Australian Research Council
Nanotechnology Network

ANNUAL REPORT

Australian Research Council
Nanotechnology Network

MISSION STATEMENT AND OBJECTIVES

Mission Statement

The Mission statement of the Australian Research Council Nanotechnology Network is to enhance Australia's Research in Nanotechnology and related areas, by effectively promoting and drawing together collaborations in this field.

Objectives

The Nanotechnology field is one of the fastest growing areas of research and technology. The Australian Research Council Nanotechnology Network (ARCNN) is dedicated to substantially enhancing Australia's research outcomes in this important field by promoting effective collaborations, exposing researchers to alternative and complementary approaches from other fields, encouraging forums for postgraduate students and early career researchers, increasing nanotechnology infrastructure, enhancing awareness of existing infrastructure, and promoting international links. The ARCNN will achieve these goals through its dedication to bringing together all the various groups working in the field of Nanotechnology and related areas within Australia. This innovative new network was created by four seed funding networks joining together in order to cover the broader areas and to create a larger more effective network.

The Network aims to:

1. bring together key groups working in this area to communicate, innovate, share and exploit mutual strengths and facilities to make a major impact internationally
2. identify new areas of research
3. highlight the infrastructure that is available in Australia and promote use and sharing of these facilities
4. identify infrastructure needs to strengthen research
5. leverage off and interact with other networks for mutual benefit
6. develop industry and international links
7. interact with the wider community
8. encourage postgraduate students and early career researchers to enhance their skill base and training
9. become a national resource for industry, research and educational institutions, government and policy developers

Year 1 in Review

During 2005 ARCNN focused on establishing and developing its Management Committee and Governance and its Website – http://www.ausnano.net .

Membership of 407 members which include 138 post graduate students and 50 Early Career Researchers. More than 90 groups are participating in the Network.

Over 100,000 Website hits

Cash Income of $647,980

In Kind Contributions of $161,780

Hosted 3 International Distinguished Lecturer tours

International Visit – Global Nanotechnology Network Workshop

2 ECR/Postgraduate symposia

30 PhD students and 7 ECRs received Travel Grants

Member Forum

Member Survey

2 Short Term Visits

8 Events Sponsored by ARCNN

Initiated a major International Conference in the field
(ICONN 2006: http://www.ausnano.net/content/iconn2006)

Sponsored a NOVA Topic in Nanotechnology hosted by the Australian Academy of Science
(To go online in 2006)

Structure and Management

The Australian Research Council Nanotechnology Network is managed by a Management Committee which meets every three months. The first Board meeting was held at the Research School of Physical Sciences and Engineering at the Australian National University on the 22nd November 2004. Other meetings were held during 2005 at the University of New South Wales in March 2005, at the University of Western Australia on the 19th July and at the University of Queensland on the 7th December 2005.This management board represents the wider membership and is chaired by an independent chair. The committee determines the priorities for each activity and allocates the budget for the network. A Network Manager manages the day to day administrative tasks under the Guidance of the Network Convenor.

Management Committee Chair

The duties of the Chair are to chair Management committee meetings, provide advice to the Network, confirm meeting minutes for circulation to Management committee members, represent the network at important meetings and provide general guidance to the network management.

Convenor

The convenor has overall responsibility for the Network operations and for meeting ARC requirements and guidelines. Represent the network at key Nanotechnology meetings in Australia and key International network meetings. Supervise Network staff and provide overall direction to the network activities.

Management Committee Members

The management committee members participate in committee meetings. They serve on the Working Group sub committees, represent the Network and publicise network activities, organise and actively participate in the management of network activities, act as ambassadors for the Network and provide advice to the network members about network programs.

Working Groups

Committee member Groups form part of working groups that assess funding applications and other issues prior to the matter going to the full Management committee for voting.

There are four working groups and their areas comprise

Events Working Group *– evaluates all applications for sponsorship funding for Conferences, Workshops, Summer and Winter Schools and Short Courses.*

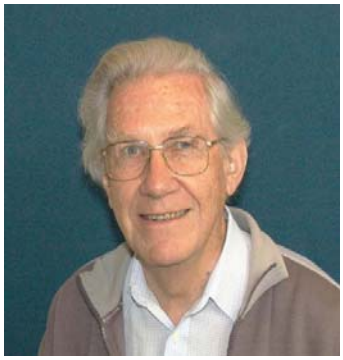
Visits Working Group *– evaluates all applications for Short and Long Term Visits and Overseas Travel Fellowships.*

Outreach Working Group *– evaluates outreach proposals such as Public Lectures, Distinguished Lecturers visits, outreach and Webpage.*

Education Working Group *– evaluates applications for student, ECR and Entrepreneur Forums and educational activities..*

The Convenor fills in if a working group member is unavailable or is one of the applicants (when there is a conflict of interest).

The Management Committee (MC) comprises of the following members, representing 6 States, students and early career researchers and chaired by an Independent chair. The MC has representatives from ANSTO, CSIRO, DSTO and industry (Intel).



Emeritus Professor Neville H. Fletcher
Australian National University
Chairman

Professor Chennupati Jagadish
Australian National University
Convenor

Prof. Laurie Faraone
University of Western Australia

Prof. Max Lu
University of Queensland

Prof.Paul Mulvaney
University of Melbourne

Dr Adam Micolich
University of New Wales

Prof Peter Majewski
University of South Australia

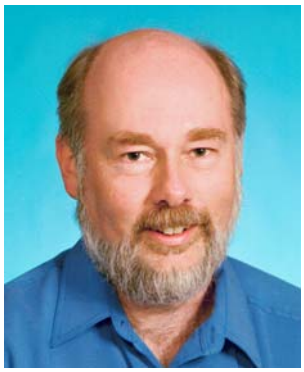
Prof. Deb Kane
Macquarie University

Prof Gordon Wallace
University of Wollongong

Dr Alan Wilson
Defence Science and Technology Organisation

Dr Terry Turney
Commonwealth Scientific and Industrial Research Organisation

Dr Steve Duvall
INTEL



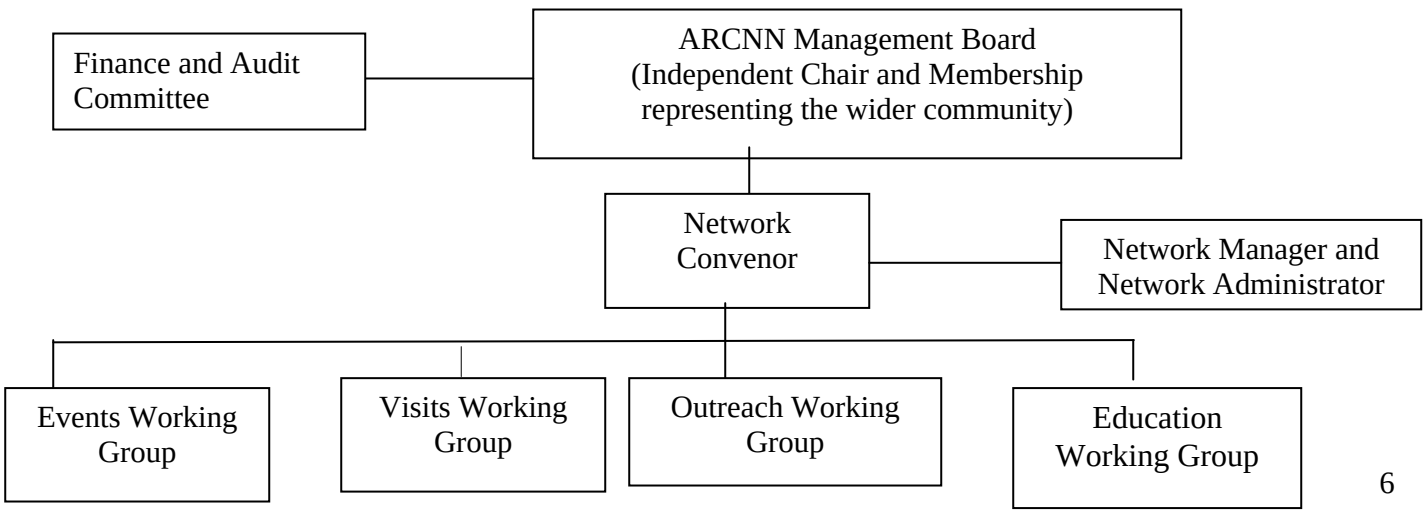
Dr John Bartlett
ANSTO

Ms Fang Xie – Student member
Macquarie University

Ms Helen McMartin
Network Manager

Ms Cindy Bradley
Network Administrator

ARCNN Structure



ACTIVITIES UNDERTAKEN BY ARCNN

List of Activities funded by ARCNN

Distinguished Lecturers

- Distinguished Lecturer – Prof Klaus Ploog - Paul Drude Institute – Berlin Germany
  25/07/2005 – 28/07/2005 – Melbourne, Canberra and Sydney
- Distinguished Lecturer – Dr Vince Castranova - National Institute for Occupational Safety and Health, Morgantown, West Virginia, USA.
  13/07/2005 – 29/07/2005 – Brisbane, Adelaide, Melbourne, Canberra ,Sydney and Perth
- Distinguished Lecturer Tour: Prof Sajeev John – University of Toronto, Canada
  21/11/2005 – 25/11/2005 – Canberra, Adelaide & Sydney

International Visits by Network Members

- Global Nanotechnology Network 2005 Workshop visit by Prof Jagadish
  26/05/2005 – 27/05/2005 – Saarbrucken, Germany

ECR/Postgraduate Symposiums organized by ARCNN

- Postgraduate Symposium on Nanotechnology
  21/07/2005 – 22/07/2005 – University of Western Australia, Perth
- ECR/Postgraduate Student Symposium on Nanotechnology
  08/12/2005 – 09/12/2005 – Bioscience Precinct, University of Queensland, Brisbane

