry investors and venture capitalists to jointly develop the intellectual property acquired by NanoQuest. NanoQuest can also provide funding opportunities and linkage for potential collaborators in research: nanotechnologies with technical advantages and commercial potential will be considered by NanoQuest for investment and assistance in IP development and transfer.

## CONTACT NANOQUEST

Please contact Dr Paul Massarotto, Chief Executive Officer, for enquires on our projects or yours, towards equity participation, joint ventures or collaboration activities. Tel +61-7- 3365-4152; Mobile +61-(0)408 193 074; Fax +61-7-3365-4199; Email: paulm@nanoquest.com.au; Website: Http://www.nanoquest.com.au/.

# The NanoMaterials Centre, University of Queensland

nanomac
The NanoMaterials Centre

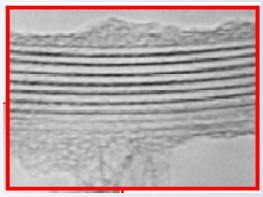
THE UNIVERSITY OF QUEENSLAND

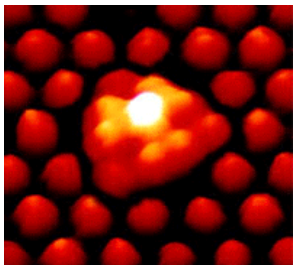
Established in late 2000 with the Vice-Chancellor's Strategic Initiative Funding, the Nanomaterials Centre (Nanomac) at the University of Queensland is home to around 30 researchers. The core research programs are nanostructured membranes for molecular separation, carbon nanotubes for energy storage, nanoporous oxide particles for catalysis, and polymer-based nanocomposites for a wide range of applications including biomaterials.

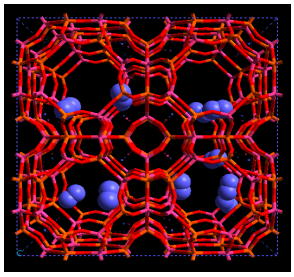
The centre is directed by Professor Max Lu (FTSE and Federation Fellow) and it is the first centre for nanomaterials research in Australia. It has successfully brought together research expertise in the field of nanostructured materials from the University's various departments and units, such as Chemical Engineering, Chemistry and Centre for Microscopy and Microanalysis (CMM).

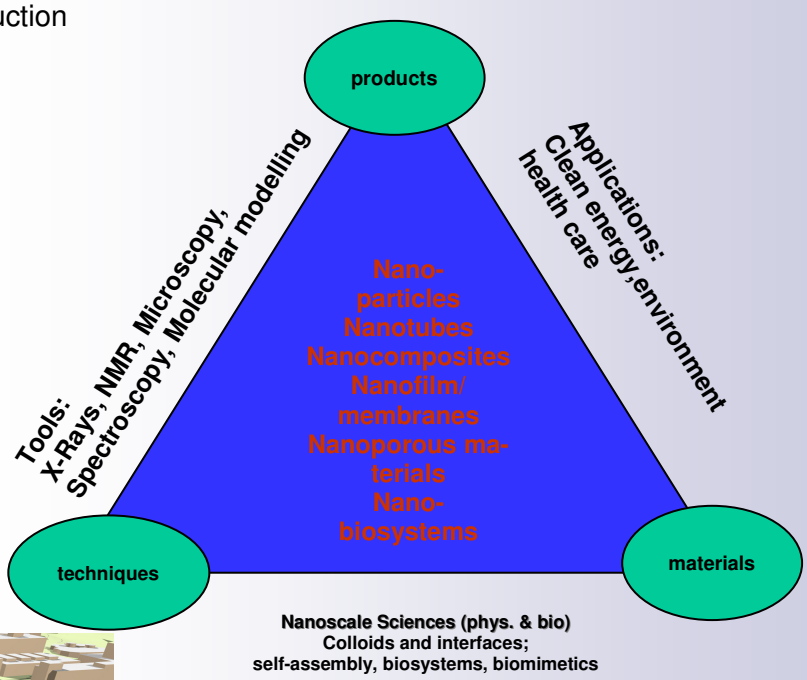
**Nanomac** as the leading group has won the ARC Centre grant of $7.5 m and will become **the ARC Centre for Functional Nanomaterials.** It will also be a core centre in the $60m Australian Institute for Bio-Engineering and Nanotechnology (AIBN). AIBN's focus will be on developing new materials, devices and processes based on bioengineering and nanotechnology. Specific applications include:

