Australian Research Council

Nanotechnology Network

Annual Report 2009

Australian Research Council
Nanotechnology Network

ANNUAL REPORT 2009

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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.

Funding: ARCNN received funding from the ARC during 2004-2009. An in principle carry forward of funds from the ARC has been requested for continuation of operations. Funding was also received from the ANU in 2009.

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 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 5 in Review

The work in 2009 was focused on enhancing Australia's International linkages and continuing up on funding events related to Nanotechnology around the country. Preparations were also underway for the next International Conference on Nanoscience and Nanotechnology to be held in Sydney in February 2010.

Membership of 1342, participants including 843 post graduate students and Early Career Researchers. More than 256 research groups are participating in the Network.

Over 2,000,000 Website hits

Cash Income of $ 225,267

In Kind Contributions of $ 153,603

Hosted the Nanotechnology Roundtable meeting with the Hon Minister Senator Kim Carr

EC Workshop on Emerging Materials, Processes and Nanotechnology

3 Short Term Visits

1 Long Term Visit

6 Overseas Travel Fellowships

8 Young Nanoscience Ambassador Awards

8 Events Sponsored by ARCNN

Australian Academy of Science Nanotechnology Report Survey

Published the second Edition of the NanoQ (Nano Quest Magazine)

Structure and Management

The Australian Research Council Nanotechnology Network is managed by a Management Committee which met twice during 2009. The first Board meeting for 2009 was held at the Intellligent Polymer Research Institute at the Univeristy of Wollongong on the 27th of February. The second meeting was held at the Faculty of Science at Macquarie University on the 28th of August.

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. The current chair is Professor Erich Weigold.

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. The network Convenor is Professor Chennupati Jagadish.

Working Groups

Committee members form into 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 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.

The Management Committee in 2009 comprised of:

Chairman – Emeritus Professor Erich Weigold – Australian National University

Convenor- Prof Chennupati Jagadish - Australian National University

Events Working Group
Prof. Laurie Faraone –The University of Western Australia
Prof. Paul Mulvaney –The University of Melbourne
Dr Alan Wilson – Defence Science and Technology Organisation
Prof. Peter Majewski –University of South Australia
Prof Michael James –Australian Nuclear Science and Technology Organisation

Visits Working Group
Dr Adam Micolich – University of New South Wales
Prof. Deb Kane – Macquarie University
Prof Gordon Wallace – University of Wollongong
Miss Hannah Joyce – Australian National University

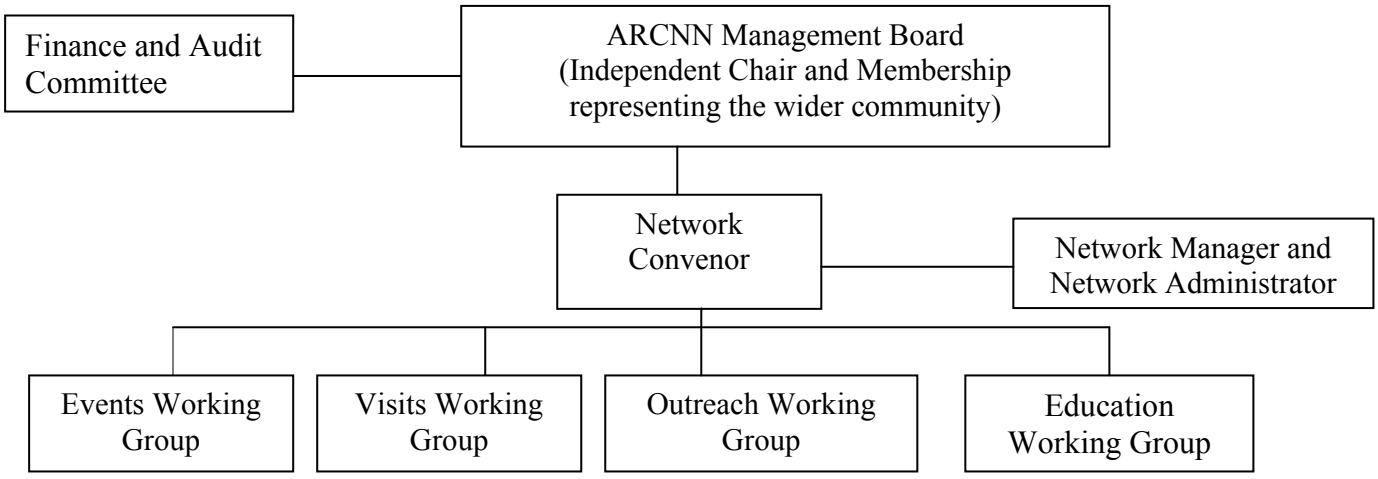
Outreach Working Group
Dr Adam Micolich – University of New South Wales
Prof. Deb Kane – Macquarie University

Education Working Group
Prof. Max Lu – University of Queensland
Dr Terry Turney – formerly Commonwealth Scientific and Industrial Research Organisation

Dr Steve Duvall – Formerly from INTEL
Dr Calum Drummond – Commonwealth Scientific and Industrial Research Organisation
A/Prof Paul Wright – RMIT-University

Ms Liz Micallef – Network Manager

ARCNN Structure



ACTIVITIES UNDERTAKEN BY ARCNN

List of Activities funded / organized by ARCNN

Ministerial Roundtable on Nanotechnology

International Networking

- Emerging Materials, Processes and Nanotechnologies for ICT, Manufacturing, Environment, Energy and Health Applications Workshopin Brussels, Belgium, 12-14th October 2009

Long Term Visits

- Miss Wing Sze Tung (Monash University) – visit to the Centre for Material and Fibre Innovation at Deakin University

Short Term Visits

- Mr. Bernard Mostert (University of Queensland) -visit to the University of New South Wales
- Miss E-Jen Teh (University of Western Australia) – visit to the Australian National University
- Mr Benjamin Meuller (University of Wollongong) – visit to the University of Tasmania

Overseas Travel Fellowships

- Mr Nadim Darwish (UNSW) visit to Hokkaido University, Japan
- Miss Candace Chiu Ping Chan (UniSA) visit to University of Poitiers, France
- Mr Mohammad Choucair ((UNSW) visit to Cambridge University, UK
- Miss Bianca Haberl(ANU) visit to the University of Illinois at Unrbana-Champaign, USA
- Dr Edin Nuhiji (MelbUni) visit to the University of Vigo in Spain
- Mr Michele Giulianini(QUT) visit to the University of Quebec, Canada
- Dr Oleh Klochan (UNSW) visit to Cambridge University, UK
- Dr Yong Wang (Qld Uni) visit to the University of California, Los Angeles, USA

Young Nanotechnology Ambassador Awards

Queensland

- Mr Anthony Musumeci (University of Queensland)

South Australia

- Dr Mahaveer Kurkuri (Ian Wark Research Institute, University of South Australia)

Victoria

- Mr Ashley Stephens (The University of Melbourne)
- Miss Minoo Naebe (Deakin University)
- Mr Muthukumaraswamy Pennirselvam (LaTrobe University)

New South Wales

- Miss Amy Gelmi (University of Wollongong)
- Mr Luke Sweetman– University of Wollongong
- Dr Edith Chow –CSIRO

Workshops and Events Sponsored by ARCNN

- **Researcher and Postgraduate Student Symposium**
  19/02/2009 - 20/02/2009 - ANU, Canberra

- **PECS VIII - The 8th International Photonic & Electromagnetic Crystal Structures Meeting** - 05/04/2009 - 09/04/2009 Sydney

- **Nanophotonics Down Under 2009: Devices and Applications**
  21/06/2009 - Melbourne Convention Centre

- **Hole Burning, Single Molecule & Related Spectroscopies: Science and Applications**
  22/06/2009 - 27/06/2009 - Palm Cove

- **Third Australian Nanoindentation Workshop**
  05/07/2009 - 07/07/2009 - Kioloa

- **MM2009 – Molecular Modelling Meeting – Mantra Legends Hotel, Gold Coast, Queensland -** *26th-29th July 2009.*

- **16th AINSE Conference on Nuclear and Complementary Techniques of Analysis**
  25/11/2009 - 27/11/2009 - Lucas Heights, Sydney

- **Materials and Complexity V11**
  12/12/2009 - 16/12/2009 - Kioloa, ANU Coastal Campus

- **Small Matters: Microscopy and Microanalysis**
  03/12/2008 - 05/12/2008 - The University of Sydney

Published the Second Edition of the NanoQ (Nano Quest Magazine)

Ministerial Roundtable on Nanotechnology - 7th September 2009
Parliament House, Canberra

The Second Ministerial Roundtable on Nanotechnology was held to provide the Hon. Senator Kim Carr, Minister for Innovation, Industry, Science and Research, with first hand knowledge about nanotechnology in Australia and in particular recent developments in the field.

An open discussion by participants representing the research community, industry, union and civil society communities presented a full picture of nanotechnology in Australia today. It highlighted current and possible opportunities and challenges from nanotechnology and identified areas needing particular consideration in the process of developing nanotechnology policy.

Nanotechnology is considered as technology of the future with predicted revenues of multi-trillion dollars in the next 20 years. Australia has a range of activities in the field of Nanotechnology. While many exciting opportunities are envisaged for Nanotechnology, some challenges are emerging in terms of occupational health, safety, environment, regulation and life cycle issues of nanotechnology products. There is a significant interest among the public about nanotechnology and media reports are a daily occurrence in terms of the new developments in the field as well as concerns about the safety of this technology. The Minister for Innovation, Industry, Science and Research receives many requests for meetings with various nanotechnology players and it is important to have a discussion about various issues related to Nanotechnology.

Outcomes
Participants of the Roundtable prior to the arrival of the Minister, extensively discussed various issues. Mr. Peter Chesworth made a presentation about new National Emerging Technologies Strategy.

Based on extensive discussion among participants of the roundtable, following issues have been identified as priority areas.

Discussion followed that prioritised the following issues to brief Minister:

- Categorising and labelling
- Public engagement
- Regulation
- Safety & lifecycle issues
- infrastructure
- Networking and industry bodies
- Access to knowledge and education
- Research
- International linkages
- Social/ethical issues

Categorising and labelling

Nanotechnology need to be categorized based on the level of risk. A suggested starting point could be:

- Class A would be compounds such as free carbon nanotubes with legitimate safety concerns.
- Class B where there are potential risks but systems are in place to deal with them, such as drugs undergoing clinical trials
- Class C products that have been around for long without evidence of harm

It has also been identified that in all cases clear categorisation is not possible and caution should be taken whenever there is less knowledge about the safety of a product/process. Categorization may also leads to labelling which may allow public to make informed decisions about their choices about various products. Labelling of food and personal products should be a priority.

Public engagement and Social/ethical issues

Public engagement has been identified as another critical issue and this engagement should be objective. . Public engagement is a continuous process and public need to be engaged to discuss the developments on a regular basis. An oversight committee for NETS has been suggested with broader participation from various stakeholders. Collaboration among social scientists, ethicist, philosophers, scientists and engineers is essential for the responsible development and balanced reporting of benefits and risks

Regulation

Regulation has been identified as a crucial issue. Regulation need to be clear, flexible and non-prescriptive. Regulation need to be dynamic to adapt to the new knowledge being developed globally in terms of occasional health and safety and environmental impacts of nanotechnology.

Safety & lifecycle issues

More work needs to be done on safety and life-cycle issues of nanotechnology and research need to be supported in these areas. Predictive modelling in these areas may provide an opportunity to predict and re-engineer properties to ensure that the products are safe. International engagement in these areas is critical to ensure that we have up to date knowledge on safety issues.

Infrastructure, Research

Continued development of infrastructure accessible to both industry and research community is essential to benefit from this emerging technology. Funding of staff and operational costs is essential to engage with industry.

Networking and industry bodies

Participants have expressed concerns about closure of ANBF and impending completion of ARC funding for ARCNN. It has been identified that both research and industry networks need to be maintained to enhance interactions in this multidisciplinary field and NETS and other opportunities need to be explored to ensure that both industry and research networks continue to operate.

International linkages

International collaborations and engagement is essential for Australian researchers and industry to benefit from developments worldwide. In particular, some of the technologies developed overseas may benefit Australian industry and Australian technologies may be of interest to international industry. Access to knowledge and cross-sectoral collaboration is important for

Australian manufacturing industry. Participation in international projects has been identified as essential part of international engagement.

In summary, this roundtable was found to be highly valuable to address all critical issues of importance for the development of nanotechnology. The Minister found the roundtable to be very useful in capturing views from various stake-holders. He indicated interest in advancing the labelling and registration of nanomaterials, international linkages (especially in Australian manufacturing industry), establishing NETS advisory body to ensure the continuation of consultations, and maintaining nanotech industry and research networks (possibly through other Govt networks).

Considering that the event gave the opportunity to address critical issues of importance for Nanotechnology, it has been suggested by the Minister that next meeting should be held much earlier than 12 months (preferably in the first part of 2010) to take stock of the developments so that issues of concern could be addressed.

Attendees for the Nanotechnology Roundtable meeting on the 7th Sept. 2009

1	**Senator the Hon Kim Carr, Minister for innovation, industry, science and research**
2	**Mr. Tim Murphy, Adviser to the Sen. Kim Carr**
3	**Professor Chennupati Jagadish, Convenor, Australian Research Council Nanotechnology Network**
4	**Mr Ken Pettifer, Head, Innovation Division , Department of Innovation, Industry, Science and Research**
5	**Associate Professor Paul Wright, Immunotoxicology, RMIT Coordinator, NanoSafe Australia**
6	**Professor Graeme Hodge, Director, Centre for Regulatory Studies, Monash University**
7	**Prof Calum Drummond , Chief of CSIRO Materials Science and Engineering**
8	**Prof John Weckert, Centre for Applied Philosophy and Public Ethics**
9	**Dr Andrew Campitelli, MiniFAB nano fabrication company Melbourne**
10	**Ms Georgia Miller, Nanotechnology Project Coordinator, Friends of the Earth (FoE) Australia**
11	**Mr Jarrod Moran, Australian Council of Trade Unions (ACTU)**
12	**Ms Renata Musolino, Victorian Trades Hall Council**
13	**Dr James Stening, Senior Environmental Engineer, ORICA**
14	**Ms Carla Gerbo , Director and CEO, Australian Nanotechnology Alliance (ANA)**
15	**Dr Leanna Read, Managing Director and CEO, Tissue Growth and Repair (TGR)**
16	**Ms Rosie Hicks, CEO Australian National Fabrication Facility**
17	**Dr Leo Hyde, Research & Development Manager, Dupont**
18	**Mr Thomas Seeger - Brucks Textiles**
19	**Dr Roshini Jayewardene, National Industrial Chemicals Notification and Assessment Scheme**
20	**Dr Howard Morris, SafeWork Australia**

21	**Prof Richard Coleman, Australian Research Council**
22	**Ms Caroline Mills, NHMRC**
23	**Mr. Peter Chesworth, DIISR**
24	**Ms Alison Hemmings, DIISR**
25	**Ms Sari Ruuska, DIISR**
26	**Dr. Craig Cormick, DIISR**
27	**Ms Liz Micallef, ARC Nanotechnology Network**

INTERNATIONAL NETWORKING

INTERNATIONAL NETWORKING

Emerging Materials, Processes and Nanotechnologies for ICT, Manufacturing, Environment, Energy and Health Applications Workshopin Brussels, Belgium, 12-14th October 2009

The **first day** of the workshop focussed on general presentations related to the nanotechnologies, materials and new production technologies (NMP) and emerging and future technologies (FET) Platforms of the current 7th Framework program. As well as detailed presentations on the current call for proposals in these programs, discussions involved practicalities of potential (formal) Australian involvement. There were also presentations from chief investigators of active 7th framework projects that had substantial formal and informal Australian involvement. The focus of these presentations was to identify issues, opportunities and impediments to formal Australian involvement by way of lessons learnt in current collaborative ventures. The presentation by Professors Jamieson(University of Melbourne) and Sanquer (CEA ,France) was particularly illuminating since this project involves formal Australian participation in a Framework project (with funding from the EU to directly support the Australian R&D). Lively discussions followed with strong and compelling reasons why Australian involvement was beneficial to both economies, as indicated in the outcomes below. In addition, there was a presentation by Dan Nagy from intelligent manufacturing network (IMS) highlighting its programs and touching on the potential benefits of formal Australian involvement (Australia was a financial member until a couple of years ago).