Member Forums organized by ARCNN

- ARCNN Member Forum
  19/07/2005 – Seminar Room 1, University Club, University of Western Australia

Short Term Visits

- Stuart Hatch (UWA) – La Trobe University – July 2005
- Neerushana Jehanathan (UWA) – University of New South Wales

Travel Funds for Early Career Researchers and Postgraduate Students

- 30 PhD students and 7 ECRs received travel funds

Workshops and Events Sponsored by ARCNN

- Australian Nanoindentation Workshop
  21/03/2005 – 23/03/2003 – Kioloa
- Workshop on Quantum Materials
  01/06/2005 – 04/06/2005 – Heron Island
- International Workshop on Nanotechnology
  17/07/2005 – 20/07/2005 – Perth
- XXII International Conference on Photochemistry
  24/07/2005 – 29/07/2005 – Cairns
- Workshop on Positron Applications – from Atoms to Materials to Cells
  09/11/2005 – 11/11/2005 – Shine Dome, Canberra
- 8th Japan-Australian Colloid and Interface Gakkai
  27/11/2005 – 30/11/2005 – Terrigal, NSW
- BioNano: The Next Frontier Conference
  04/12/2005 – 07/12/2005 – Brisbane
- Special Lecture – Professor Robert Mackay
  16/12/2005 – Link Seminar Room, Oliphant Building, ANU

DISTINGUISHED LECTURER TOURS

The aim of the Distinguished Lecturer Program is to bring international experts in the field to Australia and to give lectures in various institutions across the country. This also allows young scientists to interact with internationally renowned scientists in the field and allow Australian researchers to be aware of state of the art research overseas. These visitors will act as Ambassadors for Australian Science internationally.

There were three Overseas Distinguished Lecturers invited to tour Australia and talk about their fields of research and expertise.

Prof Klaus Ploog

Professor Ploog is from the Paul Drude Institute for Solid State Electronics, Berlin Germany. His area of research is ferromagnetic semiconductors for spintronics applications.

During his July 2005 visit to Australia, Professor Ploog gave talks on 'Nonpolar group III nitride films and heterostructures for improved UV light emitters and detectors' and 'Ferromagnetic-semiconductor nanostructures for spintronics' at:

- The University of Melbourne, Melbourne
- The Australian National University, Canberra, and
- The University of New South Wales, Sydney

Prof Ploog was also an invited speaker at the International Workshop on Nanotechnology held in Perth, in July, 2005.

Professor Ploog and Professor Jagadish

Abstract of seminar on 'Ferromagnetic-semiconductor nanostructures for spintronics'

Utilizing both the electric charge and the spin of electrons (holes) in semiconductors allows to exploit novel device functionalities. The perspectives of higher speed and lower power consumption have inspired the research activities in the field of spin electronics ("spintronics"). The practical implementation of spintronic devices based on semiconductors requires the development of suitable material combination that allow spin-polarized carriers to be effectively injected, transported, manipulated and detected in semiconductor heterostructures. To probe the electrical spin injection efficiency in ferromagnetic-semiconductor heterostructures, the electroluminescence and its polarization from a quantum well LED are frequently used. However, the correlation of optical polarization measurements with the actual spin transport across the ferromagnet-semiconductor interface is not straightforward and often erroneous conclusions with respect to spin injection efficiencies have been drawn.

Dr Vince Castranova

Dr Vincent Castranova is the Chief of the Pathology and Physiology Research Branch at the National Institute for Occupational Safety and Health, Morgantown, West Virginia, USA. He is also an adjunct professor at West Virginia University and University of Pittsburgh.

Dr Castranova's area of research is the impact of nanotechnology on OH&S issues. Dr. Castranova's research has concentrated on lung cells and lungs diseases that result from exposure to fine particles like coal dust.

During his visit to Australia he gave talks at:

- The University of Queensland, Brisbane
- University of Melbourne, Melbourne
- University of South Australia, Adelaide
- The Australian National University, Canberra
- National Gallery of Australia **(ANU Public Lecture)**
- The National Industrial Chemicals Notification Assessment Scheme (NICNAS), Sydney.

Dr Castranova was also an invited speaker at the International Workshop on Nanotechnology held in Perth, in July.

Video Recording

A video recording on CD of the ARCNN/ANU Public Lecture "Health Issues of Nanoparticles & Nanotubes"given by Dr Castranova on Wednesday 27th July 2005, at the National Gallery of Australia. Complimentary copies of the CD were distributed to over 55 members on request.

Prof Jagadish and Dr Castranova

Sydney

Abstract

Nanotechnology has great potential to create breakthroughs in fields like medicine, electronics and cosmetics. But the health implications of the miniscule technology need to be addressed as nanoparticles can breach the body's barriers and enter the lungs, bloodstream and brain.

For this reason, research about exposure levels and the health effects of engineered nanoparticles is essential for the safe development of materials for commercial use. This talk will review research results on the effects of nanoparticles and nanotubes on the health of those people who are exposed to the technology.

Prof Sajeev John

Professor John is from the Department of Physics, University of Toronto, Canada, and he is also a Canada Research Chair holder. Professor John is the winner of the 2001 King Faisal International Prize in Science, which he shared with C. N. Yang. He is also the first ever winner of Ontario's Platinum Medal for Science and Medicine in 2002. His area of research is photonic crystals, and he is the co-inventor of Photonic Crystals.

During his visit to Australia in November 2005, Professor John gave lectures on the topic of 'Photonic Band Gap Materials: Engineering the Fundamental Properties of Light' at the following institutions:

- The Australian National University, Canberra
- The University of Adelaide, Adelaide,
- The University of Sydney, Sydney

Prof Sajeev John at ANU

Prof Jagadish and Prof Sajeev John

Abstract

Photonic Band Gap (PBG) materials are artificial, periodic dielectrics that enable engineering of the most fundamental properties of electromagnetic waves. These properties include the laws of refraction, diffraction, and spontaneous emission of light. Unlike traditional semiconductors that rely on the propagation of electrons through an atomic lattice, PBG materials execute their novel functions through selective trapping or "localization of light" using engineered defects within the dielectric lattice. This is of great practical importance for all-optical communications and information processing. Three dimensional (3D) PBG materials offer a unique opportunity for simultaneously (i) synthesizing micron-scale 3D optical circuits that do not suffer from diffractive losses and (ii) engineering the electromagnetic vacuum density of states in this 3D optical micro-chip. This combined capability opens a new frontier in integrated optics as well as the basic science of radiation-matter interactions.

A DVD of the video recording of Prof John has been mailed to MacDiarmid Institute in New Zealand based on their request.

International Visits by Network Members

- Global Nanotechnology Network 2005 Workshop visit by Prof Jagadish
  26-05-2005 – 27-05-2005 – Saarbrucken, Germany

Professor Jagadish represented ARCNN at the Global Nanotechnology Network 2005 Workshop in Saarbrucken, Germany. Representatives from various parts of the globe met to discuss nanotechnology activities in various countries and to enhance interactions between scientists particularly with an aim to bridge the nano-divide between developing and developed countries. This dynamic development process is expected to energize interactions and create novel synergies among scientists, educators and government representatives from all parts of the world.

ECR/POSTGRADUATE SYMPOSIA ORGANISED BY ARCNN

Postgraduate Symposium on Nanotechnology

21/07/2005 – 22/07/2005 – Perth

The Australian Research Council Nanotechnology Network (ARCNN) held its first Postgraduate Symposium on Nanotechnology at the University of Western Australia, following the International Workshop on Nanotechnology, from 17 – 20 July 2005.

Professor David Joy from the University of Knoxville, USA, was an invited speaker and gave a talk titled "Want a Career in Nano science?" This talk highlighted the "pros and cons" of working in Industry, National Laboratories and Universities.

Symposium Details:

The symposium was held across one and a half days (Thursday 21 and the morning of Friday 22 July). A total of 22 postgraduate research students from around Australia presented talks and there were 60 attendees. The symposium chair was Dr Adam Micolich from the University of New South Wales.

Program

The aim of the symposium was to provide a forum where postgraduate students working on nanotechnology research could present their work, meet other students and researchers, and interact with other research groups in Australia.

Attachment A – Copy of Postgraduate Symposium on Nanotechnology Program

The Symposium was a great success and this led to the planning of the ECR/Postgraduate symposium in Brisbane later in the year.

Symposium Attendees

Symposium Audience

Prof David Joy and Dr Adam Micolich

ECR/Postgraduate Student Symposium on Nanotechnology

08/12/2005 – 09/12/2005 – Queensland Bioscience Precinct, Queensland University, Brisbane

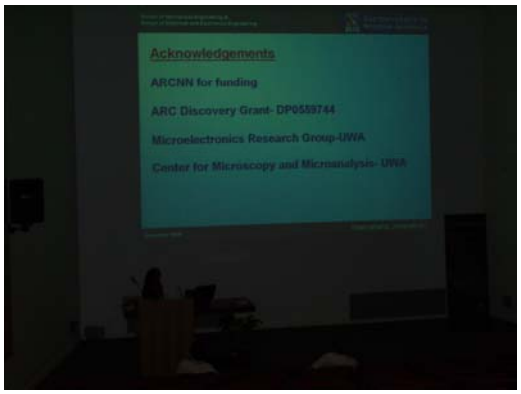
Following on from the success of the ARCNN Postgraduate Symposium held in Perth in July, a 2nd Symposium for both Early Career Researchers (ECRs) and Postgraduate Students was held at the Queensland Bioscience Precinct, Queensland University Brisbane. This Symposium followed on from the BioNano: The Next Frontier Conference at the same venue. The aim of this symposium was to provide a forum where ECRs and Postgraduate Students working on nanotechnology research can present their work, meet other researchers and students, and interact with other research groups in Australia.