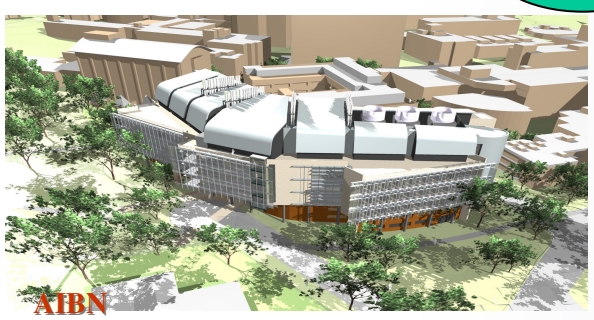
- artificial tissue/ organ fabrication
- drug delivery vehicles
- nanostructured materials for diagnostic, separation, and energy applications
- processes for the cellular production of complex biomolecules










Contact: Professor Max Lu, Director,
ARC Centre for Functional Nanomaterials,
University of Queensland,
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Email:maxlu@cheque.uq.edu.au

# SMR Scientific

*SMR Scientific Pty Ltd* is a leading importer and distributor of scientific instrumentation in Australia. We represent the following

## Raith Electron Beam Lithography Systems

**RAITH50** Universal Electron Beam Lithography Tool is a state of the art high performance high resolution lithography tool, specifically designed for the university community.

**RAITH150** Ultra High Resolution E-Beam Lithography and Metrology Tool. The system is specifically designed to meet the requirements of researchers, designers and engineers in universities. The field emission electron column also facilitates the use of this tool for high resolution inspection and metrology applications..

**ELPHY *Quantum*** is the universal Nanolithography attachment which converts any SEM/FIB into a nanowriter.

## CAMECA

**CAMECA** produces a range of instrumentation for microanalysis including Electron Probe Micro Analysers (EPMA), Secondary Ion Mass Spectrometers (SIMS), Atom Probes and Shallow Probe Systems

The **NanoSIMS50** Secondary Ion Mass Spectrometer is designed specifically for trace element isotope imaging and measurement at high resolution offering 50nm spatial resolution and parallel collection of up to 5 species for simultaneous isotopic and/or elemental analysis

## nanoSurf

**Nanosurf** is a Swiss based company producing STM and AFM systems for quality control and educational applications. The modular design allows for upgrading from single to multiple function systems

***easy*Scan DFM** (Dynamic Force Microscope) is an intermittent contact AFM with spatial resolution of up to 0.15nm. and is easily positioned on surfaces for measuring roughness, morphology, and defect analysis. Optional Phase Contrast and Force Modulation modes are available. Available in both high resolution and large area scanners

***easy*Scan STM** (Scanning Tunneling Microscope) represents excellent value for a system capable of atomic resolution and is ideal for quality control and educational use

***easy*Scan AFM** (Atomic Force Microscope) operates in static mode

## Molecular Imaging

AFM and STM research systems with true environmental control and open liquid cell design with a “top-down” scanner for electrochemical applications

**PicoTREC** is a complete molecular recognition tool kit for AFM research which allows researchers to quickly distinguish between species that are and are not engaged in molecular binding events, thus eliminating the need to perform tedious force spectroscopy experiments to get the same results. The kit includes specialised SPM/AFM hardware.

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PO Box 128, HORNSBY NSW 2077
Tel: (02) 9482 1149 Fax: (02) 9482 1196 email: smrscientific@ozemail.com.au

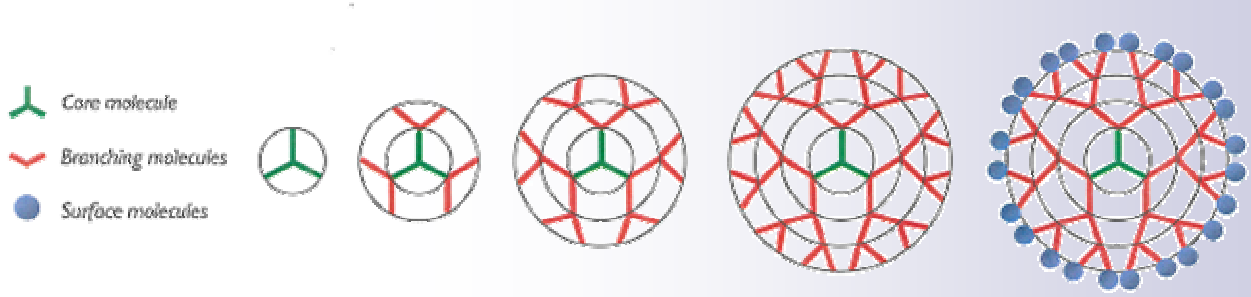
starpharma

*…leading the World in nanomedicine…*

Starpharma is an Australian company leading the world in the creation of polyvalent dendrimer nanodrugs for human illnesses. Starpharma was established in 1996 as a Pooled Development Fund to invest in the research, development and commercialisation of dendrimers for pharmaceutical applications. In 2001, investee company Dendritic Nanotechnologies was established and is now a U.S.-based company commercialising dendrimers for a wide range of applications.