Outcomes 1:

i) The European NMP and FET program Directors (including Mary Minch, the Director General of Science and Technology) welcomed formal Australian involvement in 7th Framework programs, stressing that the current informal involvement of Australian researchers had clearly demonstrated the strength of Australian S&T in NMP and FEM areas. They also highlighted the importance to achieving the overall project goals that Australian involvement provided. Benefits for Australia included: the enhancement and acceleration of Australian research programs by opening up resources available within Europe; the opening up of Australian involvement in S&T brainstorming and planning workshops within 7th Framework Platforms; enhanced prospects for mobility of personnel between Europe and Australia (both ways) to enhance Australian science and technology expertise; the ability to more readily translate Australian research outcomes into products by involvement with global industry partners; and the potential for Australian industries to join Framework programs.

ii) A major impediment to full Australian involvement in 7th Framework programs was the lack of a clearly identified funding source to support such involvement. It was clear that formal Australian involvement would require an Australian funding source to fund the Australian R&D component of collaborative 7th Framework programs since it was extremely rare that EU funding could be made available to non-EU groups (and only in cases where the success of the program relied heavily on capabilities not available in any form in Europe).

iii) There was a strong desire from the EU and the IMS that Australia renew its subscription to IMS to enable Australia to propose and be involved in manufacturing network

programs that benefit industry and more specifically Australian industry. The cost of subscription is around 140,000 Swiss Francs per annum.

The **second day** of the workshop involved presentations by R&D teams (Australian and European partners), where collaboration was already strong but at various stages of maturity across the project teams. These projects were chosen for presentation since they involve very high profile Australian teams with similarly very strong European partners that could potentially lead to strong EC-Australian 7th Framework projects in the NMP and FET space. EC Framework managers attended this presentation day and actively participated in the discussions. The day concluded with a discussion of outcomes and the next steps to progress EC-Australian cooperation in terms of the desired outcome of formal Australian involvement in 7th Framework programs.

Outcome 2:

i) The recognition that the collaborations and projects presented were at various stages of maturity raised an interesting issue of how to support and nurture collaborative projects from initial (researcher to researcher) collaborations through to large multi-group collaborations that involve a mix of R&D laboratories and industry that characterises 7th Framework projects. It was clear that the larger scale collaborations that were presented invariably began as small scale and only blossomed into beneficial large scale collaborative efforts when support (funding) was available to nurture both sides of the EC-Australian collaboration. Hence, from the Australian perspective it was important to have an avenue for funding support at all stages to allow collaborations to develop to joint 7th Framework scale. Researcher to researcher collaborations are often supported by research council funding from both sides (the ARC in the Australian case). The next stage most often required separate support at a bilateral level since the goals were now more applied and focussed and unlikely to be supported by research council funds. The ISL program in Australia (matched by institutional support) was formally the main avenue of support at this project scale. When collaborations and projects matured to a level where a 7th Framework collaborative project emerged (with many R&D partners and industries involved), support of the Australian R&D component was most often difficult to secure unless CSIRO, CRCs or other such bodies identified the project as core to their strategic plans. University groups in particular have found the support for very directed industry-relevant 7th Framework programs beyond their means of support. Hence, for EC-Australian collaborative R&D projects to develop into large scale Framework programs, all project stages need nurturing with appropriate support. In the NMP and FET areas, only a small percentage of projects might be expected to develop to Framework status but at this stage it is essential that avenues for funding support are available. Recommendations on possible means of supporting EU-Australian projects at all levels will be made in the follow-up (6th month) report on this workshop.

ii) The Australian and European partners of each of the 10 collaborative projects presented have been asked to summarise their projects in roughly one-page to cover:

- Title of collaborative area
- Very generally, what challenge or problems of global significance does this project address

- Potential partners (both Australian and European) and the particular expertise they bring to the project; why is this collaboration important
- Give (briefly) the nature of existing collaboration (how long, how funded and scale) as well as publications resulting (only numbers over the period of collaboration)
- What is the next step in the collaboration (eg bilateral, ready for Framework application, etc) and what is the scale?
- If known, very briefly give an estimate of the scale and nature of funding (ie travel, exchanges of personnel, significant project costs, etc) that would be necessary for the Australian component of the continued collaboration and what are the possible funding sources
- What potential benefits are there from Australian involvement and what Australian industry involvement is there in the general project area of the Australian collaborator
- Are there any training/exchange opportunities for Australian PhD students and ECRs

These reports will form part of the follow-up report.

iii) The follow-up report will be available by the end of February 2010 and will be written in two parts, one available to the EC S&T NMP and FET Platform Directorates and one for DIISR and the Minister, the latter with specific recommendations relating to the Australian involvement.

The workshop's contribution to ISL Objectives

The workshop program, presentations and outcomes as described above clearly support the ISL objectives as indicated below. In terms of the **first ISL objective**: ('Increase the uptake of leading edge technology by Australian researchers through: promoting access/participation in global research, and increased strategic alliances between Australian and overseas researchers'), the workshop's main goal was to strengthen both Australian participation in and strategic alliances with European researchers through collaboration that leads to active Australian involvement in 7th Framework programs. The presentations on day 2 showcased 10 such collaborations all of which are consistent with this first ISL objective.

In terms of the **second ISL objective**: ('Facilitate Australia's access to the global S&T system by supporting bilateral and multilateral relations with other countries'), again the main goal of the workshop was to stimulate a range of collaborations with Europe beginning at the bilateral level and progressing to large scale multilateral 7th Framework programs.

The contribution to goals of National Research Priorities.

The R&D focus of this workshop was in areas of nanotechnologies, advanced materials, processes and manufacturing technologies, and emerging and future technologies, all of which underpin advancements in manufacturing industries. Thus, the workshop directly supported the priority of **Frontier Technologies** for building and transforming Australian industries by cutting edge (breakthrough) research and innovative technologies. Application of these technologies as outlined in some of the project presentations also supported other national priorities such as **an environmentally sustainable Australia** (eg innovative environmental sensors and photovoltaics), and **promoting and maintaining good health** (eg application of nanoscience to medicine).

List of workshop participants

Australian Participants		European Participants	
Prof Jim Williams Prof Chennupati Jagadish	Australian National University	Prof Maria Grazia Grimaldi	Catania University
		Prof Ian Boyd	Monash University/University College
		Prof Andrej Kuznetsov	Oslo University
Prof Laurie Faraone	University of Western Australia	Dr. Martin Walther	Head of Department Epitaxy and Infrared Devices Fraunhofer-Institut
		Prof Sorin Cristoloveanu	Director of Research CNRS
Prof Max Lu	University of Queensland	Professor Pegie Cool	Department of Chemistry, Antwerp University
Prof Tanya Monro	University of Adelaide	Prof David Richardson	University of Southampton
Prof David Jamieson	University of Melbourne	Prof Marc Sanquer	(CEA-Grenoble)
Dr Calum Drummond	CSIRO	Prof John Seddon	Head of Theoretical and Experimental Physical Chemistry, Imperial College
Prof Michelle Simmons	University of New South Wales	Prof Sven Rogge	Delft University of Technology
Prof Leon Kane-Maguire	University of Wollongong	Dr Robert Byrne	Dublin City University
Prof Rob Lamb	Australian Synchrotron	Prof. Dr. Michael Grunze	Heidelberg University
Prof Andrew Holmes	University of Melbourne	Professor Yves Geert	Universite Libre de Bruxelles
		Dr Fabio Biscarini	CNR Bologna

EC Officials
Herbert von Bose
Mario Campolargo (INFSO)
Mary Minch (Dir D)[1]
Michel Poireau (G1)
Renzo Tomellini (G3)[2]
Jurkyi Suominen (G4)
Pilar Aguar Fernandez (G3)
Roberta Salonna (G2)
Patrice Millet (G2)
Wolfgang Boch (INFSO-F1)
David Guedj (INFSO-F1)
Martine Wauters (G1)

	Montserrat Benavent (G1)
	Almudena Cano Saenz de Magarola
	Pierrick Fillon-Achida (D1) ou remplaçant
	Martyn Chamberlain (GI) Wilhelm Meulenberg (Institut fuer Energieforchung)
EU scientists invited by NMP & FET	
	W. A. Meulenberg
	Dan Nicolau
	Dr. Helen Dutton
	Dan Nagy
	Marc Sanquer
	Jean-Fançois Roch
	Ian Walmsley
	Prof. Claude Fabre
	Fabrizio Illuminati
Australian Industry Delegates	
	Carla Gerbo – Future Materials
	Angela Krepcik – Advanced Manufacturing Australia
	Vanessa Heuser - Australian Nanotechnology Alliance
	Australian Officials
	Michaela Bauer (DFAT)
	Edward Bray (DFAT)

LONG TERM VISITS

LONG TERM VISITS

ARCNN supports the nanotechnology community by making funding support available to **postgraduate students** and **early career researchers** (within 5 years of award of PhD degree) for travel and accommodation expenses associated with Long Term Visits to research Institutions within Australia. Up to $2,000 are provided for a maximum of three months for travel and accommodation to a location(s) within Australia.

Miss Wing Sze Tung (Monash University) – visit to the Centre for Material and Fibre Innovation at Deakin University

Wing Sze is a PhD student and her research interests are, Production of self-cleaning wool fibers, Modification of adhesion ability of titanium dioxide and wool, and Synthesis of visible-light photocatalyst.

Purpose of Visit: The significant aim of this project is to develop self-cleaning keratin fibrous materials with photocatalytic self-purification functions, such as auto-cleaning, anti-odorizing, and antimicrobial. The proposed experiments will help us understand the influence of plasma surface modification on the adhesion ability between keratin and photocatalyst.

First and foremost I would like to express my sincere gratitude to the Australian Research Council Nanotechnology Network (ARCNN) for supporting my long term visit to the Centre for Material and Fibre Innovation (CMFI) at Deakin University. My special thanks also due to Professor Xungai Wang and his research group for their valuable scientific inputs and technical supports. Owing to their consistent assistances, I am able to accomplish my experiments within the predetermined time frame. Last but not least, I extend my appreciations to all the administrative staff of CMFI for their cooperation during my visit.

The main purpose of this visit was to study the effect of plasma treatment on keratin fibrous materials in improving the self-cleaning performance by enhancing the deposition of titanium dioxide onto fiber surface. The plasma-treated fibers and the plasma-treated titanium dioxide coated-fibers were prepared by microwave generated plasma treatment and self-cleaning coating process in Monash University. Evaluation works were conducted in the Centre for Material and Fibre Innovation. The titanium dioxide absorption ability was evaluated using contact angle analyzer, while the titanium dioxide particles deposition was observed by SEM, and their photocatalytic ability was measured by Suntest solar simulator. The absorption ability of keratin fibrous materials greatly improved after the plasma treatment, which only took 33ms for the completion of droplet absorption (Figure 1). The SEM images showed that change of surface morphology after plasma treatment. The scales on the fiber surface were etched and small porous were formed, which explained the reason why the hydrophilicity of the fibers improved. Besides, after plasma treatment, new active sites were introduced on fiber surface and strengthened the bonding with titanium dioxide during self-cleaning coating process. Additionally, photodegradation test (Figure 2) proved that deposition of titanium dioxide increased because the coffee stain removed sufficiently in 3hours, which the sample took 8hours to decompose if no plasma treatment was applied. Obtained results gave a brief understanding about the influence of plasma treatment on surface properties and photocatalytic performance of keratin fibers; however, more research works are needed to gain more insights on the role of plasma treatment in titanium dioxide coating process.

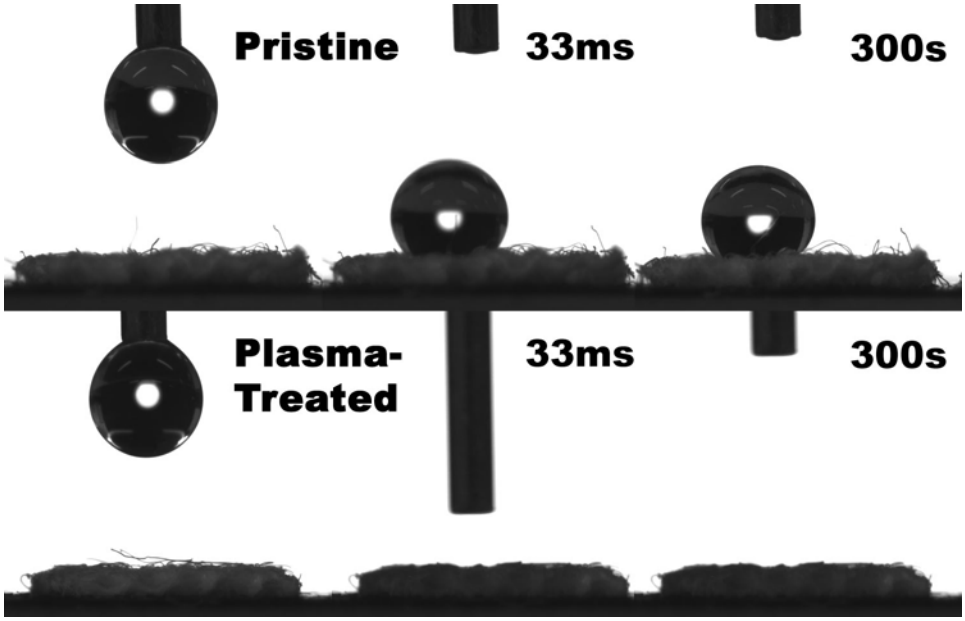


Figure 1. Hydrophilicity of pristine keratin fibers and plasma-treated keratin fibers.

Other Projects: During this visit, experiments were also conducted to investigate the photoactive functions of newly synthesized visible-light-driven photocatalysts. XRD was performed to study the crystallinity of titanium dioxide after non-metal doping with different doping ratio. The XRD spectra demonstrated the existence of anatase phase with high crystallinity at 25.4°, 38.0° and 48.0°. However, no diffraction peaks had been traced for the non-metal, boron. It might be because the amount used for doping was insignificant for the XRD measurement. In addition, photocatalytic performance (decomposition of food stains) was evaluated under exposure to a Suntest solar simulator for 40hours. The results showed that anatase-coated keratin fibrous materials showed discoloration after visible light irradiation, while boron-anatase-coated keratin fibrous materials exhibited better performance after 40hours visible light exposure, particular in lower doping ratio. The above-mentioned results gave a general picture about the performance of boron-doped titanium dioxide, but more experiments are need to be done for further confirmation.

To conclude, under the supervision of scholars who are experts in the relevant field, I obtained more understanding on the surface properties of titanium dioxide-coated keratin fibrous materials through plasma-induced surface modification. I got new ideas on how to analyze and interpret my obtained results with a new prospective from their guidance. This fieldwork I had conducted improves the feasibility of the self-cleaning materials I am studying on.

SHORT TERM VISITS

SHORT TERM VISITS

Funding support is also available to **postgraduate students** and **early career researchers** (within 5 years of award of PhD degree) for travel and accommodation expenses associated with Short Term Visits to research Institutions within Australia. Up to $1,000 is provided for travel and accommodation to a location(s) within Australia.

Mr. Bernard Mostert (University of Queensland) -Visit to the University of New South Wales

Bernard is a PhD student and his research interest is in charge transport properties of disordered organic materials for use in electronic applications such as sensors. At his current project he is focusing on the bimacromolecule eumelanin as a poternital material for humitidy sending applications.

ARCNN provided support for Bernard Mostert from University of Queensland, whose area of research is determining the charge transport properties of eumelanin. He visited the School of Physics at the University of New South Wales to perform a Hall effect measurement on hydrated eumelanin samples.

Copy of report from Bernard Mostert

Bernard Mostert Physics Department University of Queensland ~ Brisbane

ARCNN Short Visit Report

The funding provided by ARCNN was used for travel from University of Queensland (UQ) to the University of New South Wales (UNSW) in Sydney from 19th to 31st January 2009. The money was spent on travel (airfares), accommodation at Kensington Colleges at UNSW and meals.

Summary of Benefits

- The use of Hall effect magnets were very beneficial (see points below), since at my home institute we don't have such equipment.
- We tested eumelanin pellet samples in a Hall effect setup as a function of hydration and found that other groups' previous experimental reports on eumelanin Hall effect are not reproducible. Despite not observing the Hall effect in our samples, because of sample issues leading to an immeasurably small Hall voltage, the measurements we have performed have allowed us to set experimental bounds on the transport mechanisms, which are useful to ongoing theoretical & experimental studies of eumelanin. We hope to publish this work in the near future.
- We have established a new plan of action to obtain a measurable Hall effect signal from redesigned eumelanin samples, where the long RC time constant that plagued these measurements can be reduced.
- Personally, I've learned more about electrical signals in this one trip than I have in the past year.

Due to our samples having a large RC constant, we weren't able to do AC measurement, we therefore decided on doing DC measurements. We could find no discernible Hall signal in the DC setup. These results are at odds with the literature[1], since an apparent Hall signal was obtained using the same sample morphology. Upon investigation we have found the literature highly deficient since there is a total absence of methodology. With a proper methodology, we have shown that Trukhan et al.'s result is irreproducible and most likely incorrect. Although we couldn't observe a Hall voltage with samples similar to Trukhan's, it does a) allow us to set boundaries on the Hall-related charge transport parameters for the system, which we intend to publish, and b) give us insight on how to refine our samples so that we can achieve a measurable Hall signal.