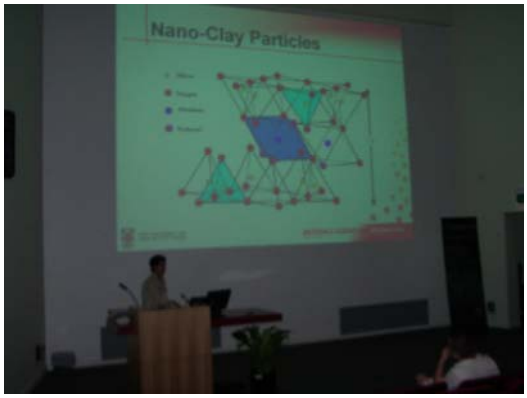
Symposium Details:

The Symposium was held over two days (Thursday 8th and Friday 9th December) and consisted of 17 talks of 20 minutes duration from Australian ECR's and Postgraduate Research Students, and there were 59 attendees.

Symposium Chairs:

Dr Adam Micolich, University of New South Wales
Ms Fang Xie, Macquarie University





A copy of the Symposium poster is in attachment B

ARCNN Member Forum

19/07/2005 – Seminar Room 1, University Club, University of Western Australia.

The aim of the Forum is for members to take part and contribute ideas.

This forum included an overview of current ARCNN activities and funding grants and provided an opportunity for the members to provide input about what ARCNN can do to enhance its focus on supporting Australian ECRs and postgraduate students, and sponsoring Nanotechnology events held in Australia.

Based on the positive feedback received from this forum a new funding program to support International travel for collaborative research undertaken by ECRs and Postgraduate students was considered by the Management Committee for 2006.

Members at the Forum

ARCNN Member Survey

An ARCNN member survey was conducted after the event and all the members who participated in the Postgraduate Symposium took part. Based on the feedback it was agreed that ECRs would be included as part of the next and following symposia.

ARCNN Banner

SHORT TERM VISITS

Stuart Hatch – visit to La Trobe University

ARCNN provided support for Stuart Hatch from the University of Western Australia whose area of research interest is Molecular beam epitaxy growth & characterization of HgTe-HgCdTe superlatttices. He visited La Trobe University in July 2005 to carry out x-ray measurements on samples grown at UWA using La Trobe's High Resolution X-ray Diffractometer. Stuart's supervisor A/Prof John Dell and collaborator A/Prof Brian Usher supported this visit.

Copy of Report from Stuart Hatch.

ARCNN Travel Funding

Outcomes: La Trobe University Visit

Stuart D. Hatch
Microelectronics Research Group
University of Western Australia

The x-ray diffraction work performed at La Trobe University proved to be very useful. Their Panalytical X'Pert PRO system enabled a thorough structural characteristion of the (001) and (112) oriented HgTe-HgCdTe superlattices grown by molecular beam epitaxy at UWA.

Double and triple crystal rocking curves were performed on all samples. This allowed the determination of layer thicknesses, composition, and overall crystal quality. Dynamic simulations were also performed and fits were made to the data to verify this compositional information. All superlattices grown were found to be of high quality.

Triple axis diffractometry is possible with the X'Pert PRO system, and therefore reciprocal spacing mapping measurements can be made. Both symmetric and asymmetric Bragg reflections were investigated, primarily (004), (224) and (224), (115) for the (001) and (112) orientations, respectively. This was used to determine the level of relaxation in the layers, as well as the in-plane and out-of-plane lattice spacings. Biaxial tetragonal strain was present in the (001) orientations, whereas a shear strain was present along one azimuth of the (112) orientation, due to the inherent anisotropy of the (112) zincblende crystal structure normal to this direction.

A number of reciprocal space maps were taken over the surface of the sample, to gather some information on the structural uniformity of the growths. The full width half maxima (FWHM) of the diffraction peaks were quantified for both the variation of lattice spacing and tilts. Localised defects were revealed where an increase in these FWHMs were measured, and interestingly, some areas of the (001) orientation sample measured showed an increase in lattice tilts but not lattice spacing, indicating the presence of defects within the substrate below the absorption length of the x-rays. By quantifing both the spread in tilts and spacings, this measurement can be further developed as a powerful yet non-destructive method of mapping crystalline growths and substrates.

The work was presented at the 'US Workshop on the physics and chemistry of II-VI materials' in a talk entitled "High resolution x-ray diffraction studies of HgTe-HgCdTe superlattices," held in Boston in late September. It is set to be published in the Journal of Electronic Materials early next year.

Neerushana Jehanathan – visit to University of New South Wales

ARCNN provided support for Neerushana Jehanathan from the University of Western Australia whose area of research interest is nanomaterials, thin films, nanomechanics, electron microscopy and MEMS. She visited the University of New South Wales to undertake research in the preparation of TEM Cross section samples(5) of SiNx thin films using the FIB facility to prepare samples, and to perform XPS analysis (depth profile) on the SiNx thin films.
Neerushana's application was supported by her supervisors A/Profs Yinong Liu and John Dell and collaborators Prof Paul Monroe and Dr Bill Bin Gong.
Copy of report from Neerushana Jehanathan

Following is a report from Neerushahana about her visit:
Neerushana Jehanathan
School of Mechanical Engineering & School of Electrical and Electronic Engineering
The University of Western Australia
Report 5th January 2006

SHORT RESEARCH VISIT TO THE UNIVERSITY OF NEW SOUTH WALES (NOV- DEC 2005)

The purpose of my research visit was to use the Nova Nanolab 200 Dual beam Focused Ion Beam (FIB) and the ESCALAB220i-XL X –ray Photoemission Spectroscope (XPS). The FIB was used to prepare TEM cross section samples and the XPS was used for depth profiling and surface analysis of heat treated PECVD SiN_x thin film samples.
At the end of this visit, I had a good understanding of both these techniques and the research goals were met. In addition, this visit provided a good opportunity for communication and information exchange among the laboratories involved at UWA and UNSW in this frontier research on advanced nanomaterials and nanotechnology. It also paved the way for me to upgrade my skills and ride with the new waves of change.
It was indeed a very fruitful experience.

Figure 1: ESCALAB220i-XL XPS Figure 2: Nova Nanolab 200 Dual beam FIB

ECR/POSTGRADUATE STUDENT SYMPOSIUM ON NANOTECHNOLOGY AT THE UNIVERSITY OF QUEENSLAND (DEC 2005)

The symposium gave me the opportunity to present my research work and incited meaningful discussions. I was exposed to a wide range of researchers from different parts of Australia whose research activities encompassed different areas of Nanotechnology. A great networking experience and opened avenues for potential collaboration.
I wish to thank ARCNN for giving me this splendid opportunity to visit UNSW for my research and also attend the postgraduate symposium at UQ. Both experiences have benefited me immensely.

TRAVEL FUNDS FOR EARLY CAREER RESEARCHERS AND POST GRADUATE STUDENTS

ARCNN provided travel funds to the following PhD Students for the Post Graduate Symposium on Nanotechnology in Perth in July 2005

Title	First name	Last name	Department	University
Mr	Satyanaryan	Barik	Electronic Materials Engineering Research School of Physical Sciences and Engineering	Australian National University
Miss	Christina	Cortex	Chemical & Biomolecular	Melbourne University
Mr	Alexandru	Fechete	School of Electr/Biomed Eng	RMIT University
Ms	Tamara	Fehlberg	School of Electronic and Computing Engineering	University of Western Australia
Ms	Ann	Gooding	School of Chemistry	University of Melbourne
Mr	Barry	Halstead	School of ST & E	La Trobe University
Mr	Rainer	Hoft	Institute for Nanoscale Technology	University of Technology Sydney
Miss	Neerushana	Jehanathan	Mechanical Engineering	University of Western Australia
Mr	Yonggang	Jin	ARC Centre for Functional Nanomaterials	University of Queensland
Mr	Gajendran	Kandasamy	School of Physics	University of Melbourne
Mr	Yit-Lung	Khung	School of Chemistry	Flinders University
Mr	Matthew	Lay	School of Physics	University of Melbourne
Ms	Qi	Li	Chem Eng Department	University of Melbourne
Mr	Li	Li	School of Chemical Engineering	University of Queensland
Mr	Peter	Livingston	Industrial Research Institute	Swinburne University
Ms	Sudha Siva Rani	Mokkapati	Electronic Materials Engineering Research School of Physical Sciences and Engineering	Australian National University
Mr	David	Oliver	Electronic Materials Engineering Research School of Physical Sciences and Engineering	Australian National University
Mr	Paul	Schwenn	Physics	University of Queensland
Ms	Lisa	Stadtmueller	Electron Microscope Unit/Nano	University of Sydney
Mr	Xiaoda	Xu	Institute for Nanoscale Technology	University of Technology Sydney
Mr	Jingxian	Yu	School of Chemistry	Flinders University

The following ECR's and PhD Students were sponsored to attend the ECR/Post Graduate Symposium in Brisbane in December 2005.