## Dendrimer Nanotechnology

Nanotechnology is the manipulation of matter, molecule by molecule, to create new materials with novel, tailored properties. Dendrimers (*dendri* – tree, *mer* – branch) are synthetic, nanoscale structures that can be tailored for various applications. Specialised chemistry techniques allow for precise control over the physical and chemical properties of the dendrimers. They are constructed generation by generation in a series of controlled steps that increase the number of small branching molecules around a central core molecule. The final generation of molecules added to the growing structure makes up the polyvalent surface of the dendrimer. The core, branching and surface molecules are chosen to give desired properties and functions.

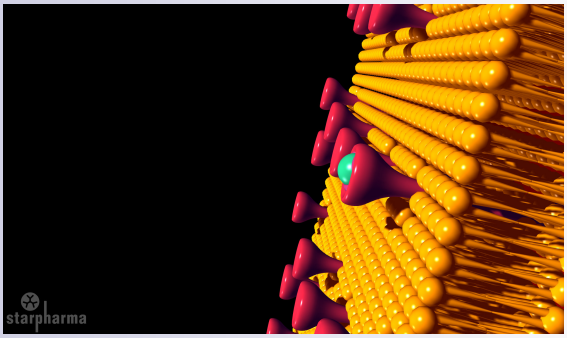



Dendrimers allow man for the first time to produce highly defined and biocompatible nanoscale objects built from the bottom up. This high definition enables unique functionality of dendrimers in life science applications and industries including medical, electronics, chemicals and materials.

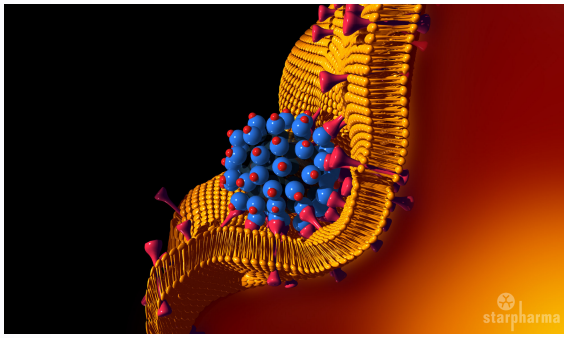
## *Innovative, polyvalent pharmaceuticals…*

Dendrimers may be designed and synthesised to achieve a polyvalent interaction, meaning that a single dendrimer can have multiple, simultaneous attachments to biological targets (e.g. cell surface).

Pharmaceuticals reliant on multiple simultaneous binding events (polyvalence) interact with common biological structures, such as viruses and cells, in a manner that mimics natural processes. Tailored polyvalent dendrimers can interact simultaneously with these multiple binding targets, resulting in enhanced or novel pharmaceutical activity compared with conventional small molecule drugs.




*A typical interaction between a small molecule and a biological surface.*




*A polyvalent interaction between a dendrimer molecule and the same biological surface.*

### *Designer 'synthetic proteins'…*

Dendrimers can be designed to be similar in size to biological structures, such as proteins. Dendrimers are suitable for the development of polyvalent pharmaceuticals with unique activities and applications, or for creating new and improved presentations of existing pharmaceuticals. Some features of dendrimers as drugs include:

- Efficacy: active against a wide range of diseases;
- Stability: stable as solids and in a variety of pharmaceutical formulations;
- Toxicity: safe at therapeutic doses;
- Identity / purity: reproducible and defined species;

Cost / ease of manufacture: cost effective, scaled-up cGMP manufacture.

Starpharma has developed a significant body of know-how associated with the repetitive synthesis and characterisation of functionalised dendrimers as defined species.
Compared with large linear polymers, dendrimers are rigid structures that enable more predictable placement of surface groups and greater control of surface functionality. By altering the surface composition, dendrimers can be targeted to specific diseases, tissues or organs, and important properties such as bioavailability can be altered.

Starpharma has discovered and is developing dendrimers for a wide range of diseases. Starpharma has also identified a number of promising small molecular entities with activity against certain disease states.

### Starpharma's Core Capabilities

Starpharma has developed core skills in the following key areas required for the successful development and commercialisation of dendrimer nanotechnology:

Dendrimer / Medicinal Chemistry
Analytical Chemistry
Biology
Product Development
Quality Assurance And Regulatory Affairs
Intellectual Property And Commercialisation

Partnerships to develop Starpharma's technologies may incorporate the company's expertise for the successful development of dendrimer-based products. Starpharma's established skills and expertise in these areas is available to lower the barrier to entry for commercial partners and licensees in the field of dendrimer nanotechnology.