Our results are important, since much of the charge transport literature on eumelanin relies on this singular Hall effect result as a starting point for discussion on positive polaron hopping. Our experiment shows that this assumption is unsubstantiated. Furthermore our results are extremely useful, since it allowed us to improve experimental methodology to determine the sign of the charge carrier. With the knowledge of the charge carrier, we can start to manipulate eumelanin substances as a possible bio-organic conductor in sensing technology[2].

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Miss E-Jen Teh (University of Western Australia) – visit to the Australian National University

E-Jen is a PhD student and her area of research is Surface chemistry, rheology and direct measurement of surface forces via Atomic Force Microscopy.

THE UNIVERSITY OF WESTERN AUSTRALIA

E-Jen Teh
Surface Forces and Rheology Group

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6009, Australia

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24 April, 2009

Liz Micallef
Network Manager
Australian Research Council Nanotechnology Network (ARCNN)

Re: Australia Research Council Nanotechnology Network (ARCNN) Short Term Visit Travel Report

Dear Ms Micallef,

A one-month visit was made to Australia National University (ANU) from 9th March to 8th April 2009 with the main goal of acquiring the skill of the Atomic Force Microscope (AFM) technique under the supervision of Assoc Prof Vincent Craig. The AFM experimental technique is critical to my research as it characterizes the microscopic behaviour between metal oxide surfaces in the presence of adsorbed molecules.

During the visit, I not only managed to achieve my initial trip objective but also had the opportunity to learn about Vince's ongoing research in growing atomically smooth surfaces via Atomic Layer Deposition (ALD). In addition to that, we managed to investigate the interaction between the ALD surfaces in the presence of a family of dicarboxylic acid. Despite a few challenges with the instability of the ALD surfaces under pure aqueous condition and the low solubility threshold of the dicarboxylic acids, an insightful mechanism on how these adsorbed molecules dictate the interaction between the ALD surfaces was successfully constructed by the end of this trip. On top of that, the AFM data agreed well with the rheological result obtained back in UWA and thus, confirming the correlation between the microscopic and macroscopic relationship in metal oxide system. We will present the data from this visit in the 2009 Chemeca conference in Perth and also plan to publish this work in a peer-reviewed journal.

I left ANU with new friendships and insights into how researchers from different institution and background carry out their work and also on the improvements that I can carry out to my project in order to make it a better, more comprehensive work of science. To say the very least, this has been a very informative trip with great collaboration between two research groups of different background and expertise which I hope to continue in the near future. I would like to thank Vince for his kind guidance during the entire visit but most importantly to ARCNN for granting me this travel fund which made everything possible.

Yours sincerely,

E-Jen

(E-Jen Teh)

Mr Benjamin Meuller (University of Wollongong) – visit to the University of Tasmania

Benjamin is a PhD student and his area of interest is colloidal graphene dispersions and its applications, especially self-assembly.

Report of Research Visit to the University of Tasmania
6-16 October 2009

PhD Candidate Benjamin Meuller
Intelligent Polymer Research Institute
ARC Centre of Excellence for Electromaterials Science University of Wollongong

Collaborators Dr Joselito Quirino, Prof Pavel Nesterenko
Australian Centre for Research on Separation Science
University of Tasmania

Capillary Zone Electrophoresis on Graphene Oxide and Chemically Converted Graphene

Capillary Zone Electrophoresis (CZE) was performed on Graphene Oxide (GO) and Chemically Converted Graphene dispersions (CCG).

We found:

- GO seems to agglomerate faster in the strong electric field (15kV) of the CZE system than without electric field. This effect is assumed to be due to increased van-der-Waals and Pi-Pi interactions of parallel sheets as compared to randomly oriented sheets.

- Repetitive CZE on freshly reduced GO (i.e. CCG) shows aggregation or loss of charge takes place (during and) after reduction (CZE measures only a ratio of mass to charge of the particles). The GO was treated as described in Nature Nanotechnology 2008, 3, 101 and is assumed to be fully reduced under the buffer conditions of CZE measurement. It is therefore likely that no further loss of charge can occur and the observed lectropherograms show aggregation of CCG after reduction from GO.

- For both CCG and GO small (around 100 nm) and large (around 1 μm) can be well distinguished. The smaller sheets form a hump in the electropherogram and move slower than the big sheets as the big sheetsshow a higher ow resistance. The big sheets cause spikes in the electropherogram as they pass the UV-Vis detector.

- Based on the previous point that the sheet size is separable using CZE, fractions were taken to proof the sheet size difference under AFM. The amount of graphene that could be collected, and the presence of remaining background electrolyte make it diffcult to find a clear difference between sheet sizes from different fraction using atomic force microscopy.

- Fluorescence labeling of GO and CCG using APTS was performed to investigate the possibility of greatly enhanced graphene detection. The resulting electropherograms show a reaction of APTS with GO and CCG, and possibly also with TPAH. Further studies are necessary to see the conditions and mechanisms that can be used to label and detect GO and CCG with uorescence markers like APTS.

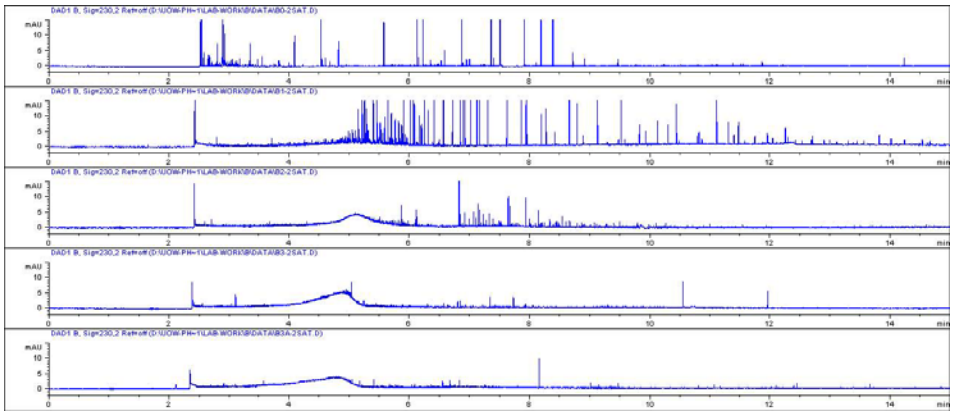

Figure 1: Electropherograms of GO, showing the effect of different sheet sizes (big to small from top to bottom). The spikes represent aggregations of GO.

A publication based on the results of this collaboration is currently prepared and will be submitted shortly.

This study is highly relevant to understand and use graphene in nanoengineering, e.g. for building functional layers for bioelectrodes, solar cells, sensors, microelectronics and composite materials.

The author Ben Mueller would like to thank ARCNN and the collaborators for funding this research visit.

OVERSEAS TRAVEL FELLOWSHIPS

OVERSEAS TRAVEL FELLOWSHIPS

Opportunities for Five to six Overseas Travel Fellowships valued at up to $5,000 each are offered every 6 months. This is a mechanism whereby Australian students and early career researchers can visit overseas laboratories to gain new skills and training in this emerging field of research. These fellowships are also offered for attending International Summer Schools of minimum one week duration, or longer.

Applications are ranked and Fellowships awarded to the top 5-6 ranked applications.

Miss Candace Chiu Ping Chan (UniSA) visit to University of Poitiers, France

Candace is a PhD student and her research area of interest is removing organic contaminants from water stream based on modified engineering nanomaterials.
Purpose of Visit: To develop nanomaterial for water treatment and water science. The objectives behind the science and technology of nanomaterial are:
(i) fully understand the synthesis of functionalised nanoparticles and their assemblies with specific properties
(ii) to explore nanoparticles concept and thus leading to the higher lever of system architectures and finally
(iii) generating a new class of high performance nanoparticles materials.

ARCNN Overseas Travel Fellowship Report

Functionalisation of self-assembled monolayers nanomaterials for water treatment

Candace Chiu Ping Chan
Ian Wark Research Institute, University of South Australia
Visit to Ecole Supérieure d'Inġenieurs de Poitiers at the University of Poitiers in France
21.11.2009 to 29.01.2010

I would like to express my sincere thank you to the Australian Research Council Nanotechnology Network (ARCNN) committee for granted an Overseas Travel fellowship to support the travel and accommodation expenses. The funding is associated with the collaborating research institution for 2 months at University of Poitiers, France.

Background:
The works focussed at Functionalisation of Self-assembled monolayers nanomaterials with the surfactant of N-[3-(Trimethoxysilyl) propyl] diethylenetriamine (TRIS, in short) coated on silica surface and magnetite nanoparticles. Silicone dioxide (SiO2) or glass has been widely used as a substrate for chemical modification especially in a wide variety of technological applications, such as the application for new anti-adhesion coatings in microelectromechanical systems (MEMS)1, magnetic storage device, perfluoropolyether (PFPE), lubricants, corrosion and adhesion2-4. The construction of planned molecular assemblies system have thus been expanded from the last decade where ordered monolayer films can be done through either on solid support from vapour-liquid interface by the Langmuir-Blodgett (LB) method or SAM formation with spontaneous adsorption of specific surfactant molecules.

SAM is a closely packed, highly ordered array of hydrocarbon chain containing various numbers of CH2-unit made from amphiphilic molecules. Such molecules can be presented

based on a general formula of A-(CH2)n-B. The B group is referred to the anchor group such as thiols (S-S), alcohols (OH), acids (COOH), chlorosilanes (SiCl3), amine (NH2) and alkoxysilanes (Si (OR)3). The A group is the functional head group (end group), it can be a range of compounds including methyl (CH3), sulfonate (SO3H), hydroxyl (OH), amine (NH2) or carboxylic acid (COOH) group. By immersing surfactant in aqueous solutions, some of the head group like sulfonate head group tend to deprotonate and forming negative charged surfaces. For others surfactant such as with amine headgroup, it will deprotonate at high pH-values and capture protons at low-pH-values forming a positively charged surface. By manipulating the surfactant and the type of surfaces used, surfaces of either charge can be obtained.

Other than the surface engineered silica (SES), the synthesis of magnetite nanoparticles also shows interesting behaviour in various applications such as in environmental, catalysis, ferrofluids, as well as biomedicine area for magnetic resonance imaging (MRI) and therapeutic agent for treating cancer5. All of these application demand nanomaterials of specific shapes, sizes, surface characteristics, and its magnetic properties.
Objectives:

By Applying both of the functionalised TRIS-coated nanomaterials in water, the removal of natural organic matter (NOM) can be examined. The NOM removal was evaluated using bench-scale dose-response experiments by DOC content, UV absorbance at 254 nm (UV254) and the use of high performance size-exclusion chromatography with UV (HPSEC-UV). As the project is collaborated with University of Poitiers, I was working closely with Prof. Herve Gallard and his team members from the department of water chemistry. His department has state of art facilities in developing innovative water treatment technologies based on nanotechnological approaches and related analytical tools by using the well synthesised nanomaterials.

Research outcomes:

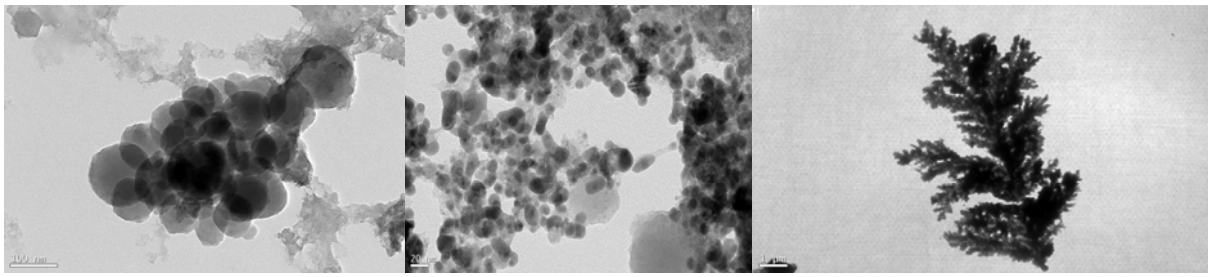

Fig. 1. Transmission Electron Microscope (TEM) spectra where magnetite nanoparticles has the size of 20 nm and do agglomerates with sizes up to micron.

Fig. 2. Pictures showed how the magnetite nanoparticle was removed by applying a magnet next to the vial glass wall.

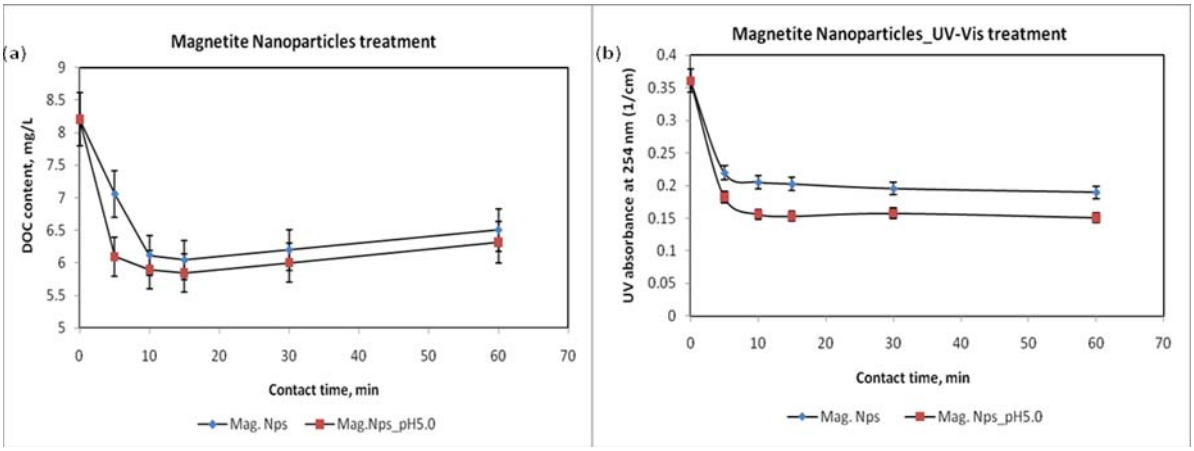

Fig. 3. Kinetic removal of (a) DOC and (b) UV254 by TRIS-coated nanoparticles for Pinail surface water with and without the pH adjusted to pH5.0

The works illustrated here by treating the nanomaterials with different DOC content of surface water, Clain and Pinail, respectively.

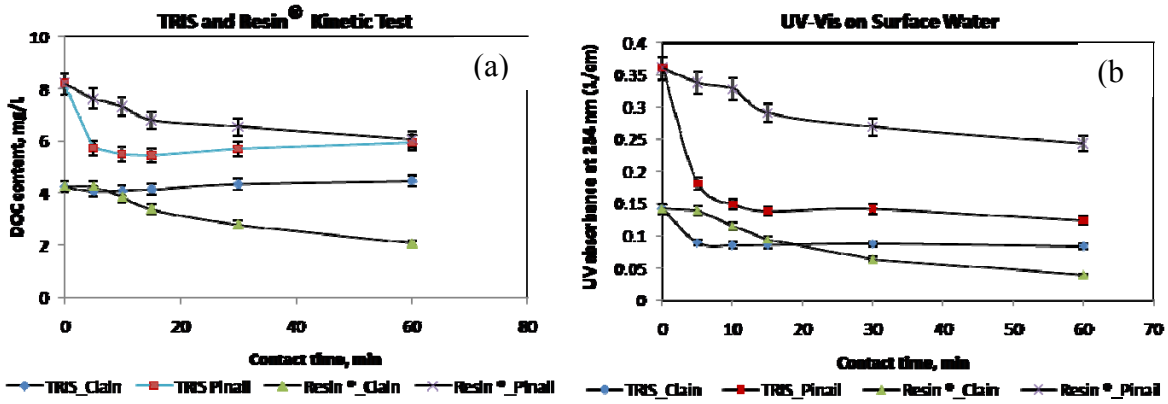

Fig. 4. Kinetic removal of (a) DOC and (b) UV 254 by TRIS-coated SES and resin® for 2 different types of surface water, Clain and Pinail, respectively.

Results showed that UV254 absorbance and DOC content decreased rapidly with increasing contact time, especially at the first 5 min with the use of TRIS-coated SES. After 15 mins, DOC content dropped from 8.2 mg/L to less than 5.4 mg/L which is comparable with conventional treatment by commercially available ionic exchange resin at certain dosage.

As a general observation for TRIS-SES and resin®, the removal of UV absorbing structures (more than 65 %) is more important than the removal of DOC (about 26.63 %) indicating a preferential sorption of aromatic type molecules. For all surfactant coated particles as well as magnetite nanoparticles, the higher the DOC of the raw water, the higher the mass of carbon removed. The removal of DOC content and UV254 absorbance indicate the potential in removing carbon content from surface water at short contact time, 10-15 mins.