Early Career Researchers

TITLE	FIRST NAME	SURNAME	INSTITUTION	TITLE OF PAPER
Dr	Aaron	Dodd	University of Western Australia	Modifying the Photocatalytic Activity of Nanoparticulate Zinc Oxide
Dr	Michael	Gao	Australian National University	Photocurrent Study of InGaAsN Quantum Dot Laser Devices
Dr	Andrew	Harris	University of Sydney	Towards the large scale synthesis of carbon nanomaterials
Dr	Dennis	Palms	University of South Australia	Accessing and interpreting Equilibrium Contact Angles, Contact Angle Hysteresis & Dynamic Contact Angles
Mrs	Saritha	Samudrala	University of New South Wales	Use of atomic force microscope in nanomaterials and nanocomposites
Dr	Ngamta	Thamwattana	University of Wollongong	Oscillating fullerences C60 in Singles-Walled carbon nanotubes
Dr	XiangDong	Yao	James Cook University	Hydrogen storage properties and hydrogenation mechanism of magnesium-based nanocomposites

Students

TITLE	FIRST NAME	SURNAME	INSTITUTION	TITLE OF PAPER
Miss	Duangkamon	Baowan	University of Wollongong	Static wave formation for double walled carbon nanotubes
Mr	Sasha	Boskovic	University of Melbourne	Amino functionalised nanoporous silica: characterisation and stability for biomolecule separation applications
Mr	Suhrawardi	Ilyas	University of New South Wales	Porous silicon based high quality optical devices
Miss	Neerushana	Jehanathan	University of Western Australia	Characherisation of Mechnical Properties of Silicon Nitride thin films for mems applications.
Ms	Dakrong	Pissuwan	University of Technology, Sydney	Gold-antibody conjugates for therapeutic applications
Ms	Kallista	Sears	Australian National University	Growth of InAs/GaAs Quantum Dots and Diode Lasers by Metal-Organic Chemical Vapour Deposition
Mr	Wai man	Tam	University of New South Wales	Nano-clay and alumina in epoxy resin
Mr	Anbusathaiah	Varatharajan	University of New South Wales	Nanoscale Characterisation and Study of Domain Dynamics in Ferroelectric Materials Using Scanning Probe Microscopy.
Ms	Fang	Xie	Macquarie University	A Simple Method to Prepare Homogeneous Silver Nanoparticles on Glass Substrate and their Application for Fluorescence Enhancement

WORKSHOPS, CONFERENCES AND EVENTS

The purpose of the workshop is to take stock of the status of the field nationally and internationally, identify emerging areas of research and exchange information and to identify opportunities for collaboration and training.

Australian Nanoindentation Workshop

21/03/2005 - 23/03/2003 – Kioloa

The aim of this workshop, organized by Dr Jodie Bradby, was to bring together researchers interested in both the application and development of methods for characterizing nanoscale mechanical and tribological properties of materials from across Australia for the first time. There was a strong focus on engaging researchers new to the field of nanoindentation, particularly graduate students and early Career Reseachers. ARNAM also supported this workshop.

There were 60 attendees taking part in the workshop from Australia and overseas. A large numbers of young researchers attended and gave presentations. Given the success of this workshop plans are now underway to make this a regular event every 2 years.

Two student awards were presented to **Ms Lisa Stadtmueller** from The University of Sydney **and Ms Bianca Haberl** from the Australian National University.

Attendees

Lisa (left) and Bianca (right) with Seth Downes from Hysitron. Both were awarded $150 and a framed certificate compliments of Hysitron.

Workshop on Quantum Materials

01/06/2005 – 04/06/2005 – Heron Island

This workshop was organized by Prof. Ross McKenzie from the Department of Physics from the University of Queensland.

This Workshop was a link for physicists, chemists and molecular biophysicists from leading Australian and international Universities and institutions in an ambitious, interdisciplinary endeavor. Its aim was to create an effective quorum of Australia's best theoreticians and experimentalists from the fields of quantum many-body and condensed matter physics, materials chemistry and physics, computational chemistry and molecular biophysics.

International Speakers:

Professor James Brooks
Florida State University
Dr Mark Pederson
US Naval Research Laboratory
Professor Gabriel Kotliar
Rutgers University
Dr Paul Burn
University of Oxford

Australian Speakers:

Dr Adam Micolich
The University of New South Wales
Dr Ben Powell
The University of Queensland
Dr Paul Meredith
The University of Queensland
Dr Chris Ling
The University of Sydney
Dr Jeffrey Reimers
The University of Sydney
Professor Michelle Simmons
The University of New South Wales
Professor Sean Smith
The University of Queensland
Dr John Dobson
Griffith University
Dr John Dobson
Griffith University
Dr Andrew Martin
The University of Melbourne

International Workshop on Nanotechnology

17/07/2005 – 20/07/2005 – Perth

Following is part of the report by Prof Terri Ann White

In recognition of the growing importance of nanotechnology—a term that embraces a wide spectrum of technological endeavours—in the scientific and technological arenas, the Institute and the Materials Science and Engineering Discipline Group organised an international workshop in July 2005. This workshop was given the full support of the ARC Network and brought together national and international experts in the field. The endeavour of nanotechnology encompasses multiple efforts across a range of scientific and technological disciplines, such as Chemistry and Physics, Engineering, and Biological and Biomedical sciences. In order to make significant progress in this field there is a strong need to foster work across traditional academic and institutional boundaries. The specific aim of the workshop was to provide attendees with a detailed understanding and know-how of a variety of aspects of nanotechnology, thus establishing and invigorating synergistic interactions between different research groups in WA and to establish and to enhance collaboration with high calibre national and international researchers. The workshop was conducted on four different levels in order to maximise the benefits to the WA community. The first level consisted of multi-session tutorials presented by invited international and national researchers, which covered background, basic sciences and key technological developments, followed by leading edge research level seminars from both Australia and overseas. Finally, a poster session provided an opportunity for postgraduate students and local researchers to present their work and access both valuable experience and feedback from some of the leading experts in their research areas.

The workshop was cross-disciplinary with single sessions enabling all participants to receive new and updated information and knowledge from disciplines other than those they work within. Attendance was good, and the formal and informal discussions robust.

Number of full registrants - 162 (inclusive of speakers)
Number of students registered - 32
Number of keynote speakers--USA (6), Europe(4), Asia (1), New Zealand (1), South Africa (1), Australia (14)
Number of posters at the two poster sessions - 34

Public Lecture
Exploring the Nanoworld
Professor David Cockayne FRS, Department of Materials, University of Oxford

Our sponsors included
The Australian Research Council Nanotechnology Network (ARCNN)
Institute of Advanced Studies, UWA
School of Physics, UWA
Edith Cowan University
Advanced Nanotechnology Ltd
School of Mechanical Engineering, UWA
Curtin University
Nanostructural Analysis Network Organisation Major National Research Facility

XXII International Conference on Photochemistry

24/07/2005 – 29/07/2005 – Cairns

The applicant for this ARCNN funding was Dr Trevor Smith from the School of Chemistry, University of Melbourne. This was the first time this biennial conference has been held in the southern Hemisphere. Photochemical science is highly interdisciplinary and plays an integral role in the understanding and advancement of nanotechnology. This conference was of importance to researchers involved in using light to initiate and study chemical, physical and biological processes on the nano-scale.

Conference Details:

The conference was attended by a total of 209 registrants from 22 countries including 34 attendees from Australia. Japan was the highest represented country with 87 attendees. The scientific programme of two parallel sessions covered a range of topics.

In addition to the four plenary lectures by Professors Johan Hofkens (Katholike University, Leuven, Belgium), James T. Hynes (University of Colorado at Boulder & Ecole Normale Supérieure, Paris, David Millar (Scripps Institute, USA) and Hiroshi Masuhara (Osaka University, Japan), 28 invited, 60 other oral presentations and 74 poster contributions were presented.

The conference secured an impressive selection of some of the world's eminent scientists from a range of fields, but of particular interest to members of the ARCNN, were those representing the photochemistry of nanomaterials. A strong emphasis of the conference was on the detection and spectroscopy of single molecules and nanoparticles. This was supported by presentations involving developments in ultrafast laser phenomena, high spatial resolution and small time & space spectroscopic and microscopy methods being applied to nanomaterials.

Amongst others attending and working in these fields, the following people working in various areas of relevance to nanotechnology as a whole gave invited contributions:
Prashant Kamat (University of Notre Dame, USA) ,Greg Scholes (Toronto, Canada)
Frans De Schryver (KUL, Belgium),John Grey (representing Paul Barbara, Texas, USA)
Marcus Sauer (U. of Bielefeld, Germany)
The plenary lectures of Hofkens, Millar and Masuhara were all directly related to aspects of nanotechnology, with Masuhara's lecture, entitled "Laser Nano Chemistry: From Spectroscopy to Manipulation" being of particular relevance.
A one day workshop on "Ultrasensitive Fluorescence Detection" was also held at the University of Melbourne as a satellite meeting to ICP2005 before the conference. As such, this event was fully attended, largely by (local) students, many of whom could not attend the actual ICP.

A major goal of the organisers of ICP2005 was to encourage and enable a large attendance of students and early career researchers. Considering the substantial costs involved in students travelling to Cairns from all corners of the globe, the organisers were pleased to be able to provide a substantial subsidisation of the registration costs of the conference for students, largely made possible by the $4,000 support provided by the ARCNN. The student registration fee of $475 (early bird, or $600), which included the social program, corresponded to a subsidy of $220 (or $395) per student. This resulted in 40 of the attendees being students from various countries.

Workshop on Positron Applications - from Atoms to Materials to Cells

9/11/2005 to 11/11/2005 – The Shine Dome Canberra

This workshop was organized by Dr. Anita J Hill from CSIRO

Copy of Report from Dr Anita Hill

Summary of outcomes from the activity, relative to the objectives of the activity:

The main objective of the Workshop "Antimatter Matters" was to bring together a diverse group of Scientists and Engineers from around Australia and internationally, who were involved in research with positrons. The program consisted of presentations, posters and discussions on the use of positrons in science, technology and medicine. With a new positron beam soon to become available in Australia, it was an opportune time to seek common areas of interest that offer potential for new research activities. The major outcomes from the workshop include:

- New interactions between participants.
- Greater interaction between already collaborating participants.
- Greater appreciation of the role positrons play in the characterisation of materials at the nano-metre level.
- An understanding of the beam technology being developed in Australia for the production of positron beams and their use in fundamental and applied sciences.
- Beneficial connections with equipment manufacturers and users of positron beams.

The Workshop attracted approximately 60 delegates with approximately 30% being either students or early career researchers. Ten students and early career researchers were directly involved in nanotechnology research, and these were funded at a level of $500 each from the ARCNN to help cover travel and accommodation costs.