## Dendrimer / Medicinal Chemistry

Starpharma's team of dendrimer chemists is a core asset of the company. The team works to generate novel intellectual property, optimise dendrimer pharmaceuticals, and provide a pipeline of new dendrimer nanodrug opportunities for commercialisation. The team's dendrimer chemistry knowledge has been generated through over 90 man-years of experience and is an important factor in the successful commercialisation of dendrimer nanotechnology. The chemistry team has set up its own state of the art, 990m$^2$ laboratory facilities in the Baker Heart Research Building in Melbourne, Australia.

## Commercial Development and Intellectual Property

Starpharma has established a leading IP position in dendrimer pharmaceuticals. Starpharma's technology is protected by a number of patents covering a wide range of applications of dendrimers and polyvalent compounds. Three of these patents are broad-based patents granted in the US.

Starpharma's strategy is to create value from dendrimer nanotechnology by leveraging IP through licensing and partnerships. Starpharma has immediate licensing opportunities and is actively seeking strategic commercialisation partners and licensees for its technologies at all stages of development. Starpharma has an extensive patent portfolio consisting of intellectual property related to dendrimers as pharmaceuticals.

Starpharma's commercial development and IP management skills were critical to the successful establishment of Dendritic Nanotechnologies, Inc. (DNT).

## Recent Company Highlights

- Starpharma submits an Investigational New Drug (IND) application for VivaGel™ (topical microbicide gel – SOL 7013) to the United States Food & Drug Administration (FDA) and clearance was obtained at the end of July 2003 for human clinical trials to commen
- Starpharma and AGT Biosciences agree to collaborate in the development of drug therapies for Type 2 Diabetes.
- Starpharma and Industrial Research Limited (IRL) establish a major nanotechnology alliance, supported by a multi-million dollar grant to IRL from the New Zealand Government.
- DNT converted to a U.S. registered entity. Starpharma remains the largest shareholder of DNT.
- Starpharma's third U.S. patent granted: No. 6,464,971 – Anionic or Cationic Dendrimer Antimicrobial or Antiparasitic Compositions.
- Starpharma granted US patent: No. 6,426, 067 – Angiogenic Inhibitory Compounds.
- Starpharma completes US nanotech venture with Donald A. Tomalia, PhD, granting intellectual property licenses to DNT for the rights to 33 patent families involving 1982 granted patents worldwide, related to dendrimers and dendritic polymers.

**Dendrimer Nanotechnologies, Inc. (DNT)**

DNT is a US Delaware incorporated company with research and development operations located at the Center for Applied Research and Technology (CART) at Central Michigan University (CMU) in Mount Pleasant, Michigan, USA.

DNT was established by Starpharma with the pioneer of dendrimer nanotechnology, Donald A. Tomalia, PhD. In October 2002, the Australian PDF Registration Board gave permission for Starpharma to remain the largest shareholder of DNT (49.99%) after its conversion to a US incorporated company.

Starpharma invested in the creation of DNT to create value for shareholders of Starpharma by advancing the development and commercialisation of non-pharmaceutical applications of dendrimer nanotechnology. Starpharma established DNT with a total capital investment of A$3.8 million and its investment in DNT is a significant asset with considerable growth potential.

DNT's objectives are to create value from dendrimer and dendritic polymer technology by creating novel dendritic IP through innovative design and synthesis, by being the leading supplier of high quality, innovative new dendrimers, and by establishing commercialisation partnerships, joint ventures and spinning out new companies in the areas of
energy storage, drug delivery and light generation.

DNT is now recognised as a major participant of nanotechnology development in the US. DNT was a beneficiary of a US biodefense grant worth US$3.5 million, which will help establish DNT and CMU as a Center for Dendrimer Nanotechnology. DNT was also selected as an industrial partner of Massachusetts Institute of Technology's (MIT) Institute for Soldier Nanotechnologies.

DNT has established a team of high profile individuals with extensive commercial experience. Charles Burke, Ph.D., (CEO), has previous experience in the start-up and management of successful US biotechnology companies. Mr Gifford E. Brown, former Vice-President of Planning & Finance and CFO of Dow Corning, is now the CFO of DNT, while Mr Richard Hazleton, former President and CEO of Dow Corning is a Director of DNT.

starpharma

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**Nanostructural Analysis Network Organisation Major National Research Facility, NANO-MNRF**