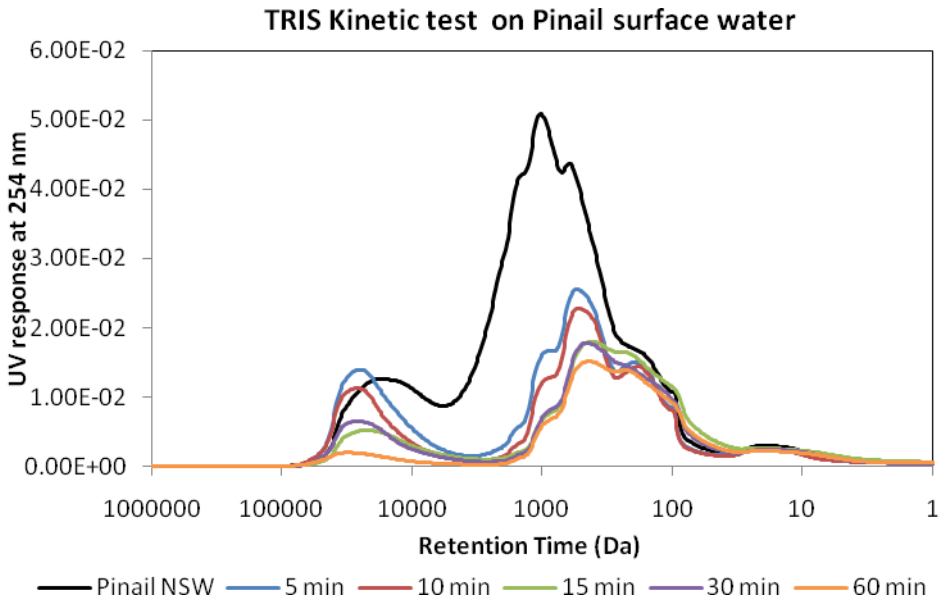

Fig. 5. HPSEC/UV chromatograms of raw and treated water at different contact time, up to an hour.

Figure 5 showed HPSEC/UV profile where TRIS-coated powder removed both low and high molecular weight organics that absorb UV lights. SEC profile was depicted between 6 to 12 minutes that corresponding to the molecular weight (MW) ranging from 15KD to 400Da (the higher the retention time, the smaller the molecular size).

In summary, this long term visit allowed further investigation on the application in water treatment area. Works have been done not only provided a great valuable results for certain chapter in thesis write up, but also for paper publication in water technology area journal. Again, I would like to extend my thank you to the ARCNN for the financial support which covers the travel and accommodation expenses and thus leading to the successful of having the research trip to University of Poitiers.

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Mr Nadim Darwish (UNSW) visit to Hokkaido University, Japan

Nadim is a PhD student and his area of interest is on interfacial electron transfer through novel rigid norbornylogous bridges assembled on gold surfaces.

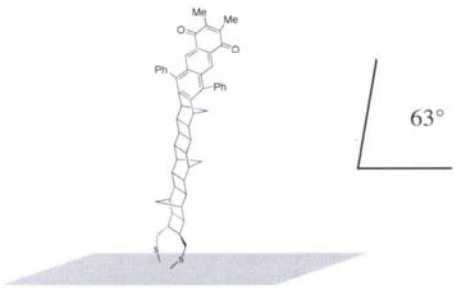
Purpose of visit: The major purpose of the visit is to collaborate with the research group led by Prof. Shen Ye at Hokkaido University (Japan), which is a world leading group in molecular structure characterization using surface spectroscopy on the nanoscale.

Re: sumary of Experiments done in Japan

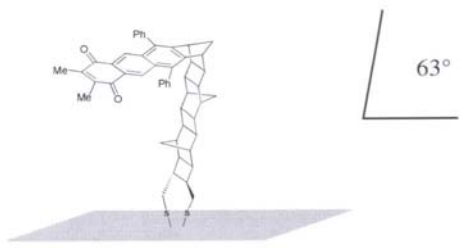
Experiments were done in the Catalysis Research Center at the Hokkaido University of Sapporo Japan with Prof. Shen ye group using their advanced surface characterization techniques. The length of stay was 46 days.

Summary of experiments:

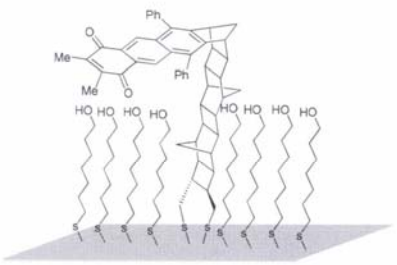
1- Spectroscopic characterization was made on two novel Norbornylogous bridges using the straight and L-shaped molecules by in situ IR, electrochemistry, water contact angle and ex situ sum frequency generation (SFG) measurements. From these experimental results, we were able to quantitatively discuss the orientation angles for these two molecules and organization ordering of these monolayers with pure component or diluted with OH or CH3-terinated molecules on the gold electrode surface. It is quite interesting to note that we observed a clear evidence for interactions between the L-shaped molecules with the different terminated diluents from SFG measurement. We were able to discuss the angle orientation at which the molecules assemble on the surface and to monitor any change in the geometric orientation of the bridges while undergoing faradic process. We were able to discuss surface packing of the SAMs formed of these molecules and to monitor the structural change of quinones during their redox reaction. In summary , these set of experiments showed clearly that the molecules, we designed and synthesized here in Sydney UNSW, are excellent candidates to probe the surface head groups of self assembled monolayers of alkane thiols on gold surfaces. There are some new observations in molecular self assembly, something which we believe will be highly recognized by the scientific community in the area of Nanotehnology and Physical Chemistry.

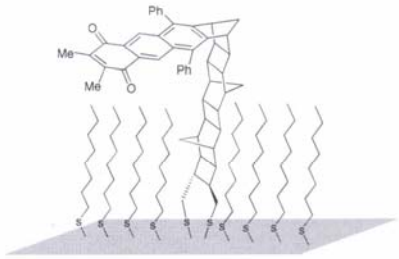


Straight shaped molecules assemble at approximately 63° from parallel to the surface



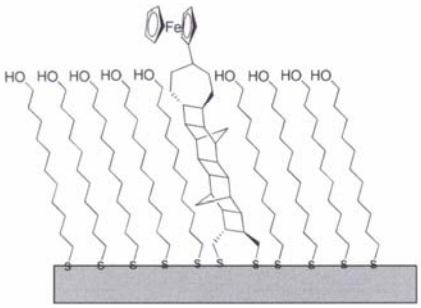
The straight backbone of the L- shaped molecules assemble at approximately 63° from parallel to the surface





Studies of interactions of L- shaped constructs with OH and CH_3 terminated diluents

2- Second set of experiments was using ferrocene based Norbornylogous bridges to monitor the ferrocene based bridge redox activities (other than anthraquinones as above) using again SFG and in situ IR



3- Third set of experiments was optimizing the fabrication of atomically flat single gold crystals, a technique that is novel to Australia. The quality of the crystals were checked by the Japanese group and the good quality of the crystals was confirmed.

In summary, the visit was excellent and we are in the process of analyzing the data that we believe will publish highly. ARCNN will be sure highly acknowledged in any publication resulting from the experiments carried in Japan.

Mr Mohammad Choucair (UNSW) visit to Cambridge University, UK

Mohammad is a post graduate student and his area of interest is the novel synthesis of carbon nanostructures and their applications; namely graphene.

Purpose of visit: The major purpose of the overseas visit is to investigate the bulk properties of graphene (in particular the adsorption properties), now that a technique has been developed to synthesise graphene in gram-scale quantities. Dr Stuart Clarke is a leading researcher on the adsorption properties of graphite and activated carbons, so his expertise in graphene related materials would surely strengthen the ability to achieve, develop and interpret subsequent results. Collaborations with Dr Stuart Clarke will allow access to dedicated instrumentation to perform: X-ray reflectometry, differential scanning calorimetery, thermogravimetric analysis and a recently developed technique that can provide details of the state, absolute composition and crystallographic structure of the adsorbed layers.

A study into the multiphase behaviour of alcohols, alkanes, and haloalkanes on graphene

Graphene has come to light as a potential contender in many surface area exploitable applications due to its very high theoretical surface area. The use of graphene as an adsorbate support can be advantageous when contending with that of the 'parent' three-dimensional graphite: Fundamentally, the two-dimensionality of graphene can provide the superior physical properties needed to probe the behaviour of different adsorbed carbon compounds (alkanes, alkenes, haloalkanes, alcohols etc.), by providing a truly flat – very large surface area – crystalline monatomic layer. The adsorbate-substrate interaction issues have a marked effect on the properties governing surfactant capabilities, detergency, colloidal and crystal formations, and lubricating behaviours; making the studies of these interactions of fundamental importance.

A range of carbon compounds adsorbed on graphene were studied using differential scanning calorimetry (DSC) and included a haloalkane (1-iodononane), alkanes (octane, nonane, decane, undecane, and dodecane), and alcohols (octanol, nonanol, and decanol). The main application of DSC is in studying phase transitions, such as melting, glass transitions, or exothermic decompositions. These transitions involve energy changes or heat capacity changes that can be detected by DSC. The result of a DSC experiment is a curve of heat flow versus temperature or time. There are two different conventions: exothermic reactions in the sample shown with a *positive* or *negative* peak. This curve can be used to calculate enthalpies of transitions and is done by integrating the peak corresponding to a given transition.

The work performed built upon that already conducted by Stuart Clarke and his colleges on graphite[1-3]. When iodononane was probed on powdered graphene using the DSC, a peak corresponding to the 2-d phase transition of iodononane was not observed. Natural and synthetic graphite powders were used to probe iodononane for a comparison, and showed no 2-d phase transition peak. This was contradictory to the results obtained on a 'papex' sample (a pressed form of graphite) which showed the 2-d transition. It was realised that the sample preparation was an important factor in whether a signal was detected, as graphene in the free

powdered form (and indeed natural and synthetic graphite) raised issues regarding the contact and heat flow through the material which is detected by the DSC. A simple dye was made, Figure 1a and 1b, which was used to compact the graphene sample into a small disc.

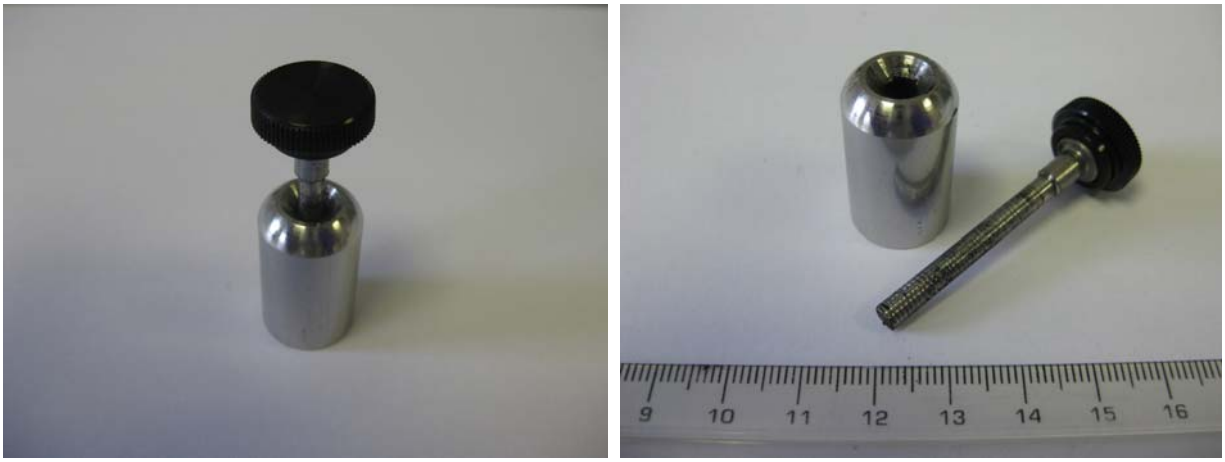


Figure 1. Digital images of (**a**) the plunger and dye used to compact the graphene samples and (**b**) the individual components shown relative to a centimetre scale.

When the graphene was lightly compacted into a disc, the 2-d phase transition peak was observed for iodononane (and indeed, for the synthetic and natural graphite once pressed into a disc). The graphene discs made were consistently of the order 7 mg to 12 mg, and the 2-d peak was observed on three different samples prepared by this method. This showed that the technique was repeatable as well as reproducible. The DSC runs were performed at a heating rate of 20°C/min, and it was thought that the rates of heating had the ability to affect the detection of the 2-d peak due to the 'thermal lag' of the graphene material, so a series of heating rates were tried on the iodononane-graphene sample, Figure 2.

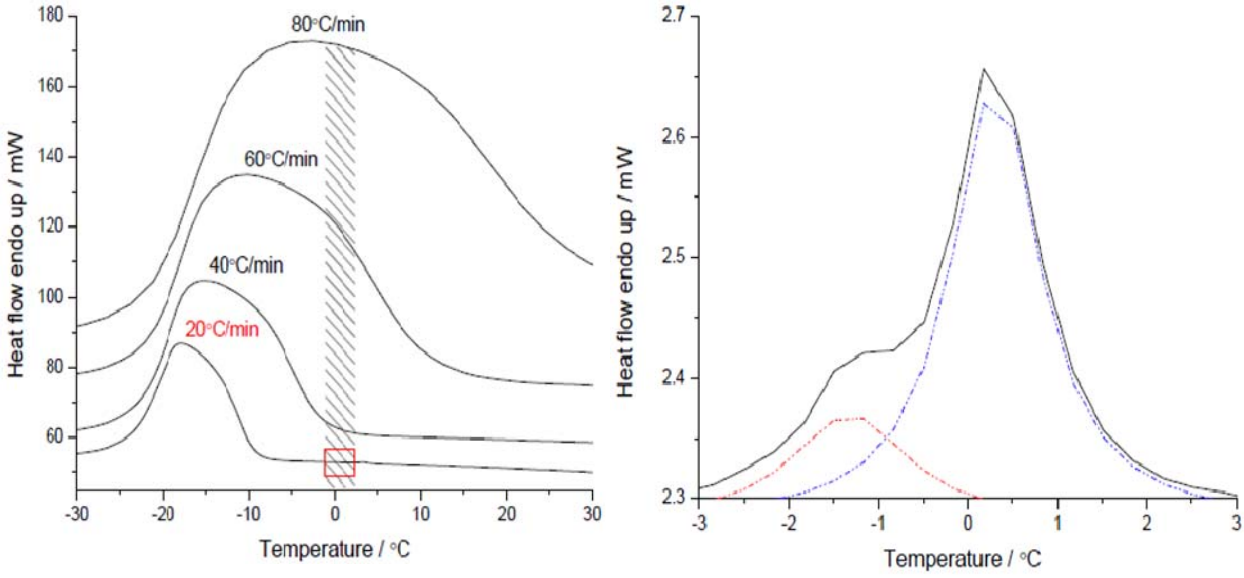


Figure 2. (**a**) DSC curves showing the heating of iodononane on graphene at different heating rates, with the dashed column representing the region in which the 2-d phase transition of iodononane is expected, clearly showing that for higher heating rates, the peak would be hidden due to the large 3-d bulk transition peak, with the optimum heating rate being 20°C/min; (**b**) The magnified region in the red box in (**a**) showing the 2-d transition peak of iodononane on graphene after a linear baseline subtraction of the region, with the dashed red and blue curves being Lorentzian type fitted peaks, with the origin of the smaller shoulder unknown – believed

to be an impurity, or a configuration effect caused by the monolayer structure of iodononane on the surface of the graphene.

It was believed that the investigations of different rates resulted in a annealing affect on the iodononane-graphene sample, as heating allowed the thorough diffusion of the analyte throughout the graphene material. A sample containing iodononane-graphene was cycled seven times to a temperature above the boiling point of iodononane and each time the 2-d transition enthalpy was plotted against cycle time which was compared to that of a papex sample containing iodononane, Figure 3a. The 2-d transition enthalpy obtained from the graphene sample appeared to increase asymptotically to ca. 0.5 J/g, while the graphite sample averaged around ca. 0.7 J/g. This showed that annealing had a profound effect on the graphene sample in the signal obtained, and not on the papex sample.