The research goals of the young Australian participants funded by the ARCNN cover a broad range of topics that span from the fundamental aspects of positron interactions with condensed matter through to the use of positrons to characterise the properties of materials at the nanometer-scale. The students and early career researchers gave oral and poster presentations on their work and had ample time to network with leading nanotechnologists, including two ARC Federation Fellows, Prof Calum Drummond and Prof Frank Caruso, who presented and discussed their views on nanotechnology and advanced materials development, characterisation, and utilisation.

A large number of disciplines were represented including Physics, Chemistry, Engineering, Materials Science, Polymer Science, Corrosion Science, Soft Matter, Radio-Pharmaceutical Science, Bio-Medical Science and Health Science. This wide variety of diverse backgrounds meant that there were many individuals who had never met previously, such that every participant had their network of scientific colleagues substantially expanded as a result of the Workshop.

8th Japan-Australian Colloid and Interface Gakkai

27/11/2005 - 30/11/2005 – Terrigal, NSW

ARCNN funded $5000 for this Gakkai and the applicant was Dr Vince Craig from the Department of Applied Maths at the Australian National University.

第八回 日本 - オーストラリアコロイド界面学会

8th Japan-Australia Colloid and Interface Science Gakkai

This meeting brought together leading researchers in the field of Colloid and Interface Science from Japan and Australia.

The support of the ARCNN was used to support the attendance of early career researchers.
A total of 12 (7 Australian, 3 Japanese and 2 British) Early Career Researchers received assistance.

They were;
Dr Meifan Zhou of the University of Melbourne,
Dr Catherine Whitby of the University of Sydney,
Dr Shannon Notley of the Australian National University,
Dr Nobuo Maeda of the Australian National University,
Dr Paul Fitzgerald of the University of Newcastle,
Dr Rob Atkin of the University of Sydney,
Mr Shaun Howard of the Australian National University,
Dr Hiroshi Sakuma of Tohoku University,
Dr Taku Iiyama of Shinshu University,
Dr Tomo Hayashi of Tokyo Institute of Technology,
Dr Syuji Fujii of Sheffield and Dr Kenichi Sakai of Leeds University.

A total of 70 delegates attended the meeting

Five supported researchers gave Keynote presentations at the conference.

In addition the conference devoted most of Tuesday to a session on Nanoparticles and Nanomaterials which included a presentation by Federation Fellow A/Prof Paul Mulvaney, of the University of Melbourne. Topics covered included, Synthesis and properties of nanoparticles, Fabrication of layered nanostructures and fabrication of nanoline patterns.

BioNano: The Next Frontier Conference

04/12/2005 – 07/12/2005 – Brisbane

Following is a copy of the report sent to ARCNN by the organisers of this Conference:

The BioNano: The Next Frontier 2005 Sir Mark Oliphant Conference was held at the Queensland Bioscience Precinct, University of Queensland, Brisbane from 4-7 December 2005. The conference was hosted by the Australian Institute for Bioengineering and Nanotechnology (AIBN) and brought together world leaders working at the interface between bioengineering and nanotechnology to discuss current and future research and industrial developments in these areas.

There were 218 conference participants comprising 189 Australian and 29 international participants. Countries represented in the delegation included: China, France, Republic of Korea, Singapore, Taiwan, Thailand, United Kingdom, USA.
One of the core objectives of the conference was to highlight the work of outstanding young researchers who are making significant contributions to nanotechnology and bioengineering. These young researchers were invited to make poster and oral presentations at the conference. Sponsored poster prizes were awarded to outstanding young researchers.

Sponsorship provided by the ARC Nanotechnology Network provided for 20 student registrations and 4 student poster cash prizes (valued at $800 each)

The BioNano Conference Management Committee appointed the following individuals to the Poster Selection Committee: Professor Matt Trau (Chair), University of Queensland, A/Professor Justin Cooper-White, University of Queensland, Dr Michael Whittaker, University of Queensland, Mr. David Hughes, New Horizon Biotech, Professor Harvey Blanch, University of California, Berkeley.

In total 44 poster applications were received. 35 applicants were selected to present their work at the conference with 20 of these applicants receiving full financial support for their conference registration and a further 15 applicants receiving a discounted rate to attend the conference. At the conclusion of the conference, 8 Cash prizes were awarded to the best posters.

The cash prizes were awarded to:

- Dr Mikel Duke, ARC Centre for Functional Nanomaterials, Effectiveness of Inorganic membranes for lactic acid dehydration
- Dr Annette Dexter, AIBN, University of Queensland. Reversible Switching of a Designed Peptide Film at Fluid-Fluid Interfaces
- Carrie Newbold, CRC for Cochlear Implant and Hearing Aid Innovation, Advances in Electrode Development: An in vitro model fo the electrode-tissue interface.
- Dr Simon Moulton, ARC Centre for Nanostructured Biomaterials, Controlled Release of Neurotrophins from inherently conducting polymers: The importance of nanostructured morphology.
- Dr Katherine Dean, CSIRO Manufacturing and Infrastructure Technology, Nanoparticle design and processing of biodegradable starch and protein nanocomposites by melt extrusion.
- Sue Ann Lim, University of Queensland. The effect of scaffold morphology on enhancing cell growth.
- Darren Wong, CSIRO Livestock Industries, Things that go boing: Insect rubber from drosophila and flea
- Dominic Glover, Monash University, Engineered modular protein-DNA carriers as viral-mimics for efficient and specific gene delivery.

As part of the sponsorship entitlements the ARC Nanotechnology Network was also provided with a promotional spot in the conference program. Professor Chennupati Jagadish, Network Convenor, was allocated a speaking slot from 9-9.15am on Wednesday, 7 December 2005. He spoke about ARCNN activities and funding opportunities.
The Conference Host, the AIBN, and the Organizing Committee are grateful for the financial support of the ARC Nanotechnology Network which made the poster competition possible.

Special Lecture - Professor Robert Mackay

16/12/2005 – Link Seminar Room, Oliphant Building, ANU
(In collaboration with COSNET)

Biomolecular machines are complex open systems par excellence. Many of them turn the free energy of hydrolysis of ATP into useful functions, like shortening muscle, advancing a transcription bubble along DNA, and pumping ions across membranes. Yet how can free energy decreases get turned into anything useful in an unconscious thermal bath of biomolecules? It is proposed that a significant contribution to the power stroke of myosin and some conformation changes in other biomolecules is the osmotic pressure of a single molecule (e.g. a phosphate ion) expanding a trap. Necessary conditions to achieve this efficiently are given, and the elements of a mathematical justification. It is proposed as a design principle for nanobiotechnology.

WEBSITE

The ARCNN Website is a very popular website as it constantly attracts more than a 200 hits per day and it is believed that a significant amount of these are from Australia, and there is also interest from a number of other countries.
The ARCNN Website contains among other things:

- the lists of members and Research Groups affiliated with the network,
- online applications for members
- Online applications for grants

The website is continually being maintained and updated and there are links to various sites including various surveys, other networks and related activities.
A list of ARCNN members is in Attachment D

NEWSLETTER

A newsletter which is sent to all members is another means of communication that ARCNN uses as an information management tool. The newsletter is sent out every two months and details of events held in the field on Nanotechnology in Australia.
Newsflashes are released in between newsletters to make members aware of events with a short deadline.
A copy of 2nd Edition of the ARCNN Newsletter is in Appendix E

This newsletter is not only sent to all members but also to the Friends of the ARCNN.
A list of Friends is in Appendix F.

PLANNED 2006 ACTIVITIES

ARCNN plans to continue funding Workshops, Conferences, Forums, encouraging and supporting participants in getting together and networking for the growth in the research of Nanotechnology in Australia.
To encourage collaborations among its members the Following Events are planned:

Following the success of the 2005 distinguished visitor program which ARCNN is in the process of organizing its next tour by:

- **Professor Richard Kaner from the University of California, Los Angeles (UCLA).**
  His current research focuses on novel synthetic routes to new materials including nanowires and nanofibres.Professor Kaner is an internationally recognised chemist whose current research focuses on novel synthetic routes to new materials including nanowires and nanofibres. Some of his topics of interest are: Synthesis and applications of conducting polymers; Rapid synthethis of refractory inorganic materials; Plastics can conduct electricity; Carbon: from diamonds to fullerenes. This Tour is scheduled for *20/02/2006 – 28/02/2006* – Sydney, Canberra, Melbourne, Hobart and Brisbane

Other Distinguished Lecturer tours are being planned for later on in 2006.
The following Distinguished Lecturers are among these:

- **Professor Henry I. Smith from Massachusetts Institute of Technology –USA**
- **Professor Sir Michael Pepper FRS from Cambridge University – UK**
- **Professor Heinrich Hoffman, Ecole Polytechnique Federal de Lausanne -Switzerland**

The management committee has been heavily involved in preparing for the

- **International Conference on Nanoscience and Nanotechnology**
  03/07/2006 – 07/07/2006 – **Brisbane**

This is expected to be the 'Premiere' Nanotechnology Conference in the country which will showcase Nanoscience and Nanotechnology research.

- **Overseas Travel Fellowships**

Funding guidelines are being finalized for the Overseas Travel Fellowships valued at up to $5,000 each that will be offered every 6 months starting from February 2006.

- **Young Science Ambassadors Awards**

ARCNN is also in the process of writing up the eligibility and selection criteria, conditions and funding guidelines for the Young Science Ambassadors Awards which will be offered in 2006.

- **Nova Topic on Nanotechnology**

In April 2005, the ARCNN MC voted to sponsor a NOVA nanotechnology topic on the Academy of Science website. www.science.org.au/nova.The Academy of Science has advised that the proposed nanotechnology topic is due to go online sometime in March 2006.