N A N O **Atom Level Characterisation and Manipulation**

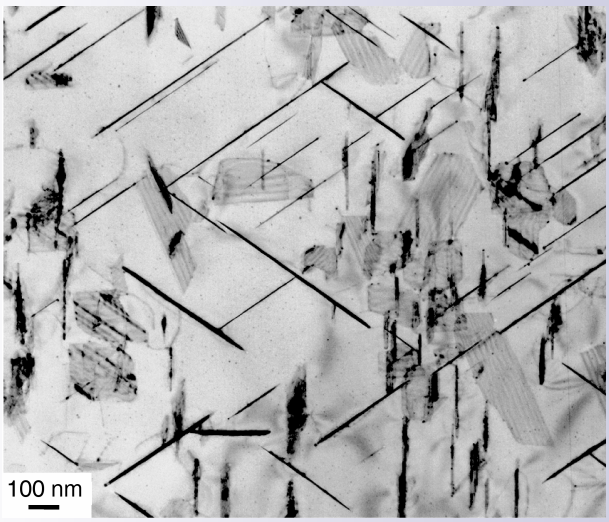
The Nanostructural Analysis Network Organisation (NANO) is a Major National Research Facility funded and established under the Commonwealth of Australia's Department of Education, Science and Training.
NANO provides the peak Australian facility for nanometric analysis of the structure and chemistry of materials in both physical and biological systems. It operates and maintains state-of-the-art facilities for the characterisation and manipulation of matter at the atomic and molecular scale. The facility specialises in instrumentation, methodologies and applications of materials characterisation using platforms for scanned probes, X-ray, ion and electron beams as well as light and laser optics. With a focus on microscopy, imaging, analysis and diffraction, this network organisation will create collaborations so as to explore and define the structure-function relationships that enable innovation in nanotechnology and biotechnology.

**About NANO**

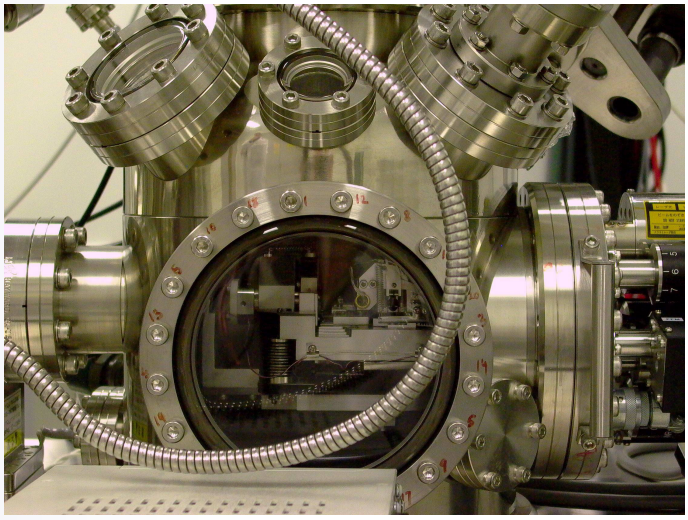
Entering the 21st century, a high quality and well-supported facility for nanostructural analysis is needed to support the innovation and ingenuity of Australian scientists and engineers. Discovery and innovation in science, engineering and technology increasingly requires researchers to explore and understand the inner space of their materials. This understanding is enables control of the relationship between synthesis, fabrication, processing and functional properties of physical, chemical and biological devices and systems.
More importantly, the NANO-MNRF creates an integrated national staff cohort in nanostructural analysis, representing excellence throughout the scientific, technical and administrative aspects of the facility operation. In 2002 NANO users logged 62,256 hours of instrument time on 919 projects and produced 842 publications.
The organisation is an unincorporated joint venture between the University of Sydney, the University of New South Wales, the University of Queensland, the University of Western Australia and the University of Melbourne, industry, and state and federal governments.

**Advanced Instrumentation**

The NANO facility encompasses an enormous range of infrastructure and expertise. Our state-of-the-art equipment provides the Australian and international research community with access to well over $70M worth of instrumentation for microscopy, diffraction, imaging and analysis using electrons, ion beams, X-rays, light and laser-optics. Our laboratories include dedicated sample and specimen preparation equipment and excellent visualisation and simulation capabilities. MNRF funding provides for the purchase of four major instruments by NANO. The University of Western Australia is now commissioning a NanoSIMs ion microprobe, one of only ten in the world. A highly focused beam of caesium (+) or oxygen (–) ions is used to sputter the surface layer



from a sample from areas as small as 35nm in diameter. These secondary ions are then analysed by a mass spectrometer and the information on the elements and/or isotopes is displayed as intensity images. Six different atomic masses can be measured simultaneously, a unique feature of the instrument.
At the University of Queensland an FEI Tecnai 30 TEM is on order. The instrument is optimised for imaging of biological materials – particularly whole cell tomography – with cryogenic cooling of the sample area and reproducible sample tilting to large angles.



At the University of New South Wales an analytical, dual-beam focused ion beam miller will be sourced for delivery in 2004. The final instrument is an advanced atom probe which will be installed at the University of Sydney node in 2005.