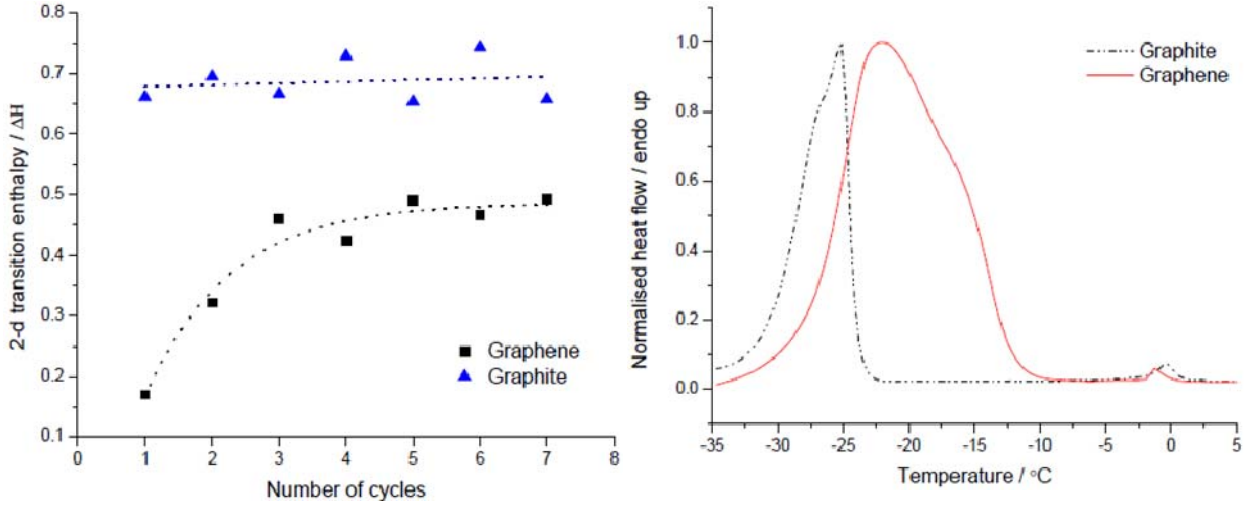


Figure 3. (**a**) Plot showing the 2-d transition enthalpies of iodononane on graphene and papex (graphite) after each heating cycle, with the effect of annealing present in the graphene sample as the values rise to a limit of ca. 0.5 J/g whereas the papex sample averages ca. 0.7 J/g, the dotted lines present to aid the eye; (**b**) A normalised heating run (7^{th} cycle) of iodononane on graphene and papex (graphite) showing the extent of the 3-d bulk phase in comparison to the 2-d phase, with evidence of greater thermal lag in the graphene sample as the gradient of the 3-d peak from the onset (ca. -35°C to -30°C) appears to increase at a slower rate.

With a surface area of the powdered graphene sample (ca. 600 m^2/g Langmuir, ca. 1700 m^2/g in solution) much greater than that of graphite (10-20 m^2/g), the 2-d transition enthalpy of iodononane was expected to be much greater when on graphene than graphite. However, the act of perturbing the porous fused graphene structure (i.e. its original synthesised form) by pressing it into a disc disrupted the porosity and acted to compact the porous graphene structure into a structure akin to turbostratic graphite, yielding a 2-d transition enthalpy maximum close to that of graphite; on the contrary, this showed that the graphene is indeed behaving like graphite (although not on the magnitude expected). This effect is another consequence of the sample preparation required for DSC. However, this demonstration of graphite-like behaviour might be advantageous when probing the crystal structures of the 2-d monolayer's using X-ray diffraction as the prominent peak corresponding to the (002) plane in graphite is absent/broader in graphene, and furthermore – the graphene structure does not need to be perturbed to the extent as in DSC, which will provide a greater surface area for coverage and enhanced signal detection.

Now that a optimum procedure had been established for the detection of a 2-d phase transition peak in an iodononane-graphene sample, both in sample preparation and DSC parameters, a more efficient investigation of other carbon compounds could be carried out. The alkanes of chain length ranging from 8 to 12 were analysed on graphene. It must be noted that the 2-d peak was not observed in the samples on the heating run, but was observed in the cooling process –

due to a '*super-cooling*' effect, with the onsets of the 2-d peaks for each carbon sample reported, Figure 4.

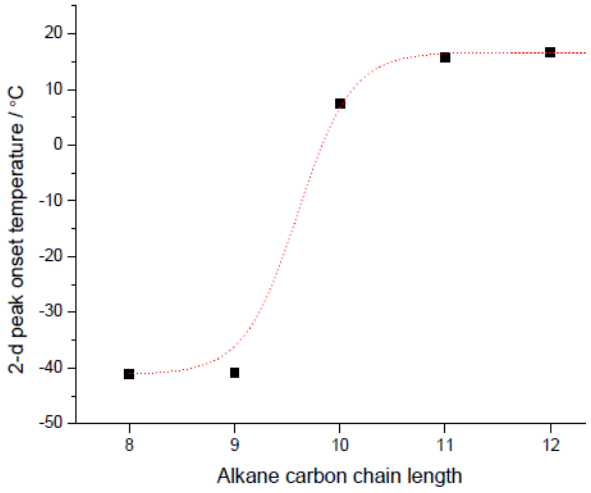


Figure 4. The 2-d phase transition peak onsets for different alkanes on graphene, showing an abrupt difference in onset temperature when the longer carbon chain lengths (i.e. decane onwards) were used, with the points resembling that of a sigmoid curve. The red dotted line is present to aid the eye.

When comparing the 2-d and the bulk 3-d onset of melting points, we see that for the shorter chain alkanes (octane, nonane) the difference between them is small, ca. 16°C and ca. 12°C for octane and nonane respectively, in comparison to the larger chain alcohols in which the difference increases to values of ca. 36°C, 42°C, and 26°C for decane, undecane and dodecane respectively. The use of the longer chain alkanes allows the easier identification of the 2-d peak as it can be more confidently distinguished between the 3d peak, and reduces the likelihood of masking by the 3-d peak. The exothermic phase transition of the 2-d peak of undecane on graphene is shown, Figure 5b.

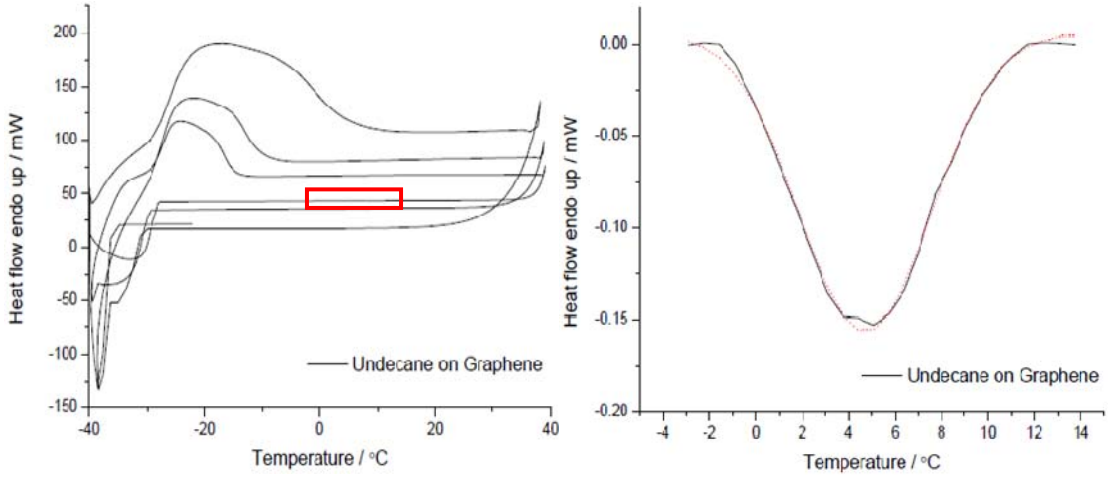


Figure 5. (**a**) A DSC run of undecane on graphene at different heating and cooling rates of 80°C/min, 40°C/min, and 20°C/min where the red box is the region where the exothermic 2-d phase transition of undecane on graphene occurs, shown in (**b**), which is baseline subtracted and fitted with a Lorentzian type peak (*in red*).

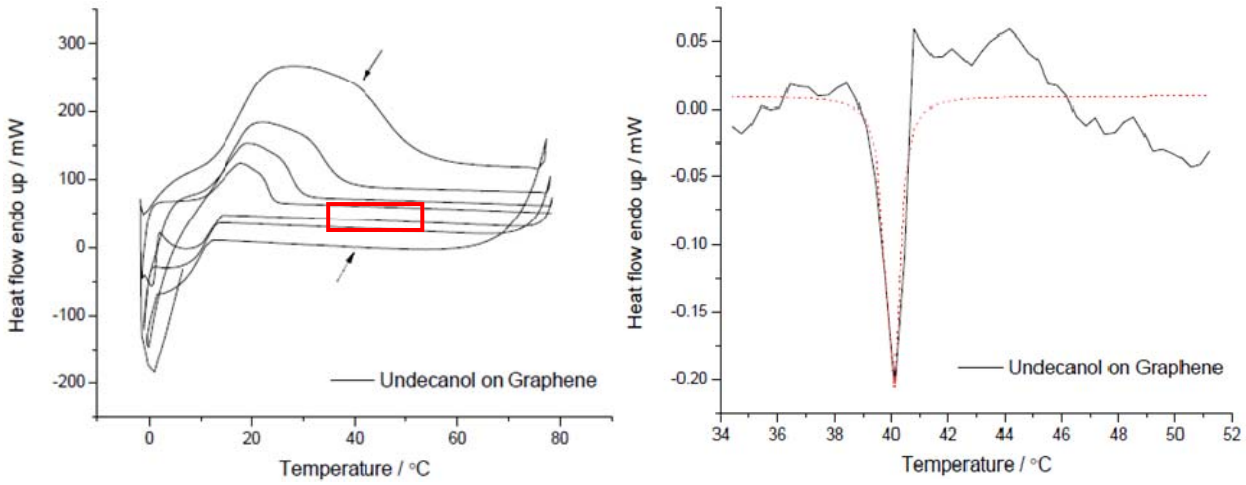


Figure 6. (**a**) A DSC run of undecanol on graphene at different heating and cooling rates of 80°C/min, 60°C/min, 40°C/min, and 20°C/min where the red box is the region where the exothermic 2-d phase transition of undecanol on graphene occurs, shown in (**b**), which is baseline subtracted and fitted with a Lorentzian type peak (*in red*). Arrows in (**a**) highlight where the 2-d phase transition peak is expected to occur with the effect of thermal lag apparent in the 80°C/min run in which the 2-d peak would be masked by the bulk 3-d phase transition.

The alkanes' corresponding alcohols were then analysed on graphene (however only octanol, nonanol and undecanol were tried due to time constraints), Figure 6. The respective alcohols showed behaviour similar to that of the alkanes as the 2-d endothermic phase transition was not observed, only the exothermic (where neither were observed for octanol).

The work conducted is a pivotal platform for further complimentary experimentation investigating the behaviour of 2-d monolayers on graphene. With an optimisation of the conditions, or the use of other calorimetric techniques, the issues associated with the current processes could be alleviated. However, the experimental results provide an exciting chance to use other techniques in probing and characterising truly atomic interface behaviour, now that graphene is seen to indeed behave similarly to graphite; small angle X-ray diffraction can be used with the premise of a spectra with signature adsorbate monolayer peaks more identifiable with the absence of the dominant (002) Bragg reflection of graphite. This work lays a foundation for potential self-assembly and behavioural aspects of single molecule adsorption on graphene to be investigated. True nanotechnology.

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Miss Bianca Haberl (ANU) visit to the University of Illinois at Urbana-Champaign USA

Bianca is a post graduate student and her research interest is Structural characterization of different forms of amorphous silicon,• Pressure-induced phase transformations in crystalline and amorphous silicon • Techniques: Nanoindentation, Transmission electron microscopy, Fluctuation electron microscopy, Raman microspectroscopy, Focused ion beam milling, Atomic force microscopy

Purpose of visit: Structure-property correlations between different forms of amorphous silicon on the nanoscale Amorphous silicon (a-Si) is a highly significant material in many areas of nanotechnology and is also a physically interesting material. It is commonly used in photovoltaic solar cells and is also gaining increasing use in micromechanical systems and thin-film transistors. This transformation pathway is also reflected in its deformation behaviour when subjected to nanoindentation testing as all forms of a-Si created by industrially employed deposition methods, whether as-deposited or thermally annealed, have been found to deform solely via plastic flow.

Thus the aim of this study is to understand the structural differences and their correlation to the mechanical properties for pure and deposited forms of a-Si. As FEM seems to be one of the very few techniques that can determine differences in the amorphous network, it will be employed to study two forms of deposited a-Si and compare their structures and properties to ion-implanted a-Si.

As there is currently no FEM system in use within Australia, this study will be conducted in collaboration with Professor John Abelson at the University of Illinois at Urbana-Champaign, USA. The type of FEM employed there will also yield a more quantitative knowledge of the MRO than previously obtainable.

The results of this study will then be submitted to a physics journal of high impact. Depending on the length of the article it will either be submitted to Applied Physics Letters (impact factor 3.596) or once more to Physical Review B (impact factor 3.172). Moreover, the results will be presented at the MRS Fall Meeting this year, where the applicant will apply for a MRS graduate student award.

Outcome of my research collaboration with the University of Illinois at Urbana-Champaign funded by ARCNN

Conducted travel

Departure from Australia: 1st of August 2009

Time spent at Champaign-Urbana for research: 3rd of August – 15th of August 2009 (12 days)

Project description

Amorphous silicon (a-Si) is a highly significant material in many areas of nanotechnology. It is also a physically interesting material since it is a model system for an amorphous semiconductor. Furthermore, its high pressure behaviour is the topic of a number of recent Nature publications as its transformation behaviour may reveal further information about the structure and polyamorphism of a-Si.

These high pressure studies employing diamond-anvil cells reported the formation of a metallic amorphous high-density phase under pressure which was found to transform back to the original low-density form of a-Si upon pressure release. However, all such studies seem to have been performed on deposited a-Si, a form of a-Si which is less dense than pure a-Si due to nanovoids and pores. This transformation pathway is also reflected in its deformation behaviour when subjected to nanoindentation testing as all forms of a-Si created by industrially

employed deposition methods, whether as-deposited or thermally annealed, have been found to deform solely via plastic flow.

The indentation behaviour, however, is substantially different when probing pure forms of a-Si. Pure a-Si exhibits two different 'states', with the as-prepared form undergoing relaxation to a more perfect continuous random network upon thermal annealing. Whereas, the as-prepared material deforms also via plastic flow, the relaxed material transforms to a metallic crystalline phase under indentation loading. Further phase transformation to the crystalline high-pressure phases Si-III and Si-XII is observed upon unloading. Thus a-Si follows the same transformation pathway as that observed for crystalline silicon. Additionally, differences between the as-prepared and relaxed network are evident when probing for the structural order on the nanoscale, the medium-range order (MRO), with fluctuation electron microscopy (FEM), a specialized electron microscopy technique.

Interestingly, the high-pressure phases created by indentation within the amorphous matrix also have possible applications, for example in photovoltaics or nanoscale-patterning. Therefore it would be of great interest to create such high-pressure phases in deposited a-Si, as ion-implanted a-Si is not a technologically feasible material since it is expensive to produce.

Thus the aim of this work is to understand the structural differences and their correlation to the mechanical properties for pure and deposited forms of a-Si. As FEM seems to be one of the very few techniques that can determine differences in the amorphous network, it was employed to study deposited forms of a-Si. The results were then compared to the well-studied pure form of a-Si created by ion-implantation. Moreover, the influence of thermal annealing on the different networks was also investigated in detail. The results of this investigation of the MRO of these different forms of a-Si will give insight into the structural differences and will shed light on how these structural differences influence or determine the phase transformation behaviour of the amorphous material.

Results

FEM measurements were performed on as-prepared and annealed ion-implanted and magnetron-sputtered a-Si in collaboration with Prof. John Abelson and his group at the University of Illinois. Only one type of deposited a-Si was compared to ion-implanted a-Si as it proved more difficult than anticipated to adapt our samples to the new type of FEM employing a scanning transmission electron microscope (STEM). Additionally, progress was impeded as our collaborators were not familiar with our type of samples and sending samples for initial testing as originally planned was not successful.

Nonetheless, despite these initial difficulties, the FEM was successfully performed on four types of samples. The measured variance over k is shown in Fig. 1. The variance of ion-implanted a-Si decreases upon annealing to a level signifying an almost perfect continuous random network and hence relaxed state of the network (red curve). Intriguingly, the as-sputtered and annealed sputtered a-Si maintain a level of variance or MRO as high or even higher than as-implanted a-Si.

This implies that sputtered a-Si cannot undergo structural relaxation in the same manner as pure forms of a-Si do, a behaviour which might be caused by the presence of the nanovoids and pores in the material. Furthermore this lack of structural relaxation explains why the annealed sputtered a-Si cannot phase transform under pressure as clearly a continuous random network and thus strong resemblance to the crystalline network is needed in order to enable the phase transformation. A manuscript for publication detailing these results is currently in progress.