Sponsorships for the Following Events:

- **Frontiers in Quantum NanoScience: a Sir Mark Oliphant Conference**
  22/01/2006 – 26/01/2006 – **Noosa**
- **National Symposium on Electromaterials Science – The Role and Impact of Nanostructure** *16/02/2006 – 17/02/2006* – **Wollongong**
- **Asia Pacific Conference on Plasma Science and Technology**
  2/07/2006 – 5/07/2006 **– Cairns**
- **International Workshop on Advances in Nanocomposites**
  14/07/2006 **– Sydney**

FINANCIAL STATEMENT

ARC Research Network name:

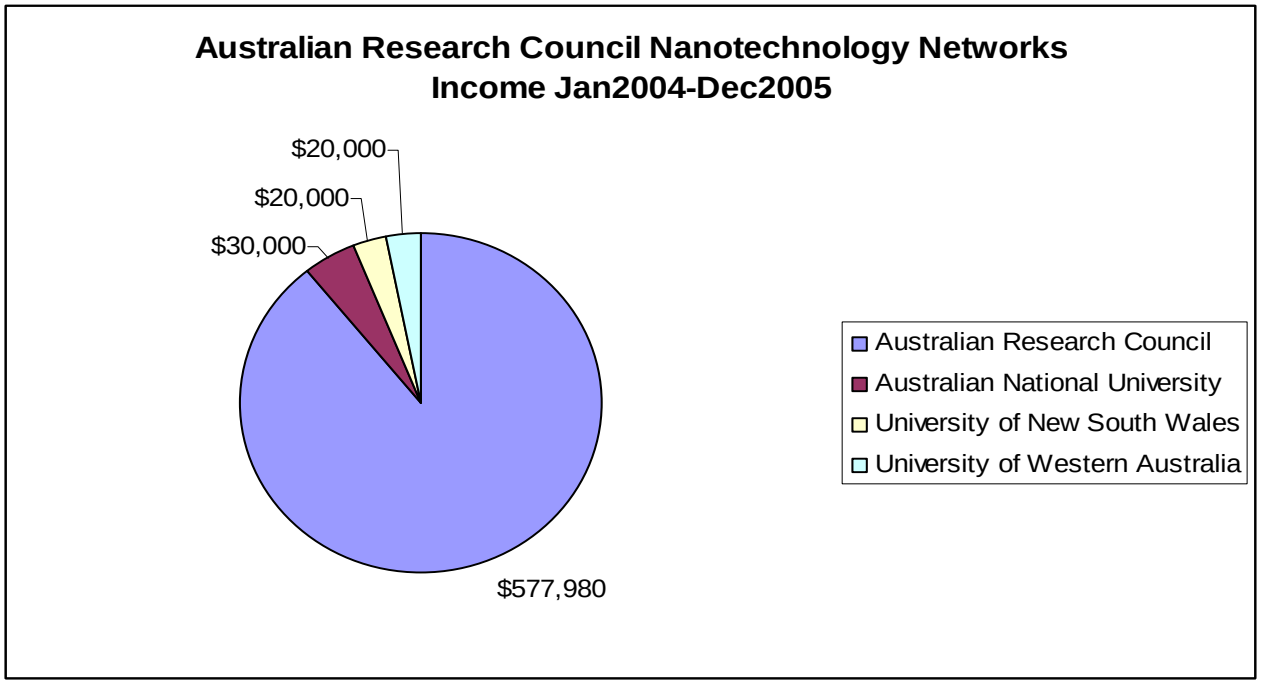
Australian Research Council Nanotechnology Network

Administering Organisation:

Australian National University –Research School of Physical Sciences and Engineering

Sources of Funding:

	CASH	IN KIND
• ARC Network Grant	**$577980**	
• Contributing Organisations (cash and in-kind)	**$ 70000**	**$161780**
TOTAL:	**$647980**	**$161780**



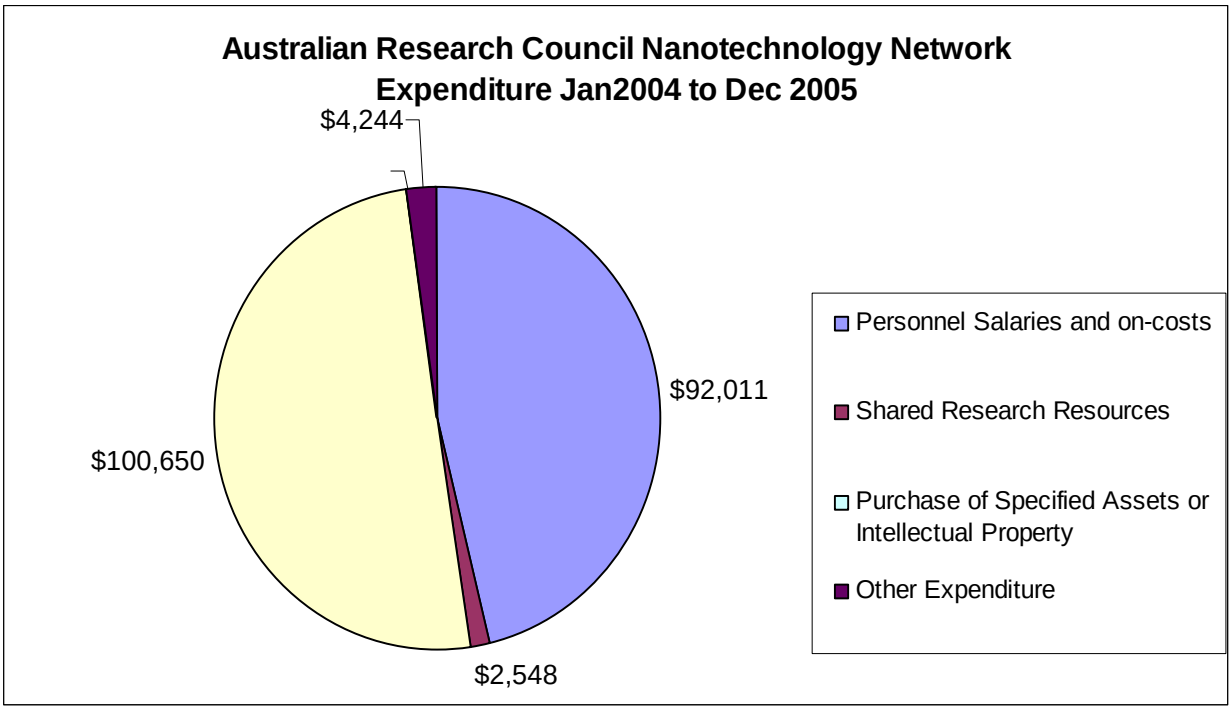
Notes on In Kind Contributions from contribution organizations:

***The in kind and cash contributions from the institutions has been maintained as indicated on the application despite reduced funding received from ARC.**

Expenditure of the ARC Research Network Grant Funds:

(Please report on the expenditure on the items as stated in the Approved Proposal for the Research Network)

❖ **Personnel Salaries and on-costs, such as:** • The Network Convenor • Research Associates, professional officers, technicians, laboratory attendants, administrators, organisers • Specialist professional staff located within major facilities and other appropriate settings	**$92010.64**
❖ **Shared Research Resources, such as:** • Social Surveys • Software tools • Databases	**$ 2548.44**
❖ **Bringing People Together, such as:** • Workshops • Meetings • Seminars • Conferences • Planning, co-ordination activities • Travel • Accommodation	**$100650.40**
❖ **Purchase of specific Assets or Intellectual Property**	
❖ **Other expenditure:** Any other expenditure not falling under the specified expenditure headings above.	**$ 4243.74**
TOTAL EXPENDITURE	**$199453.22**
Carryover amount:	**$448526.78**



Provide the reason for carryover in the column below:

It is essential that reasons be provided by carryover requests

The network started operating in the 2nd of January 2005 and the initial setting up of the network programs led to less expenditure than planned.
The feedback on this network is excellent and many activities are planned including a major International Conference on Nanoscience and Nanotechnology (www.ausnano.net/iconn2006) to be held in Brisbane during July 3-7, 2006. This has only been possible due to the Network funding and the Network Management has planned many activities for 2006.

It is the responsibility of the Research Network to ensure that the carryover amount requested in this document is the same as that which is forwarded electronically to the ARC by their Institution's Administration in a separate End of Year Report.

Research Network Convenor or Delegate:

Signature: _____

Date: _____

Postgraduate Symposium On Nanotechnology

PROGRAM

21 – 22 July 2005

Seminar Room 1
University Club

The University of Western Australia
Perth, Western Australia

Symposium Chair
Dr Adam Micolich
University of New South Wales

Thursday, 21 July 2005

Day One

TIME	*Speaker*	*Topic*
8:30		**Registration**
9:00	Dr Adam Micolich	Welcome
9:10	Professor David Joy University of Tennessee Knoxville	Invited Speaker: Research Careers
	Semiconductors	
9:40	Matthew Lay	Kelvin-probe force microscopy study of ion implantation damage in thermal oxide thin films on silicon
10:00	Satyanarayan Barik	Self-assembled InAs/InP (100) quantum dots emitting in the 1.55 μm wavelength range grown by metalorganic chemical vapor deposition
10:20	Sudha Mokkapati	Simultaneous growth of InAs quantum wells and quantum dots using selective area MOCVD
10:40	David Olivier	Phase transformations in Ge under medium load nanoindentation
	11:00	*Morning Tea*

	Thin Films/Surfaces	
11:30	Thiru Meenakshisundaram	Nanoindentation of thin films – A study of substrate influences on the nanomechanical properties of thin films
11:50	Alexandru Fechete	Application of Nanostructured in O_x Thin Films on Layered SAW Devices for Gas Sensing
12:10	Qi Li	Naoporous Polymer Thin Films via Polyelectrolyte Templating
12:30	Barry Halstead	Surface Modification of Reinforcing Materials for Improved Strength in Modern Composites
	12:50	***Lunch***
	Nanoparticles	
1:50	Ann Gooding	Photo-brightening and Surface Passivation of CdSe Nanocrystals
2:10	Paul Schwenn	Lead sulfide nanocrystals for high efficiency organice photovoltaics
2:30	Xiaoda Xu	Optical properties of gold nanorod coatings on glass
2:50	Xuan Le Thi	Synthesis, characterization and optimization of nanopolymeric particles in the treatement of inflammatory related eye disease
	3:10	***Afternoon Tea***
	Nanobiotechnology	
3:40	Jingxian Yu	Characterisation of Cut Single-walled Carbon Nanotubes and their Functionalisation for Controlled Attachment
4:00	Christina Cortez	Biofunctionalization of Core/Shell Particles for Cell Targetting
4:20	Yit-Lung Khung	Generation of Cell Growth Discriminating Patterns by Direct Laser Writing on Porous Silicon
4:40	Peter Livingstone	Characterization of DNA nano-Aggregates using AFM
	5:00	***Talks end for the day***
	5:30	***BBQ-The University Club***