**Accessing NANO**

The five major centres that constitute the core members of NANO presently maintain a wide range of instrumentation for nanoscale materials characterisation. The NANO telemicroscopy system allows users access to microscopes and other instruments from remote locations. The technology to link the nodes is accessible to NANO through a partnership with GrangeNet, Australia's first gigabit research and education network.

All Australian researchers are eligible to apply for support to use NANO through the Travel & Access Program (NANO-TAP). Application forms are available on the web:

http://www.nano.org.au/tap.html

NANO-TAP supports basic travel and accommodation costs as well as instrument time. There is no closing date and submissions are assessed on a continuing basis, with a view to obtaining a rapid response to requests.

## Additional and Associate Nodes

The NANO-MNRF has an open and inclusive stance towards linkages with other institutional, governmental or commercial entities. Indeed, the creation of an extended national grid of facilities and experts, is of great interest. The benefits to NANO and Australia are less duplication, support for specialisation at nodes and ultimately, improved national scale and focus for the development of methods in nanostructural analysis and their application to problems in science and engineering,

To this end, NANO has a policy for the formation of Additional Nodes and Associate Nodes. This policy aims to:

• promote a national strategy in the development of a knowledge economy and new innovation in the fields of nanotechnology and biotechnology;

• encourage diversity in the multi-disciplinary teams of scientists and engineers that prosecute nanostructural analysis. The development of Additional Nodes will promote a collaborative platform for this community.

• Implement a telepresence microscopy network, providing partners, future users and users with a remote portal into a selection of instruments in the facility.

Additional & Associate nodes have full access to the TAP, and their staff are encouraged to participate in the management and operation of the facility. Additional Nodes pay an up-front subscription, which purchases long-term access to the entire suite of facilities and expertise of the NANO-MNRF.

Associate Nodes purchase an up-front subscription to a single node of NANO. These linkages are not ordinarily sought at the individual organisational department/school level, but are targeted as divisional-wide, institutional-wide or company-wide linkages. The NANO business team will work with groups to develop an Additional or Associate node portfolio and can advise and assist in the preparation of funding applications that may support engagement with the MNRF. Please contact info@nano.org.au for further information.

## Telemicroscopy

The telemicroscopy project, a key element of the NANO-MNRF, aims to increase access to our world-class instrumentation by users from both within and outside of the nodes. Users will be able to share instrumentation and data over any distance, and stronger links will be forged between the nodes at all levels. The four key thrusts to the project are: passive telemicroscopy, active telemicroscopy, telemicroscopy studios and an on-line access and booking system.

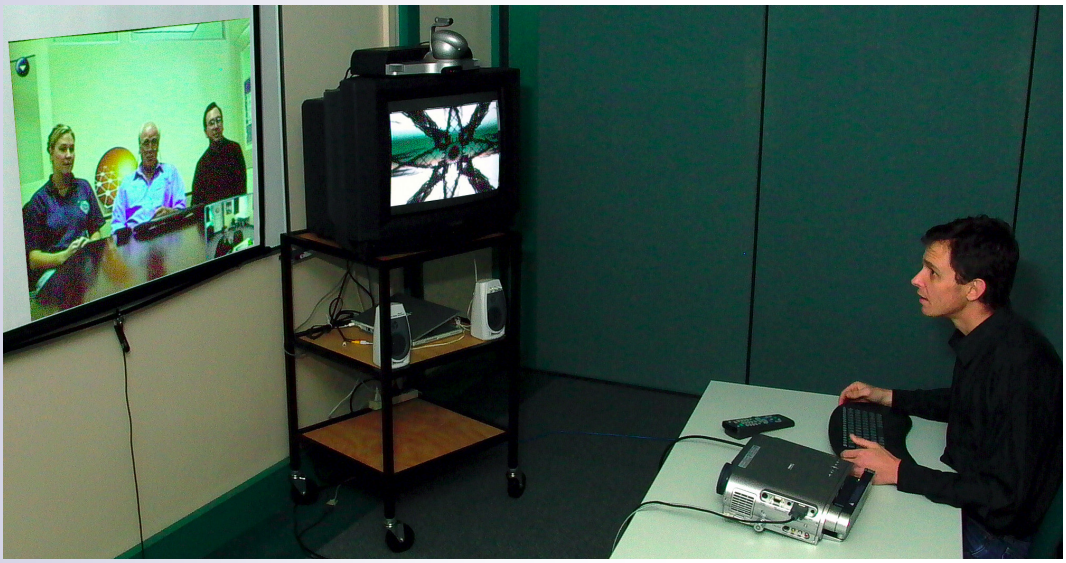
GrangeNet provides supports to the project financially and provides an advanced Gigabit network between the NANO nodes. Each node is equipped with high quality IP videoconference equipment, and a variety of technologies for transmission of video over broadband networks.