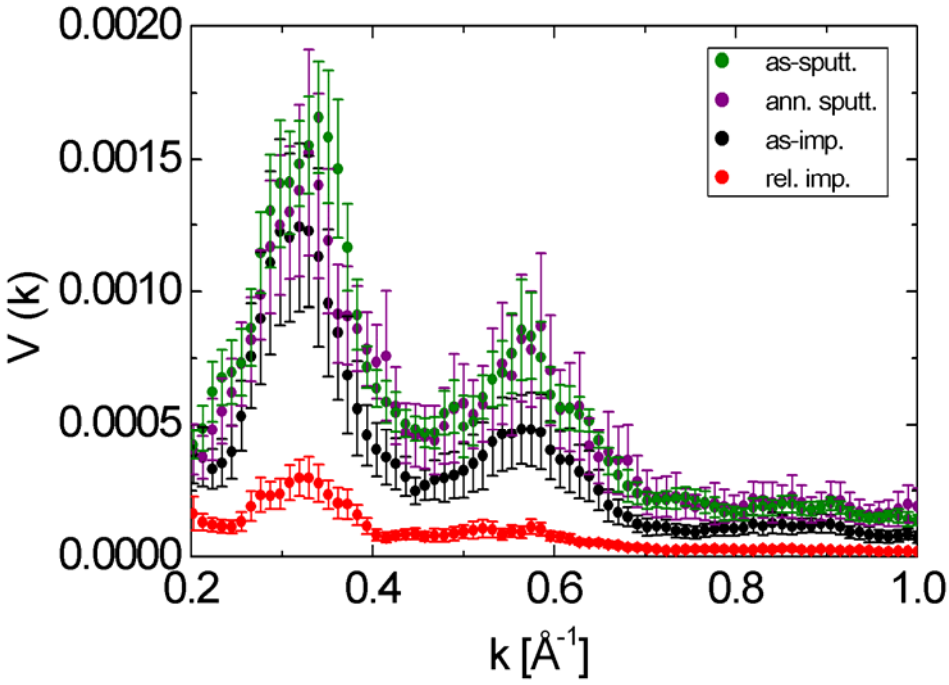


Figure 1: *The variance over k of as-implanted and relaxed ion-implanted a-Si compared to as-sputtered and annealed magnetron sputtered a-Si.*

Oct 16th, 2009

*After the visit to the University of Illinois I continued on to Europe for a visit to the University of Oxford, UK, to continue a collaboration and for two conferences in Graz, Austria (Microscopy Conference 2009) and Warsaw, Poland (E-MRS Fall Meeting 2009). Therefore an around the world ticket was purchased rather than a return flight Canberra-Chicago.

Dr Edin Nuhiji (MelbUni) visit to the University of Vigo in Spain

Dr Edin Nuhiji is an Early Career Researcher and his research interest is nanocrystals in biolabelling, fluorescence spectroscopy & microscopy, nanomaterials, colloid chemistry, molecular biology, bioconjugation techniques, surface biofunctionalisation strategies, point-of-care-systems.

Purpose of visit: The aims of the proposed research visit will be to extend the preliminary work undertaken during a short PhD related research visit to the University of Vigo in 2007. However the research could not be completed due to PhD completion commitments. During his PhD he developed a whispering gallery mode (WGM) based detection system for carrying out bioassays at the femtomole level. The preliminary work in Spain demonstrated that a monolayer of antibodies could be simply conjugated to a microsphere surface in a 1-step reaction. However due to time constraints particles were not profiled in a working antibody-antigen binding assay and the work with the high-refractive-index coatings was not completed. The overarching goal of the proposed research visit will be to develop and characterise a micropshere based whispering gallery mode (WGM) recognition platform to screen for unlabelled antibody-antigen targets. Single microspheres will be modified with a monolayer of fluorescent CdSe@ZnS nanoparticles followed by a final monolayer of target-specific antibodies. Using free beam excitation to excite the microsphere-bound nanoparticles the principal of detection is measured by monitoring changes to the microsphere emission profile (WGM). Changes to the particle WGM can be caused by any changes to the microsphere surface (e.g. antibody-antigen interaction). These surface effects will be monitored directly in solution using a spectroscopic technique established at the University of Melbourne. The microspheres will then be presented in a microwell system and will be utilized to detect, screen and discriminate various antibody-antigen interactions at trace levels. The system will utilize an entirely solution based assay format which is the first of its kind that also incorporates a single particle fluorescence spectroscopy based platform.

With the completed experimental results the aim is to produce 1-2 manuscripts targeted at Advanced Materials, Langmuirs, Nano Letters or Nature Materials the latter journal having already recognized previous research efforts in this field.

Edin will be travelling to the University of Vigo in the middle of 2010.

Mr Michele Giulianini (QUT) visit to the University of Quebec

Michele is a post graduate student and his research interest is Carbon nanotubes, Organic semiconductors and photovoltaics

Purpose of visit: The research is focused on polymer/carbon nanotubes based photovoltaic devices also known as bulk heterojunction solar cells. This technology has been recognised rich of potential crucial advantages and can represent a revolutionary way to produce electrical energy from the sunlight. Today, several research group worldwide are researching in this field in order to extend the power conversion efficiency through values high enough to start the commercialisation of the devices. Some of the advantages of this technology are: light weight, flexibility, low costs, low production costs, etc.

The aim of the research during the visit is to utilise Ultra High Vacuum (UHV) Scanning Tunnelling Microscopy (STM) and Scanning Tunnelling Spectroscopy (STS) for basic research in nanotechnology. In detail these techniques will be used to investigate and characterize the morphology and the electrical interaction between single walled carbon nanotubes and P3HT (poly-3(hexyl-thiopene)) that constitutes the nano-element at the basis of bulk heterojunction solar cells. Results in this analysis will be extremely useful to understand fundamental interactions between the materials and will be used to explain and model the behaviour of the devices. For the importance of this study, the results will be published in competitive peer-reviewed international journals

Michele will be travelling to Quebec in the first half of 2010

Dr Oleh Klochan (UNSW) visit to Cambridge University, UK

Oleh is an Early Career Researcher and his research interest is mesoscopic transport, hole systems, quantum dots, GaAs

Purpose of visit: Researchers at the University of Cambridge have recently developed a new technique for making extremely high quality quantum nanodevices. The aim of this project is to work hands-on in the laboratories at the University of Cambridge and learn this new technique. So far this technique has only been used to study the properties of electron quantum nanodevices – it will be adapted to to make induced' hole devices, such as quantum wires and quatum dots. These devices have unique spin properties with potential application in spintronics and quantum information technology. The project will take advantage of the extensive MBE crystal growth facilities at the University of Cambridge, as well as involving advanced semiconductor processing techniques using optical and electron beam lithography facilities of the Semiconductor Physics Group at Cavendish laboratory, Cambridge University.

Re: Report of the outcomes of ARCNN supported visit to Cambridge University

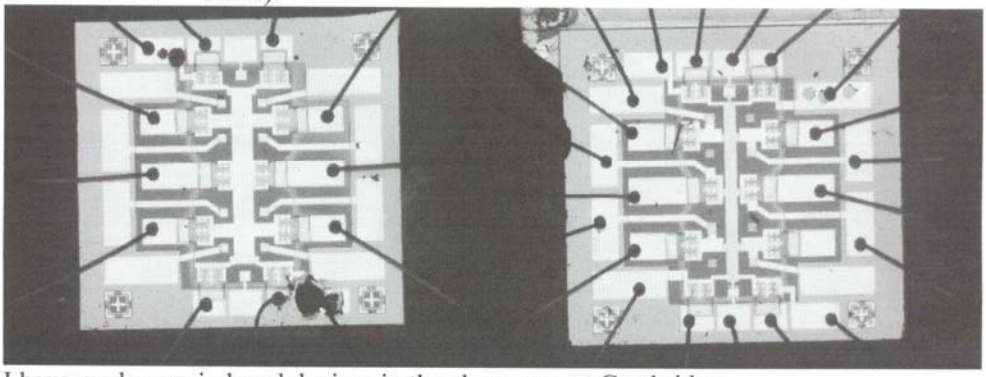
The main objective of my visit was to learn a novel fabrication technique for making induced low-dimensional structures. We would like to develop this technique at UNSW and apply it to hole systems. I visited Cambridge for 4 weeks, from August 11 to September 12, 2009.

1. Establishing a new UNSW-Cambridge collaboration.

   During my stay in the Semiconductor Physics group at Cambridge University, I worked closely with Dr. Kantimay Das Gupta and Dr. Francois Sfigakis. I have discussed with them future plans for fabrication and measurements of induced devices, which will be conducted as a joint collaboration between UNSW and Cambridge University.

2. I am now fully experienced with the Cambridge Technique for making induced devices.

   During the first 2 weeks of the visit I received a full cleanroom induction and safety training and was shown the full cycle of the fabrication flow. Four test samples (pictures of two are shown below) were fabricated and measured at liquid helium temperatures. The yield of the ohmic contacts reached 95 % (only 2 of the 40 ohmics in total have not worked). The ohmic contact resistance was measured less than 100 Ohms for the density of electrons in the two-dimensional electron gas of $5 \cdot 10^{10}$ cm^{-2}. These values are significantly better than those achieved at UNSW using an alternative induced method (yield <30 %, ohmic resistance > 10 kOhms).



3. I have made new induced devices in the cleanroom at Cambridge.

   In the following two weeks I fabricated another 4 samples fabricated on high mobility GaAs heterostructure. This samples have also been tested at liquid helium temperatures and have been taken back to UNSW in order to do measurements in a dilution refrigerator.

4. I helped my colleagues at Cambridge update their processing techniques.

During last two weeks I have also tested new stock of the polyimide and adjusted the fabrication recipe. Previously Cambridge group has use polyimide HD-2737 fabricated by HD Microsystems, however it has recently been replaced by a new polyimide HD-4104. These two polyimides have different specifications, so direct mapping of the fabrication process did not work. Modifications of the dilution ratios as well as exposure and development times were made in order to re-optimize the fabrication routine.

I have brought new ultra high quality semiconductor wafers from Cambridge to UNSW for future experiments.

Initial tests of the induced fabrication routine at UNSW has been very successful and I am planning to fabricate one and zero-dimensional hole devices on a very high quality undoped heterostructure material, which I also brought from Cambridge.

Dr Yong Wang (Qld Uni) visit to the University of California, Los Angeles, USA

Yong is an Early Career Researcher and his research interest is Fabrication and structural characterisation of semiconductors and magnetic thin films.
Pupose of visit: The main purpose of this visit is to access the molecular beam epitaxy (MBE) growth system at UCLA (Los Angeles, USA) to grow a series of GeMn thin films for spintronic devices. This is a great opportunity to get experience and acquire related expertise from the world leading team in MBE growth and semiconductor device design.

Dr Wang will not be taking up the ARCNN Overseas Travel Fellowship due to other commitments.

YOUNG NANOTECHNOLOGY AMBASSADOR AWARDS

YOUNG NANOTECHNOLOGY AMBASSADOR AWARDS

The Young Nanotechnology Ambassador Awards were set up to promote science and science education in state and territory schools. Two awards are provided per state/territory and each award is valued up to $2000.

The young nanotechnology ambassadors are required to visit a minimum of four schools (preferably at least one regional school) to inspire students about nanotechnology, and more broadly science education. It is up to the ambassadors to decide which schools they visit and to arrange these visits with the schools. The ambassadors are encouraged to present a talk which could include visual demonstrations or simple experiments, slide shows or other multimedia presentations.

The following are the Young Nanoscience Ambassadors for 2009

- **Queensland**

Mr Anthony Musumeci (University of Queensland)

- **South Australia**

Dr Mahaveer Kurkuri (Ian Wark Research Institute, University of South Australia)

Mahaveer is visiting the schools in April 2010

- **Victoria**

Miss Minoo Naebe (Deakin University)

Mr Ashley Stephens (The University of Melbourne)

Ashley will be visiting the schools in April-May 2010

Mr Muthukumaraswamy Pennirselvam (LaTrobe University)

- **New South Wales**

Dr Edith Chow –CSIRO

Edith will be visiting the schools in May 2010

Miss Amy Gelmi – University of Wollongong

Mr Luke Sweetman– University of Wollongong

Amy and Luke will be visiting the schools in 2010

- **Queensland**

Mr Anthony Musumeci (University of Queensland)

ATSE Science Ambassador / ARCNN Young Nanotechnology Ambassador

Anthony Musumeci
PhD student
ARC Centre of Excellence for Functional Nanomaterials
Australian Institute for Bioengineering and Nanotechnology
The University of Queensland, St Lucia, QLD Australia 4072

During March, April and August of 2009, 4 school across Queensland were visited as part of the Science Ambassador Program. A total of 9 presentations were given to over 200 students from years 5-12. The schools, in order of visit were;

Albany Creek State High School (***Brisbane***)

- 2 presentations: 62 students (Yrs 11 / 12)

Proserpine State High School (***Whitsunday Coast***)

- 2 presentations: 58 students (Yrs 11 / 12)

Injune State School (***Central QLD***):

- 3 presentations: 41 students (Yrs 5 / 6 / 7 / 8 / 9 / 10)

Albany Hills State School (***Brisbane***) –

- 1 presentation, 54 students (Yr 7)

The intention of these visits was to promote science and science education to both primary and secondary school students through a succinct presentation, hands-on demonstrations and practical experiments. The presentations were generally one hour in duration, commencing with a brief autobiography, including details of experiences had whilst studying science at both an undergraduate and postgraduate level at university. Fundamental concepts of nanotechnology were then explored along with topics such as clean energy hydrogen storage, electron microscopy and current application driven research being undertaken at the Australian Institute for Bioenginnering and Nanotechnology (AIBN). Hands-on demonstrations with biodegradable plastics, jelly baby morphology and polyurethane nanocomposites were well received during the presentations. Practical experiments involving the extraction of DNA from strawberries, indestructible bubbles, food dye chromatography and alginate polymer worms were also a very popular aspect of the visit for the students.

The success and relevance of the nanotechnology themed presentations was evident at several of the schools with invitations for future presentations and requests for access to the content of the presentation and filming of the presentations. The science

ambassador visit to Proserpine was documented with a media article in the Whitsunday Times Newspaper. Whilst, a Channel 10 News crew filmed a further invited presentation I delivered on Nanotechnology at Albany Hills State School, whose science program was selected as state finalists for the Education Queensland Showcase Awards. Further details of the visits were also published in the quarterly newsletters of the AIBN and ARC Centre of Excellence for Functional Nanomaterials.

In conclusion, the visits to the schools were very well-received, based on student interest and interaction during the presentation and practical experiments. A fun and enjoyable time was had by all students as they learnt about the wonders and possibilities of objects at the nanoscale. Finally on a personal level, the experience was both enjoyable and rewarding: one that I appreciate being given the opportunity to undertake by the ARCNN and ATSE.

Albany Creek State High School – Year 11 & 12

Injune State School – Year 6/7

Victoria

Miss Minoo Naebe (Deakin University)

Young Nanotechnology Ambassador Award is offered by the Australian Research Council Nanotechnology Network (ARCNN) to postgraduate students to promote science and science education in schools around Australia. The regions for this year's visit in victoria were Geelong and Melbourne and four schools were involved in this program.

Each school visit took 1-1.5 hours and compromised an introductory presentation entitled ˝ *Nanotechnology: Small Science, Big Deal*˝. This presentation which took 20-25 minutes provided a simple yet scientific introduction to nanotechnology and its significance following by introducing some tangible benefits and applications of this technology in our every day life. Finally, an introduction to related university courses and science careers were given. This presentation was followed by a demonstration of some actual samples prepard at Deakin university lab by using various nano-techniques and nano-materials. The demonstrated samples included electrospun nanofibre membranes, super-hyrophobic materials, photocromic fabrics, etc. This demonstration provided students with an objective experience of nanotechnology related products and revealed how these products are already changing our world. This took 10-15 minutes. Depending on school timing, some parts of DVD entitled " *Nanotechnology: an introduction*" released by Ress films was played. This scientific movie which was filmed partly at Deakin Universitiy has been produced for high school students. It helps to complete the picture of nanoscience and nanotechnology created in students' mind during the first two presentation/demonstration.This part took 15-20 minutes. At the end, there was 10-15 minutes for questions and discussion.This was an opportunity for students to ask questions related to nanotechnology and university studies. To make the whole session an informative yet fun experience for students, questions were asked and prizes were given to the best answers.

In general, feed back from students and teachers was positive and teachers showed interest to repeat the program for next year/term. Teachers commented on program that the presentation/demonstration was engaging and relevant to curriculum. I was impressed by the level of passion and interest shown by students to learn more about nanoscience and nanotechnology. Some students had encountered aspects of nanotechnology, however, they found it useful to interact with someone who is active in this field. Most students as well as teachers showed keen interest in demonstartions of actual nanotechnology-enabled samples which had prepared at Deakin University. They asked very good questions related to the potential applications of demonstrated specimen in every day life.

I believe that programs like this are very well placed to not only encourage students to pursue career in science but also raise the awareness of the benefit and possibilities of nanoscience and nanotechnology. Students could clearly see that nanosience/ nanotechnology is not just "scientists fantacy" rather it's a "small science" with big impact on our lives.