Friday, 22 July 2005

Day Two

TIME	*Speaker*	*Topic*
9:00	Dr Adam Micolich	Welcome
	Theory	
9:10	Rainer Hoft	Electron Tunneling in the Presence of Absorbed Molecules
9:30	Gagendran Kandasamy	Theoretical characterisastion of gate operations in the Kane quantum computer
9:50	Filip Welna	Transport dynamics of Fermi wave packet via surface acoustic wave
	10:10	***Morning Tea***
	Materials	
10:40	Yonggang Jin	Preparation and Characterization of Proton Conductive Phosphosilicate gels
11:00	Li Li	Catalytic ammonia decomposition: Co_x-free hydrogen production for fuel cell applications
11:20	Lisa Stadtmueller	Polymer-Clay Nanocomposites: New Analysis Techniques
	11:40	***Close***

Australian Research Council
Nanotechnology Network

ECR/Postgraduate Student Symposium on Nanotechnology

PROGRAM

Auditorium
Queensland Bioscience Precinct
University of Queensland
Brisbane, Queensland

8 – 9 December 2005

Symposium Chairs

Dr Adam Micolich
University of New South Wales

Ms Fang Zie
Macquarie University

Australian Government
Australian Research Council

Thursday, 8 December 2005
Day One

TIME	Speaker	Topic
8:30		***Registration***
9:00	Dr Adam Micolich	*Welcome/Introduction*
		Nanoparticles
9:10	Dr Aaron Dodd	Modifying the Photocatalytic Activity of Nanoparticulate Zinc Oxide
9:35	Dr XiangDong Yao	Hydrogen Storage Properties and Hydrogenation Mechanism of Magnesium-Based Nanocomposites
10:00	Ms Fang Xie	A Simple Method to Prepare Homogeneous Silver Nanoparticles on Glass Substrate and their Application for Fluorescence Enhancement
10:25	*Morning Tea*	
		NanoBio/Porous Si
10:55	Mr Sasha Boskovic	Amino Functionalised Nanoporous Silica: Characterisation and Stability for Biomolecule Separation Applications
11:20	Ms Dakrong Pissuwan	Gold-Antibody Conjugates for Therapeutic Applications
11:45	Mr Suhrawardi Ilyas	Porous Silicon Based High Quality Optical Devices
12:10	*Lunch 1 hr*	
		Semiconductors
1:10	Ms Kallista Sears	Growth of InAs/GaAs Quantum Dots and Diode Lasers by Metal-Organic Chemical Vapour Deposition
1:35	Dr Michael Gao	Photocurrent Study of InGaAsN Quantum Dot Laser Devices
2:00	**UQ Lab Tour**	
3:00	*Afternoon Tea*	
		Carbon
3:30	Dr Andrew Harris	Towards the Large Scale Synthesis of Carbon Nanomaterials
3:55	Dr Ngamta Thamwattana	Oscillating Fullerenes C_{60} in Single-Walled Carbon Nanotubes
4:20	Miss Duangkamon Baowan	Static Wave Formation For Double Walled Carbon Nanotubes
		Un Grouped
4:45	Dr David Bakewell	Dielectrophoresis of Colloids and DNA: Time and frequency dependent collections on Microelectrodes
	Talks end for day	
5:00	Drinks and BBQ	*Queensland Bioscience Precinct*

Friday, 9 December 2005
Day Two

TIME	Speaker	Topic
9:00	Dr Adam Micolich	*Welcome/Introduction*
		Un Grouped
9:10	Dr Dennis Palms	Accessing and Interpreting Equilibrium Contact Angles, Contact Angle Hysteresis & Dynamic Contact Angles
9:35	Miss Neerushana Jehanathan	Characterisation of Mechanical Properties of Silicon Nitride Thin Films for Mems Applications
10:00	*Morning Tea*	
		Materials
10:30	Mrs Saritha Samudrala	Use of Atomic Force Microscope in Nanomaterials and Nanocomposites
10:55	Mr Wai Man Tam	Nano-Clay and Alumina in Epoxy Resin
11:20	Mr Anbusathaiah Varatharajan	Nanoscale Characterisation and Study of Domain Dynamics inFerroelectric Materials Using Scanning Probe Microscopy
11:45	*Close*	

Attachment C - Workshop on Positron Application Participants

Participants <u>funded by ARCNN</u> and their affiliations:

Participant	*Affiliation*	*Country*	*Position*	*Nanotech Area*
Josefina Adehbar	Monash University	Australia	postdoc	Materials
Cuong Nguyen	CSIRO	Australia	ECR	Materials
Fiona Scholes	CSIRO	Australia	ECR	Materials
Steven Pas	Monash University and CSIRO	Australia	postdoc	Materials
Terry Kratzer	RMIT	Australia	postgrad	Materials
Rick Morgans	CSIRO	Australia	postdoc	Materials
Youssof Shekibi	Monash University	Australia	postgrad	Materials
Daniel Ho	Monash University	Australia	postgrad	Materials
Katya Izgorodina	Monash University	Australia	postdoc	ComputationalChemistry
Sasha Boskovic	Melbourne Uni	Australia	postgrad	Materials

Attachment D - ARCNN Members by State

ACT

	Surname	First name	Title	Department	Institution
1	Barik	Satyanarayan	Mr	Research School of Physical Sciences and Engineering,Department of Electronic Materials Engineering	Australian National University
2	Boswell	Rod	Professor	Space Plasma and Plasma Processing group, Research School of Physical Sciences and Engineering,	Australian National University
3	Bradby	Jodie	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
4	Charles	Christine	Dr	Plasma Research Laboratory, Research School of Physical Sciences and Engineering	Australian National University
5	Chen	Ying	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
6	Cifuentes	Marie	Dr	Department of Chemistry, TF	Australian National University
7	Dall (Weijers)	Tessica	Dr	Department of Electronic Material Engineering, Research School of Physical Sciences and Engineering	Australian National University
8	Deenapanray	Sanju	Dr	Department of Electronic Materials Engineering, Research School of physical Sciences and Engineering	Australian National University
9	Elliman	Robert	Professor	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
10	Fraser	Michael	Mr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
11	Fletcher	Neville	Professor	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
12	Fu	Lan	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
13	Gao	Qiang	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
14	Gareso	Paulus	Mr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
15	Glover	Chris	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
16	Humphrey	Mark	Professor	Department of Chemistry	Australian National University

17	Hussain	Zohair	Mr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
18	Johannessen	Bernt	Mr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
19	Kluth	Patrick	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineerring	Australian National University
20	Kluth	Susan	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineerring	Australian National University
21	Luther-Davies	Barry	Professor	Department of Laser Physics Centre, Research School of Physical Sciences and Engineering,	Australian National University
22	Buda	Manuela	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
23	Mokkapati	Sudha	Ms	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering.	Australian National University
24	Petravic	Mladen	Dr	Department of Electronic Materials and Engineering, Research School of physical Sciences and Engineering	Australian National University
25	Ridgway	Mark	Dr	Deaprtment of Electronic Materials Engineering, Research School of Physical Sciences and Engineering,	Australian National University
26	Rode	Andrei	Dr	Department Laser Physics Centre, Research School of Physical Sciences and Engineering,	Australian National University
27	Samoc	Anna	Dr	Department of Laser Physics Centre, Research School of Physical Sciences and Engineering	Australian National University
28	Samoc	Marek	Dr	Department of Laser Physics Centre, Research School of Physical Sciences and Engineering	Australian National University
29	Smith	Nathanael	Mr	Department of Electronic Materials Enegineering, Research School of Physical Sciences and Engineering	Australian National University
30	Stewart	Kallista	Ms	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
31	Tan	Hark Hoe	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
32	Wilkinson	Andrew	Mr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
33	Wong-Leung	Jennifer	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
34	Jagadish	Chennupati	Professor	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University

35	Brett	David	Dr	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
36	Coleman	Victoria	Ms	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
37	Williams	James	Professor	Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering	Australian National University
38	Ruan	Yinlan	Dr	Department of Laser Physics Centre, Research School of Physical Sciences and Engineering	Australian National University
39	Neto	Chiara	Dr	Department of Applied Mathematics, Research School of Physical Sciences and Engineering,	Australian National University
40	Craig	Vince	Dr	Department of Applied Maths, Research School of Physical Sciences and Engineering	Australian National University
41	Howard	Shaun	Mr	Department of Applied Maths, Research School of Physical Sciences and Engineering,	Australian National University
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Victoria