# Passive telemicroscopy

NANO has chosen a selection of instruments across the nodes for delivery through Passive Telepresence mode. A skilled operator runs the telemicroscopy-enabled instrument at one of the NANO sites, using a remote user's sample. Users follow their experiment in real time, observing the same microscope outputs in terms of image and spectral data as the operator. Typically, the User will guide the operator to the regions of sample that are of interest, advise on known artifacts, comment on image interpretation and direct the experiment.

# Active telemicroscopy

A more limited selection of instruments can be operated through Active telepresence. Active telemicroscopy enables a skilled operator to operate the instrument from a remote site using specialised software and hardware interfaces. Whilst not all instruments are amenable to this more sophisticated mode of telemicroscopy, it is planned to have at least one advanced transmission electron microscope, scanning electron microscope and optical microscope available.



**More information**

For more information about NANO's activities or capabilities contact the

The Electron Microscope Unit,
Madsen Building F09, The University of Sydney, NSW 2006, AUSTRALIA.
Application information for the TAP scheme and the 2003 NANO Annual Report may be downloaded from the web site:

www.nano.org.au

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Associate Professor Simon Ringer.
Tel +61 2 9351 2351,
Fax +61 2 9351 7682.
Email:
simon.ringer@emu.usyd.edu.au.

## University of Technology, Sydney (UTS) / CSIRO NanoHouse™

### About UTS

The University of Technology, Sydney is an Australian university with an international focus. It provides higher education to enhance professional practice, to serve the community at large and to enable students to reach their full personal and career potential.

The University contributes to the advancement and integration of knowledge, professional skills and technology, and their intelligent, sustainable and enterprising application for the benefit of humanity.

The Institute for Nanoscale Technology (INT) was established in 2001, and is focused on two major research themes: Nanotechnology applications for Energy Efficiency, and Nanotechnology application in Biomedicine. Directed by Prof. Michael Cortie, INT also seeks to lead in communication about nanotechnology with the wider community and sees the NanoHouse™ as a valuable means delivering a message that can be understood by non-scientists. INT also coordinates two undergraduate degrees in Nanotechnology, with a current enrollment of 60 (?) students. There are also currently 18 Post-Graduate students working at INT.

The INT Energy Efficiency program is lead by Professor Geoff Smith, who is one of the leading authorities in advanced window and lighting technologies. The polymer optical fibre on display is one of the technologies that Prof. Smith has collaborated on. UTS also has a range of nanotechnologies such as solar control glass coatings and skylights, luminescent solar collectors, and light mixing.

For further information about UTS nanotechnology, please contact Carl Masens on 9514 2188 email: carl.masens@uts.edu.au

### About CSIRO

CSIRO is Australia's Commonwealth Scientific and Industrial Research Organisation.
As one of the world's largest and most diverse scientific global research organisations our work touches every aspect of Australian life: from the molecules that build life to the molecules in space.

Working from sites across the nation and around the globe, our 6500 staff are focussed on providing new ways to improve your quality of life, as well as the economic and social performance of a number of industry sectors through research and development.
These sectors are:

Agribusiness
Energy and Transport
Environment and Natural Resources
Information, Communication and Services
Manufacturing
Mineral Resources
Health

For more information about CSIRO nanotechnology, go to http://www.nano.csiro.au/, or contact Fiona Cameron on 02 9413 7264 or email Fiona.Cameron@csiro.au

**About The NanoHouse™**

The NanoHouse™ is a demonstration of nanotechnology applications designed to show how the range of options in architecture and building can be increased by the use of advanced materials. The NanoHouse™ is a new housing system being developed by UTS and CSIRO that espouses 3 principles: energy efficiency, sustainability, and mass customization. It is a response to the need to provide habitation that is environmentally friendly and sustainable, both in terms of the houses themselves, and the manufacturing of the component parts.

The project is an international collaboration that is being coordinated from Australia by UTS and CSIRO. There are already 25 partners, drawing on all sectors of the economy that have a bearing on nanotechnology: scientific R & D labs, small businesses, large businesses, Govt departments, and industry associations. Currently the major partners in the NanoHouse™ are UTS, CSIRO, and SGI.