Since awarded Young Nanotechnology Ambassador Award 2008, I've been presenting my introductory nanotechnology presentation, prepared for this program, to high school students visiting Deakin University at events such as Deakin open day. Recently, marketting Division of Deakin also included my presentation topic (nanotechnology: small science, big deal) to the list of topics for its school visit program.

Finally I'd like to point out that I experienced some difficulties in relation to arranging school visits. While all target schools expressed their interest in having a talk on nanotechnology, some found it hard to fit into school program. Due to this delay, my whole school visit program and consequently issuing the summmary report took longer than expected. Despite this challenge, the whole experience was as rewarding as it could be for me.

I wish to express my gratitude to Australian Research Council Nanotechnology Network for giving me the opportunity to be a part of this program and to be able to excite the imagination of students and provoke their interest. Deakin University is also acknowledged for assisting me in arranging school visits.

Minoo Naebe
ARCNN Young Nanotechnology Ambassador 2008

List of Schools

- **St Helena** Secondary College
  Wallowa Road, Eltham North, Victoria, 3095

  Telephone: **(03) 9438 8500**
  Facsimile: **(03) 9438 8555**
  Email: **info@sthelena.vic.edu.au**
  Principal: **Trudy Thomson**
  Wednesday 17th September 2008

- **Christian College,** Senior School
  135 Pigdon's Road, Waurn Ponds, 3216

  Telephone: **(03) 5241 1577**
  Facsimile: **(03) 5243 846**
  Email: **senior@ccg.vic.edu.au**
  Head of campus: **Glen McKeeman**
  Tuesday 10th Feb 2009

- **Kardinia International College**
  Kardinia Drive, Bell Post Hill, Geelong

  Telephone: **(03) 5278 9999**
  Facsimile: **(03) 5278 9529**
  Email: **kardinia@kardinia.vic.edu.au**
  Principal: **Geof Woolard**
  Monday 18th May 2009

- **Belmont High School**
  Rotherham St , Belmont, 3216

  Telephone: **(03) 5243 5355**
  Email: **belmont.hs@edumail.vic.gov.au**
  Assistant Principal: **Scott Hucker**
  Friday 17th July 2009

Australian Research Council
Nanotechnology Network

School Visits Photos

St Helena Secondary College

Kardinia International College

Belmont High School

Students Prizes

Reflection Eyeball Hologram Sunglasses

Message Mate

Rainbow Glasses

Mr Muthukumaraswamy Pennirselvam (LaTrobe University)

Report on pre-school visit to NanoVic and School visit in 2009

I visited NanoVic office few times in 2009 regarding collecting the details for my presentation to school students. I met with Dr. Ravi Krishnamurthy and Dr. Sarah Morgan of NanoVic. NanoVic team is very experienced in presenting about Nanotechnology to various ranges of speakers. Ravi and Sarah helped me to cater the presentation that would be very suitable for young audiences.
They also gave lot of tips and ideas to make the presentations.

I have also noted the following information from NanoVic.

- Overview of NanoVic
- NanoVic's Educational partners
- NanoVic's achievements
- Australian Nano Business Forum
- Nanotechnology Resources for Education at NanoVic

Meeting at NanoVic (from left to right) Muthu, Sarah and Ravi

School visited in 2009:
Eumemmerring Secondary College
Glen Eagles College, Endeavour Hills, VIC 3802
p: 03 9708 1319 f: 03 9708 1324
Contact: Ms. Kapadia

My power point presentation included

- Introduction to Nanotechnology
- Brief history about Nanotechnology
- How big is Nano?
- Importance of Science in Nanotechnology
- Nanosensor development
- Nanocoatings
- Nanocomposites
- Commercial applications of Nanotechnology (current and Future)

I also showed animations of proposed / currently in research products of Nanotechnology

- Cleaning glass surface using nanoparticles
- Design at a molecular level (future fabric)
- Diagnostic imaging using Nanotechnology
- Nanostructured mesoporous iron oxide for water purification
- Pulmonary nanoparticle delivery
- Water analysis using Nanotechnology

Students liked the animation on the "Nanotechnology Innovations in Food Safety and Quality". The responses from both students and teacher were very positive. Teacher appreciated this kind of forum and especially the ARCNN ambassador program. I would like to thank the Australian Research Council Nanotechnology Network for giving me this opportunity.

WORKSHOPS, CONFERENCES AND EVENTS

WORKSHOPS, CONFERENCES AND EVENTS

The purpose of the workshops, Conferences and Events 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. A Large number of ECRs and students have been supported to attend these events.

ARCNN Early Career Researcher and Postgraduate Student Symposium 19/02/2009 - 20/02/2009

The Australian Research Council Nanotechnology Network (ARCNN) held its Early Career Researcher and Postgraduate student Symposium on Nanotechnology at the Research School of Physics and Engineering at the Australian National University on the 19th and 20th of February 2009.

Symposium Details:

The symposium was held across 2 days. Prof Paul Meredith from the University of Queensland gave a very interesting talk titled from "Shampoo to Solar Cells –An alternative ResearchCareer Pathway" A total of 42 postgraduate research students from around Australia presented talks and there were 60 attendees.

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.

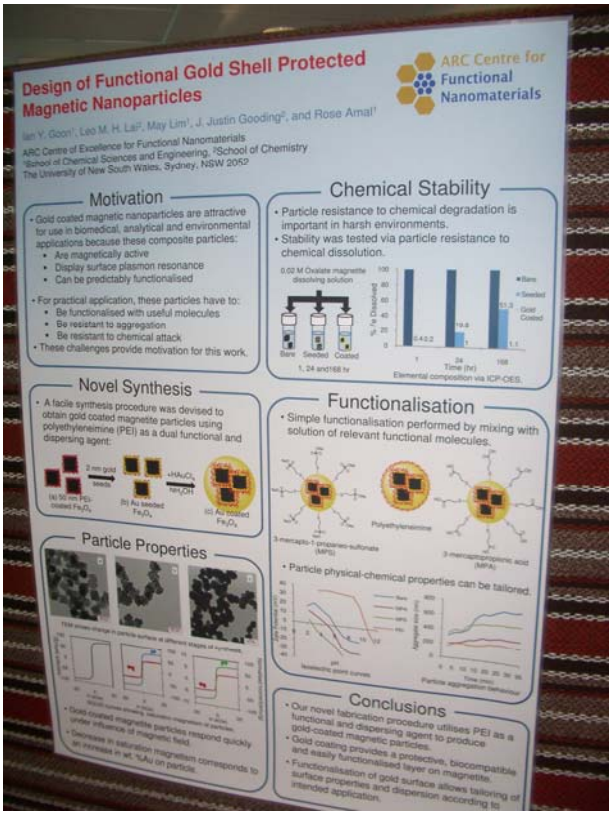
Symposium Chairs:

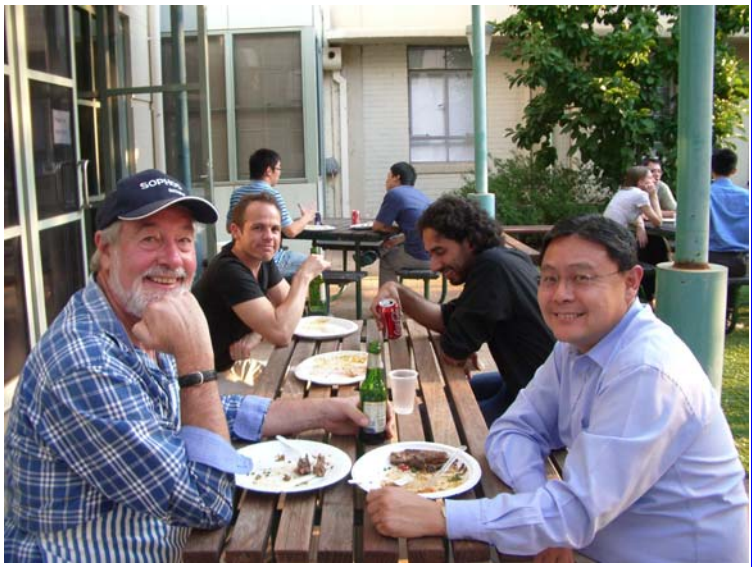
Dr Adam Micolich, University of New South Wales
Miss Hannah Joyce. Australian National University

Attendees at the Symposium

Miss Hannah Joyce and Mr Ryan Weed


From Shampoo to Solar Cells – An Alternative Research Career Pathway


Design of Functional Gold Shell Protected Magnetic Nanoparticles
ARC Centre for Functional Nanomaterials
Motivation
Chemical Stability
Novel Synthesis
Functionalisation
Particle Properties
Conclusions



List of student presenters

Oral	Abdul Sattar	University of Canterbury, Christchurch, New Zealand
Oral	Anna Sokolova	ANSTO, Menai, NSW
Oral	Steve Lade	Australian National University
Poster	Danyu Liu	Australian National University, Canberra
Poster	Hannah Joyce	Australian National University, Canberra
Oral	Ian McKerracher	Australian National University, Canberra
Poster	Suriati Paiman	Australian National University, Canberra
Oral	Paolo Falcaro	CSIRO Manufacturing and Materials Technology, Clayton Victoria
Oral	Dario Buso	CSIRO Materials Science and Engineering VIC
Oral	Daniel Gomez	CSIRO Materials Science and Engineering, VIC
Oral	Aurelia W Dong	CSIRO Molecular and Health Technologies, Clayton, VIC
Oral	Minoo Naebe	Deakin University, Geelong, VIC
Oral	Yaqiong	Deakin University, Geelong, VIC
Oral	David Sprouster	EME, ANU
Oral	Cameron Shearer	Flinders University, Adelaide, SA
Oral	Javad Foroughi	Intelligent Polymer Research Institute, University of Wollongong
Oral	Carlo Bradac	Macquarie University, Sydney
Oral	Greg Yuejun Kang	Monash University
Oral	Chi P Huynh	Monash University, Clayton, Victoria
Oral	Ming Tan	Monash University, Victoria
Oral	Maksym Rybachuk	Queensland University of Technology, Brisbane, Australia
Oral	Paul G. Spizzirri	School of Physics, University of Melbourne
Oral	Roslyn Tedja	The University of New South Wales, Sydney
Oral	Hilda Wiogo	The University of New South Wales, Sydney NSW
Oral	Zhen Li	The University of Queensland, QLD
Oral	Qiao Sun	The University of Queensland, Qld, Brisbane
Oral	Andrew das arulsamy	The University of Sydney, Sydney, NSW

Oral	Jing-Hua Fang	University of Melbourne, VIC
Oral	Brett Johnson	University of Melbourne, Victoria
Oral	Kristy Vernon	University of Melbourne, Victoria
Oral	Lisa Yu (YU Tao)	University of New South Wales, Sydney NSW
Oral	Mega Ng	University of New South Wales, Sydney NSW
Oral	Belinda Hartmann	University of Queensland, QLD
Oral	Sheng LIU	University of Queensland, QLD
Oral	Chee Howe	University of Sydney, NSW
Oral	Monica Hanus	University of Sydney, NSW
Oral	Jeremy Allan	University of Western Sydney, NSW
Oral	Peter Sherrell	University of Wollongong, Wollongong
Oral	Richard Lee	University of Wollongong, Wollongong
Oral	Shulei Chou	University of Wollongong, Wollongong
Oral	Thien Tran-Duc	University of Wollongong, Wollongong
Oral	Tony Wright	University of Wollongong, Wollongong
Oral	Yue Chan	University of Wollongong, Wollongong

PECS VIII - The 8th International Photonic & Electromagnetic Crystal Structures Meeting - 05/04/2009 - 09/04/2009

Conference report: PECS VIII, April 5-9, 2009
Michael J. Steel,
Department of Physics and Engineering, Macquarie University, NSW 2109, Australia
Benjamin J. Eggleton
School of Physics, University of Sydney, NSW 2006 Australia

The 8th International Photonic & Electromagnetic Crystal Structures Meeting (PECS-VIII), was held at Cockle Bay Wharf, Sydney from April 5-9, 2009. This series of meetings, now entering its second decade, is the world's premier conference dedicated to photonic crystal research and related activities. It attracts most of the leaders in the field and the list of registrants is a good first approximation to defining the photonic crystal community. Despite the pressures of the global financial crisis, this year's meeting attracted 250 participants and over 100 papers. Past PECS events have seen significant advancements and a fair share of controversy, and this edition did not disappoint. By good fortune, day two of the meeting coincided with the announcement by the Prime Minister of the new National Broadband Network on a scale no one had anticipated, so it was an exciting week for Australian microphotonics.

One of the joint founders of the field, Eli Yablonovitch, opened the conference with a clear message that photonic crystals are now deeply embedded in many fields especially, energyrelated areas. He gave key examples in LED lighting and photovoltaic solar cells. In both these systems, a fundamental problem is getting all the light out, or in, as the case may be: LED light is trapped by total internal reflection, incident solar light is naturally partially reflected. The traditional solution to both these problems is surface roughening of the active layer, but patterning with photonic crystals provides new scope for engineering. Eli revealed that he had long ago shown that photonic crystals could not improve on the Lambertian light distribution from a roughened surface. He was delighted to have been proved wrong in that many lighting applications call for directed emission for which photonic crystals are ideal, an idea now been commercialised.

Research activity in solar cells and improving efficiency with photonic crystals was a strong theme in the conference which featured a plenary delivered by Prof Martin Green, the leader of the world-renowned photovoltaic group at the University of New South Wales. Later, Shanhui Fan introduced us to the field of thermo-photovoltaics, explaining that the theoretical 42% efficiency limit of silicon solar cells is a result of two things we can do little about: the temperature difference between the surfaces of the Sun and the earth, and the inconvenient truth that the emission spectrum of the Sun is not a delta function just above the silicon bandgap. To overcome the contribution of the first problem, in thermo-photovoltaics an intermediate absorbing layer is introduced. Shanhui's group proposes using a tungsten layer at over 2000K, and to improve the poor absorbance of tungsten incorporates a surface patterning in the form of nanopyramids-the "Moth-eye" structure. The mismatch of the solar emission and silicon absorption spectra could be mitigated using an omnidirectional bandgap structure.

In recent years, PECS has broadened to embrace the growing metamaterials effort and this year's meeting continued the trend. Metamaterials founder Sir John Pendry gave a provocative talk in which he revealed that the vacuum itself is a negative index material for negative frequency electromagnetic waves, but that we never notice because the positive and negative frequencies rarely interact. The key to connecting the two is time reversal systems such as four-wave mixing. Teatime opinions ranged from seeing this as a remarkable insight to subtle tricks with mirrors[1].

A continuing theme at recent meetings is the influence of disorder on the loss of slow light waveguides. This year brought contributions from the groups of Kobus Kuipers, Thomas

Krauss and Romuald Houdré. It seems that with clever design work it may be possible to get around the severe $1/v_g$ [2] losses predicted and observed previously. Other highlights included startling pictures of freestanding chiral metamaterials from Martin Wegener, on-chip quantum photonics from Jelena Vuckovic, very high-Q coupled 1D nanocavities from groups at Harvard and CEA-Grenoble, and a range of impressive fabrication results using nanoimprint and micro-manipulation technologies.

Social program

PECS-VIII had a lively social program including the compulsory harbour cruise, but the highlight of the week was the post dinner revelry led by Thomas Krauss at the Tuesday night conference dinner. Never one to shy from controversy, Thomas tackled the two questions *Have metamaterials surpassed photonic crystals*? and *Will there be a Nobel prize in photonic crystals?* A plot of citation rates showed that both metamaterials and photonic crystals are growing healthily with photonic crystals still an order of magnitude ahead. We don't yet all need to jump or onto the metamaterials bandwagon. But as reflected in the technical program, photonic crystals are now as much an enabling platform for other sciences and technologies as a field of fundamental research in their own right. The second question regarding a Nobel prize was particularly sensitive given that all the scientists currently regarded as likely winners were in the room at the time, but was handled by a number of speakers with grace and humour. Both Thomas and Sajeev John pointed out that prizes have been awarded in the past both for fundamental advances (QED, binary pulsars...) and technological ones (particle detectors, the integrated circuit...). Photonic crystals are in the fortunate position of representing both types with the latter growing strongly, so while there has been an unofficial Nobel shortlist for many years, it could well be that the real prize winner is yet to enter the field. Susumu Noda brought down the house with his suggestion that whatever else is decided in Stockholm, Thomas Krauss had already earned a Nobel for Entertainment.

[1] or more accurately, phase conjugate mirrors!