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Overseas Members

	First Name	Surname	Department	Institution	Country
1	Maan	Alkaisi	Department of Electrical and Computer Engineering	University of Canterbury	New Zealand
2	Steve	Johnson	National Isotope Centre	Institute of Geological & Nuclear Sciences	New Zealand
3	John	Kennedy	Rafter Research Centre	Rafter Research Centre	New Zealand
4	Andreas	Markwitz	National Isotope Centre	Institute of Geological & Nuclear Sciences Rafter Laboratory	New Zealand
5	Kai	Starke	Institute of Experimental Physics	Freie Universitaet Berlin	Germany
6	Joachim	Wolter	Faculty of Physics	Eindhoven University of Technology	The Netherlands
7	David	Bakewell	Electronics and Electrical Engineering	University of Glasgow	Scotland
8	Mark Campbell	Barnes	Centre for Microstructure Science and Materials College of Engineering	Seoul National University (SNU)	Korea
9	Richard	Blaikie	Department of Electrical and Computer Engineering	University of Canterbury	New Zealand
10	Pascal	Brault	GREMI UMR6606	CNRS and Universite d'Orleans	France
11	Alison	Downard	Department of Chemistry	University of Canterbury	New Zealand
12	Steven Michael	Durbin	Department of Electrical and Computer Engineering	University of Canterbury	New Zealand
13	Simon	Pleasants	Department of Physics/Department of Information and Image Sciences	Macquarie University/Chiba University	Japan
14	Federico	Rosei	Energie Materiauxet Telecommunications	University of Quebec (Montreal)	Canada
15	Harry	Ruda	Materials Science, and Director of Centre for Nanotechnology	University of Toronto	Canada
16	Rob	Sewell	Physics	Imperial College London	UK
17	Richard	Stern	Centre for Microscopy and Microanalysis	University of Western Australia	USA
18	Simon	Brown	Department of Electrical and Computer Engineering	University of Canterbury	New Zealand
19	Rene	Reichel	Department Physics & Astronomy	University of Canterbury	New Zealand
20	Ahmad	Ayesh	Department of Physics	University of Canterbury	New Zealand

Attachment E - ARCNN News. Edition 2, June 2005

Australian Research Council
Nanotechnology Network

Welcome

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Dear Members,
Welcome to the second edition of the ARCNN News!
I recently represented ARCNN at the Global Nanotechnology Network 2005 Workshop held in Saarbrucken, Germany, 26-27 May. Representatives from various part of the globe met to discuss nanotechnology activities in various countries and to enhance interactions between scientists, particularly with an aim to bridge the nano-divide between developing and developed countries. See www.cc-nanochem.de/gnn2005 and www.globalnanotechnologynetwork.org for further information and outcomes from the conference.
ARCNN provided funding support for the recent Workshop on Quantum Materials held on Heron Island, 1-4 June.
See details below about upcoming ARCNN supported events and activities.
Congratulations to recent Federation Fellowship and Centres of Excellence recipients in the area of nanotechnology. WELL DONE.
I look forward to your involvement in ARCNN, ***C Jagadish, Convenor***

New Look Website

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The ARCNN website has had a makeover, and went live recently. Take a look at www.ausnano.net. Your feedback is welcome.
Please also note that if the formatting of this newsletter has been lost during transmission, you can view ARCNN newsletters (with formatting) at www.ausnan.net/content/newsletters

ARCNN Funding Support

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Funding support is offered for **Events** (Conferences, Workshops, Summer and Winter Schools, and Short courses), **Short** and **Long Term Visits**, and **Travel Grants** to attend ARCNN supported events. The ARCNN's website now has funding guidelines and online application forms available for easy access. Members are encouraged to apply. Go to www.ausnano.net/content/funding_and_sponsorship for details.

First Member Forum

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The first ARCNN Member Forum will be held from 6.00 - 7.00pm on Tuesday 19th July at the University Club, University of Western Australia. This is during the International Workshop on Nanotechnology, 17-20 July. The Forum will include an overview of current ARCNN activities and funding opportunities. The other important aspect of the Forum is the opportunity for you to provide input about what ARCNN can do to to enhance it's focus on supporting Australian ECR's and postgraduate students, and sponsoring Nanotechnology events held in Australia. If you cannot attend on this occasion, then we will be holding future ARCNN Member Forum's in other major centres around Australia to enable as many members as possible to take part and contribute ideas.

Distinguished Lecturer tours

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ARCNN's first two **Distinguished Lecturers** will be giving talks in July 2005, following the International Workshop on Nanotechnology being held in Perth. Prof Klaus Ploog from Paul Drude Institute, Germany will visit Melbourne, Canberra and Sydney. Prof Ploog's area of research is ferromagnetic semiconductors for spintronics applications. Dr Vince Castronova from the National Institute for Occupational Safety and Health, USA will visit Brisbane, Melbourne, Adelaide, Canberra and Sydney. Dr Castranova's area of research is the impact of nanotechnology on OH&S issues. Go to www.ausnano.net/content/dl/ for details.

Postgraduate Symposium on Nanotechnology

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The Postgraduate Symposium on Nanotechnology is being held in Perth on 21 and 22 July 2005, following the International Workshop on Nanotechnology. The aim of this symposium is to provide a forum where postgraduate students working on nanotechnology research can present their work, meet other students and researchers, and interact with other research groups in Australia. The program will consist of 22 postgraduate student talks and an invited talk by Prof David Joy from the University of Tennessee/Oak Ridge National Laboratory. Prof Joy's research interests focus on developing new microscopy techniques for biological and polymer materials. He holds a split appointment with one foot in academia and the other in a government laboratory, following 14 years in industry working for AT&T Bell Labs. He will talk about his experience in these different work environments and the highlights of his research career.

There is no registration fee for attendance at the symposium, however all participants are asked to register for catering purposes using the International Workshop on Nanotechnology registration form at http://www.ias.uwa.edu.au/nano, by 10 July 2005. The section to register for the symposium is on the second page of the registration form. Go to www.ausnano.net/content/symposium for more details about the symposium - the symposium program is due to be posted on the website later this week.

Upcoming ARCNN Supported Events

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International Workshop on Nanotechnology, Perth, 17-20 July 2005. **Please note the Closing Date for REGISTRATIONS is 10 July.** Further info at www.ias.uwa.edu.au/nano.

XXII International Conference on Photochemistry, Cairns, 24-29 July 2005. Further info at www.icp2005.net

LEOS deadline

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Electro-Optics Society Annual Meeting, Sydney, 23-27 October 2005: Abstract (2 pages) Submission Deadline is **22 June 2005**. Please also note that Groups can present an overview of their research activities in poster format at this conference. Go to www.ieee.org/organizations/society/leos/LEOSCONF/LEOS2005/leocom05.htm for details.

Other Nano Events being held in Australia in coming months

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Photonic Crystals: Fundamentals to Devices Workshop, Sydney, 7-8 July 2005. Further info at www.physics.usyd.edu.au/cudos/Workshop/

Materials Australia 2nd Nanotechnology Conference, Melbourne, 26-28 September 2005. Further info at www.mateng.asn.au/Nano2005

BioNano: The Next Frontier, Brisbane, 4-7 December 2005. Further info at www.bionano2005.eventplanners.com.au/

SPIE International Symposium: Microelectronics, MEMS, and Nanotechnology, Brisbane, 11-14 December 2005. Further info at www.spie.org/events/au

Quantum NanoScience, Noosa, 21-26 January 2006. Further info at www.physics.uq.edu.au/people/milburn/qnsresearch/QNSResearch.htm

30th Annual Condensed Matter and Materials Meeting, Wagga Wagga, 7-10 February 2006. Further info at www.ansto.gov.au/ansto/bragg/wagga06

ARCNN Admin Contacts

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Helen McMartin (Network Manager, 02 6125 0693) and Cindy Bradley (Network Administrator, 02 6125 2495) are your admin contacts at ARCNN. Helen and Cindy both work part time, covering the office 5 days a week. Email **arcnn@ausnano.net**. Fax 02 6125 3915.

For further information regarding ARCNN or any events, please contact Helen or Cindy, or go to www.ausnano.net

Attachment F - List of ARCNN Friends

ARCNN Friends as at 31/12/2005

Surname	First Name	Department
Tsoi	Ah Chung	Australian Research Council
Johnson	Alan	Australian Research Council
Tegart	Alistair	Standards Australia
Oldfield	Anthony	ACT Govt
Paterson	Chris	DITR
Atkinson	David	DEH
Gallagher	David	DITR
Willcocks	Deborah	NICNAS
Pianca	Dennis	ACT government
Hall	David	Treasury
Papadakis	Elim	Australian Research Council
Weigold	Erich	Australian Research Council
Keogh	Geoff	ACT Govt
Harvey	Graham	NICNAS
Barber	Greg	Health
Koerbin	Gus	ACT Govt
Ahmet	Halil	work cover Vic Govt
Dyne	Heather	DEST
Morris	Howard	DEWR
Copeland	Ian	Health
Gardner	Ian	Defence
Somina	Irina	ARC
Niall	Jane	IIRD Vic Govt
Thomas	Janet	Defence
Gardiner	Jennifer	DITR
Miles	John	National measurement Institute
Moore	Joslin	DEST
Emslie	Kerry	National measurement Institute
Gale	Kevin	DEH
Hodgman	Laurie	DEH
Davies	Les	Health
Meisel	Linda	DEH
Ribeiro	Luiz	National Health and Medical Research Council
Thomas	Mandy	ARC
Gredley	Matthew	Aus Industry
Lindsay	Megan	Dept of Environment and Heritage
Claessens	Michael	AusIndustry
Faiz	Mohammed	Workcover NSW Govt
Buckley	Nick	ACT government
Mewett	Osman	Bureau of Rural Sciences
Ross	Paul	AusIndustry
Haynes	Peter	DEWR
McInnes	Peter	DEH
Holgate	Robert	ACT Government

Keir	Roland	Defence
Brooke	Shelley	Invest Australian
Utick	Stephen	DEST
Walker	Stephen	ARC
Zaluzny	Stephen	NICNAS
Rothnie	Tony	DEST
Swan	Verity	DEST
Creaser	Wayne	DEWR
Schnaufer	Andrea	UTS
Hicks Devignes	Anne Marie	ANU
Innes	Brian	Advance Nanotechnology
Laing	Chris	University of Melbourne
Denny	Chris	ANU
Ford	D	University of Queensland
Salt	David	ANU
Rathjen	Deborah	Bionomics
Read	Leanna	TGR Bionomics
Rodan	Maruta	Materials Australia
Toifl	Melissa	CSIRO