The project is actively seeking sponsorship. For details please contact Carl Masens on 02 9514 2188 or email carl.masens@uts.edu.au

**Companies Exhibiting in the NanoHouse™ at APNF 2003**

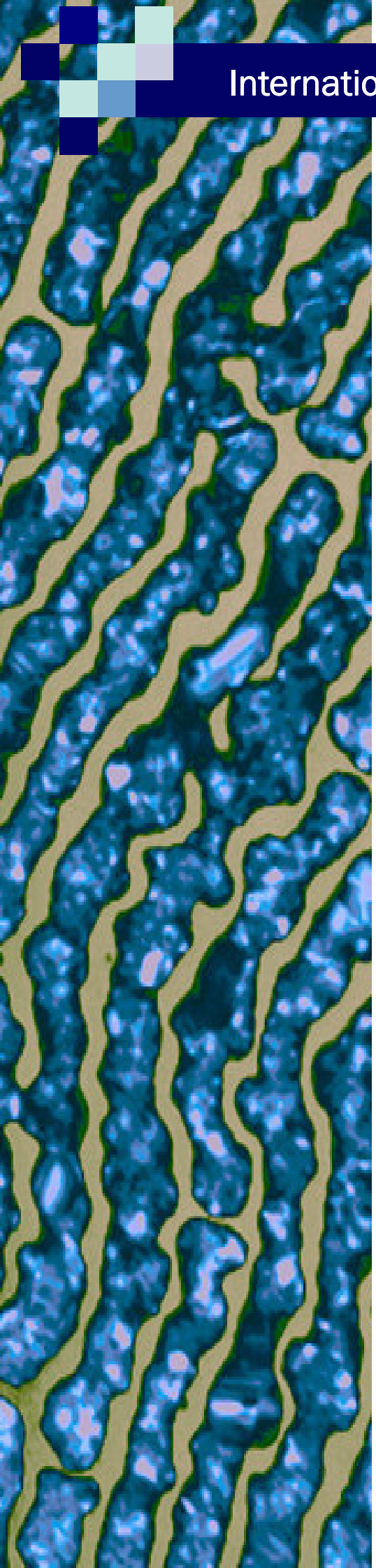
**Lehmann Pacific Solar Pty Ltd**
Lehmann Pacific Solar is a small company based in the north of Sydney. Their SkyCool™ product is a radiative cooling paint, which radiates IR in the 8-13 micron region of the EM spectrum – just where the sky is transparent. This means that a metal roof coated with SkyCool becomes a cooling element in a building rather than a source of unwanted heat gain. For more information please contact Rex Lehmann on 02 9477 4095 email: rex@skycool.com.au

**Pilkington**
Pilkington is one of the world's leading manufacturer of glass and glass products. Pilkington are the makers of Activ™ self-cleaning glass, which is on display in the NanoHouse exhibit. For more information about Pilkington and Pilkington products, visit http://www.pilkington.com.au or contact Paul Warwick on 02 9756 2100 email: paul.warwick@pilkington.com.au

**PolyOptics Pty Ltd**
Polyoptics are a small company based in Queensland who are at the forefront in the delivery of cold lighting systems. On display in the NanoHouse™ exhibit is the Supersidelight™ polymer optical fibre, which is primarily used for safety and display lighting. For more information about PolyOptics products please contact Eddy Joseph on 07 5520 2222 or email: eddy@fibreopticlight.com

**Sustainable Technologies International**
STI are the only licenced manufacturers in Australia of the dye solar cell. A small company based in Queenbeyan, NSW, STI are leaders in innovative green technology. For more information about STI please contact Ken McKeen on 0413 256 074 email: kenmckeen@sta.com.au

**V-Kool**
V-Kool is a franchise in Australia. Their product, developed by Southwall Technologies in the USA, is a multilayer metal-insulator-metal thin film which is sold as a polymer sheet that cat be retrofit to any window surface. For information on V-kool products, visit http://www.v-kool.com or call Stephen Ward on Ph: 02 9748 6842 Fax: 9648 4168.



# International Nanotechnology Showcasing Exhibition

The Australian Pavilion
International Nanotechnology Showcasing Exhibition at the
2nd Annual Conference of the Asia Pacific Nanotechnology Forum

19-21 November 2003
The Hilton Cairns
Tropical Queensland
Australia

The Asia Pacific Nanotechnology Forum is a members supported not-for-profit organization registered in NSW, Australia
ABN 20 242 753 658.

| *Conference, Workshop, Exhibition* | *Journal, Publications, International Relations* |
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| Asia Pacific Nanotechnology Forum<br>Suite 145-W6, Level 1<br>National Innovations Centre<br>Australian Technology Park<br>Eveleigh NSW 1430<br>Australia<br>ph: 61-2-9209-4126<br>fx: 61-2-9310-7232 | Asia Pacific Nanotechnology Forum<br>15 Blaxland Avenue, Suite 4<br>Newington NSW 2127<br>Australia<br><br>ph: 61-2-9748-6596<br>fx: 61-2-9748-6664 |

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