Prizewinners

Although the standard of presentation throughout was extraordinarily high, an international committee led by Prof Kobus Kuipers awarded the following student prizes:

RAITH prize for best student poster

1st prize, $500: Michael Thiel, of *Universitaet Karlsruhe* for *Towards complete polarisation band gaps in 3-D chiral photonic crystals*

Equal runners up, $250 each: Yinan Zhang, *Harvard University* and Sangwoo Ha, *The Australian National University*

CUDOS prize for best student oral presentation

1st prize, $500: Aniwat Tandaechanurat, *The University of Tokyo* for *Demonstration of high-Q (>7700) three-dimensional photonic crystal nanocavity*

Equal runners up, $250 each: Jens Niegemann, *Universitaet Karlsruhe* and Iris Bergmair, *Profactor GmbH*

The conference dinner also saw the presentation of the Elsevier PNFA Young Scientist Award to Dr. Cecile Jamois for her highly-cited 2003 paper *Silicon-based two-dimensional photonic crystal waveguides* in the very first issue of Photonics and Nanostructures-Fundamentals and Applications.

PECS-IX

The next meeting, PECS-IX will be held in Granada, Spain in the week of September 26-30, 2010, with Cefe Lopez as Director. We look forward to more great science and exciting tours of the Alhambra. Early details are at this website: http://luxrerum.icmm.csic.es/?q=node/PECS-IX.

Bouquets

It was a pleasure to work with the other members of the local organising committee: convenors Ben Eggleton (USyd.) and Yuri Kivshar (ANU), and Chris Walsh (USyd.), Christelle Monat (USyd.), Christian Grillet (USyd.), Ross McPhedran (USyd.) and Adel Rahmani (UTS). Special thanks to the last four, my partners on the technical program subcommittee, for their time, commitment and enthusiasm in constructing a fantastic scientific program. Finally we greatly appreciate the outstanding efforts of conference organiser Ros Barrett-Lennard and her team for producing yet another smooth-running optics conference in Sydney.

The organising committee appreciates the support of The Australian Optical Society as Technical Co-sponsor of the meeting, as well as the support of these sponsors:CUDOS—The ARC Centre of Excellence for Ultrahigh-bandwidth Devices for Optical Systems; The School of Physics, The University of Sydney; NSW Office for Science and Medical Research, Department of State and Regional Development; The Australian National University; United States Air Force and Office of Scientific Research; Asian Office of Aerospace Research and Development (AOARD); Elsevier; The Australian Research Council; ARCNN - Australian Research Council Nanotechnology Network ; ARNAM -The Australian Research Network for Advanced Materials; The National Computational Infrastructure; The Platform Technologies Research Institute, Royal Melbourne Institute of Technology; Swinburne University of Technology; Mathematics Department, The University of Technology, Sydney; Raith Asia Ltd; and RSoft Design Group.

ECR/Students covered by ARCNN Funding

ECR

Andrey Miroshichenko

STUDENT

Ivan Garanovich (ANU)
Elisa Nicoletti (Swin)
Xinyuan Qi (ANU)
Jiafang Li (Swin)
Martin Blaber (UTS)
Luke Stewart (Mac)
Dougal Kan (UTS)

Nanophotonics Down Under 2009: Devices and Applications- 21/06/2009

Nanophotonics Down Under 2009 Devices and Applications (SMONP 2009) was held at Melbourne Convention Centre, Melbourne from June 21-24, 2009.

This meeting was held under the banner of **The Sir Mark Oliphant Conferences (SMO) - International Frontiers of Science and Technology**, a conference series under the Australian Government's International Science Linkages Programme. The SMO conferences are designed to stage strategically significant international conferences in Australia on high priority, cutting edge, multi-disciplinary themes, and the Nanophotonics Down Under 2009 fulfilled its aim nicely. It attracted leaders in the interdisciplinary field of solar cells, nanoplasmonics, biophotonics and photonics crystals, as well as 120 presentations from 18 different countries (total 165 participants) to provide forum for emerging applications of nanophotonics.

The program of SMONP 2009 was preceded by a Public Lecture and High School Teachers Workshop scheduled on Sunday 21st June. The lecture and workshop was to expose general public to the current research in nanophotonics, and the speakers (Martin Green, Masud Mansuripur, Paul Mulvaney and Tim Senden) did not disappoint. Their lectures were dexterously delivered to integrate audience with varying scientific background.

The main event was opened with Suntech Co. Ltd CEO Dr Zhengrong Shi from China, who gave an excellent overview of the solar cell industries and how Suntech is prepared to move forward by fusing nanophotonics in next generation solar cells. Prof. Susumu Noda from Kyoto University was the second plenary speaker, who presented equally exciting developments in dynamic photonic crystals and lasers for ultra-capacity communications. The sessions followed, on photovoltaics, nanomaterials, nanoplasmonics, plasmonics, optical circuits, biophotonics, metamaterials, optical storage and optical tweezers. Throughout the sessions, it was evident that efforts put in to integrate optically addressable nanostructured materials for enhancing performance of solar cells, photovoltaics, communications, storage and medical applications.

The conference also featured Rachel Won from Nature Photonics for a promotional talk, in which she announced the first inaugural impact factor of Nature Photonics – massive twenty something that got everyone talking. It was a great achievement for the journal to reach such level in such a short period of time.

The winery tour at Domain Chandon and conference dinner at the Stone of the Yarray Valley on Tuesday night was a lively event. The wine tasting game at the Stone provided opportunity to taste great variety of wines produced locally. It perhaps was a little biased towards locals as evidenced by the winners (Ben Eggleton, David Moss and the Aussie cohorts) and losers (Masud Mansuripur, Nikolay Zheludev, Rachel Won and their international cohorts), but it nevertheless was a great social event for everyone.

Min Gu and James W. M. Chon

NP2009 group photo


Loser table members receiving olive oil gifts at the wine tasting game

Title	Surname	Given Name	Receipt	Country	University
Ms.	Beck	Fiona	Yes	Australia	Australian National University
Mr.	Blaber	Martin	Yes	Australia	University of Technology, Sydney
Dr.	Funston	Alison	Yes	Australia	The University of Melbourne
Dr.	Gibson	Brant	Yes	Australia	The University of Melbourne
Mr.	Giulianini	Michele	Yes	Australia	Queensland University of Technology
Dr.	Izdebskaya	Yana	Yes	Australia	Australian National University
Dr.	Jin	Dayong	Yes	Australia	Macquarie University
Dr.	Mokkapati	Sudha	Yes	Australia	Australian National University
Dr.	Spizzirri	Paul	Yes	Australia	University of Melbourne
Mr.	Stokes	Nicholas	Yes	Australia	University of Technology Sydney
Dr.	Vernon	Kristy	Yes	Australia	CSIRO
Dr.	Ruan	Yinlan	Yes	Australia	University of Adelaide
Mr.	McGuinness	Liam	Yes	Australia	University of Melbourne
Dr.	Wen	Xiaoming	Yes	Australia	The university of Melbourne
Ms.	Warden	Julie	Yes	Australia	
Ms.	Fang	Jinghua	Yes	Australia	University of Melbourne
Dr.	Karg	Matthias	Yes	Australia	University of melbourne
Saudi Club (undergraduate students)					
	Reem	Al Amoudi	Yes	Australia	La Trobe university
	Abdullah	Alshehri	Yes	Australia	RMIT University
	Abdullah	Alajlan	Yes	Australia	Melbourne university
	Ali	Abu Aid	Yes	Australia	Monash university
	Atallah	AL-ANAZI	Yes	Australia	RMIT University
	Abdulkhaliq	Alabdulkhaliq	Yes	Australia	Monash University
	Khalid	Majrashi	Yes	Australia	RMIT university
	Nasser	Alawwad	Yes	Australia	RMIT university
	Nahlah	Almansour	Yes	Australia	RMIT university
	Anbar	Aldawsari	Yes	Australia	RMIT university
	Abdullah	Alhassani	Yes	Australia	RMIT university
	Ahmed	Abutaleb	Yes	Australia	RMIT university
	Ahmad	Alotaibi	Yes	Australia	RMIT university
	Waleed	AL-Twejri	Yes	Australia	RMIT university
	Moneer	AL-Shaikh	Yes	Australia	Monash University
	Mohammed	Otayf	Yes	Australia	RMIT university
	Mowffaq	Oreijah	Yes	Australia	Melbourne University
	Sameer	Maashi	Yes	Australia	RMIT University
	Musleh	Alsulami	Yes	Australia	Monash University
	Mohammed	Hariri	Yes	Australia	RMIT University

Hole Burning, Single Molecule & Related Spectroscopies: Science and Applications - 22/06/2009 - 27/06/2009

Report on
The International Conference on Holeburning, Single Molecule and Related Spectroscopies: Science and Applications, June 22-27, 2009, Palm Cove, Queensland

ARCNN financial support for *The International Conference on Holeburning, Single Molecule and Related Spectroscopies: Science and Applications, June 22-27, 2009, Palm Cove, Queensland*

HBSM 2009 was the 10th international conference on hole burning and single molecule spectroscopies. 67 delegate attended and 30 were from Australia and 37 from overseas. Of the Australians 18 were students and 6 early career researchers (24 supported by ARCNN).
The conference included 13 Keynote talks, 37 contributed talks and 30 poster presentations. The early career researchers and students were well represented in each of these and were very involved in all aspects of the conference. The proceedings is published in two components: Procedia (15 papers on web) and Special Issue of Journal of Luminescence (17 papers) and involved 12 contributions from ECR and students.

Funding Support for Students and Early Career Researchers
$5000 was received from ARCNN and was used in conjunction of funds from the ARNAM to reduce registration cost from $1100 to $650. The registration included all meals and involvement in all social functions plus the cost of publication of the conference proceedings. A small amount also went to poster prizes.
The following each received $200 from ARCNN
Early Career Researchers:
Dr Stojan Rebic, Dr Carlo Bradoc, DrJ-H Schonfeldt (all Univ Macquarie); Dr Julius Orwa (Univ Melbourne); Dr Paul Stanwix (returning to Univ Western Australia); Anita Smith (ANU). Students
Marcus Doherty, Liam Hall, Igor Aharonovich, Kumar Goreshelev, Alistair Stanley, Aldosary Mohammed (all Univ Melbourne); Rose Ahlefeldt, John Bartholomew, Lachalan Rogers, Roger McMurtrie, Serjie Armstrong, Sarah Bevan, Elisabeth Goldschmidt, Morgan Hedges (all ANU); Bradley Smith, Daniel Gruber Univ Queensland); Barim Yidirim, Zhiqiang,Liu (UNSW, ADFA)
All were asked to join the ARCNN Network and acknowledge the support of the Nework in their conference proceedings.

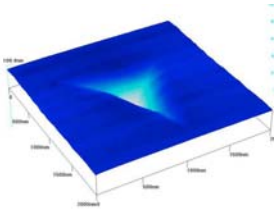
Committee:
The Organising Committee is very grateful for the support and this was acknowledged in all conference publications.

Elmars Krausz (ANU), Matthew Sellars (ANU), Hans Riesen (UNSW, ADFA), Taras Plakhotnik (UQ), James Rabeau (U Macquarie), Jason Twamley (U Macquarie), Andrew Greentree (U Melb.), Roger Reeves (U Christchurch, NZ), Jevon Longdell (U Otago, NZ).

Neil Manson (ANU),
Conference Chair

Third Australian Nanoindentation Workshop- 5/07/2009 - 07/07/2009

Report on
Australian Nanoindentation Workshop



5-7th July 2009
The Australian National University
Canberra, Australia

The Third Australian workshop on nanoindentation was held at Canberra at the Australian National University on July 5-7th 2009. This workshop was a great success with 44 participants from 21 organizations coming together from around Australia and overseas to discuss nanoindentation.

The aim of this workshop 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. There was also a strong focus on enabling researchers new to the field of nanoindentation, particularly graduate students and early career researchers, to network with more established researchers in the area.

Since the last Australian workshop on nanoindentation in 2007, there has been continued and growing interest in the technique, especially within the fields of biotechnology, materials science, and nanotechnology. This builds on the strong foundation with at least 24 instruments currently in place over several institutions across Australia including at least 6 new instruments.

The workshop started on Sunday 5th July with a welcoming reception at the Research School of Physics and Engineering before an evening users meeting run by Hysitron and Coherent Scientific (co-sponsors of the workshop). All participants were invited to this session with the aim of creating an informal network of Australian Hysitron users.

The formal presentations commenced on Monday morning at the Finkel Lecture theatre with an invited contribution by Dr Michelle Oyen (Cambridge University). Michelle has recently established a lab on the mechanical properties of bio-materials at Cambridge and presented a very interesting talk the nanoindentation of various materials including bone and cancer tumors. She is working on a project hoping to build an-indenter-like instrument to determine the boundaries of tumors in-situ which was very interesting.

The next session of the day consisted of presentations by both ECRs and students on biological applications, a topic that has clearly grown in interest since the last workshop 2 years ago. After lunch there were a series of more general talks from company representatives and experienced researchers before a tour of the ANU labs hosted by Dr Jodie Bradby and Dr

Simon Ruffell (ANU). This included white-board discussion covered a range of fundamental and practical topics important to the field of nanoindentation and the aim was to use the experience in the room to address a range of common user issues and concerns. A workshop dinner was held at Vivaldi's restaurant at the ANU.

The first presentation on the following (and final day) of the workshop was an invited contribution by Dr Tony Fischer-Cripps on the fundamentals of nanoindentation testing. Tony is the author of a book on nanoindentation and provided all workshop participants with a complementary 60-page summary of the text in the form of a A5-sized booklet.

The student prize for the best talk was awarded at the conclusion on the final session by Dr Michelle Oyen.

Participation:

We were very pleased to note that the interest in the workshop remains strong. We had 44 participants in 2009, compared to 53 in 2005, and 48 in 2007. The 44 this year consisted of 23 students, 7 ECRs, 9 career researchers and 5 industry representatives. We also had 2 accompanying persons (2 partners).

The participants represented a wide range of institutions including 12 different universities across Australia. In addition we had participants from NZ, the USA and the UK. Representatives from two nanoindentation companies (Hysitron and UMIS) also attended.

Student Participation

As outlined above 23 students participated in the workshop. Of these 5 students presented their work in an oral presentation. The standard of contributions from the students was impressive and the judge (Michelle Oyen) commented that it was extremely difficult to make a decision, with only a few points (from a possible 35) separating the top and bottom-ranked talks. The prizes was awarded to **Ms Rocio Seltzer** from The University of Sydney. She received $300 and a framed certificate knowledging her achievement.

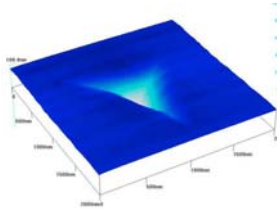
Dr Oyen congratulating Ms Rocio Seltzer on winning the student prize.

ECR Participation

9 ECRs attended the workshop and 5 presented their work.

The $5000 sponsorship from both the ARC Australian Nanotechnology Network and the ARC Australian Advanced Materials allowed us to offer **free** registration for students and a discounted rate of $110 (inc GST) to ECRs. The sponsorship also enabled us to offer generous travel subsidies for students to offset the cost of flights or car hire. 14 such awards were made totaling ~$4000. Note that many students pooled their costs so the awards actually covered the majority of the students who attended the workshop.The full registration was levied at $220 per person. The workshop was fully catered (morning tea, lunch, afternoon tea and two dinners) and the registration also the workshop dinner held at Vivaldi's restaurant on the final evening.

Third Australian Nanoindentation Workshop 5-7th July, 2009
Participant List



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Miss Thakshila Balasuriya	University of Melbourne	bts@unimelb.edu.au
Dr Luiz E. Bertassoni	University of Sydney	luiz.bertassoni@student.usyd.edu.au
Dr Oscar Borrero-Lopez	University of NSW	oscar@unsw.edu.au
Dr Jodie Bradby	Australia National University	jodie.bradby@anu.edu.au
Mr Yang Cao Leo	University of Sydney	ycao0780@mail.usyd.edu.au
Dr Li Chang	University of Sydney	i.chang@usyd.edu.au
Mr Kuiyu Cheng	University of Wollongong	kc938@uow.edu.au
Dr John Codrington	SA Pathology	john.codrington@adelaide.edu.au
Mr Pranesh Dayal	University of NSW	pranesh@unsw.edu.au
Mr Brett Delahunty	Warsash Scientific	brett@warsash.com.au
Mr Guanyu Deng	University of Wollongong	gd577@uow.edu.au
Mrs Sarita Deshmulh	Australia National University	saritakdeshmukh@gmail.com
Dr Michelle Dickinson	Univerity of Auckland	m.dickinson@auckland.ac.nz
Ms Shaymaa Elsaka	University of Sydney	shaymanaghy@mans.edu.eg
Mr David Fanany	Monash University	david.fanany.eng@monash.edu.au
Mr Gregory Favaro	CSM Instruments	Gregory.Favaro@csm-instruments.com
Dr Tony Fischer-Cripps	Fischer-Cripps Laboratories	tony.cripps@ibisonline.com.au
Mr Christian Gow	Coherent Scientific	Christian.Gow@coherent.com.au
Ms Bianca Haberl	Australia National University	bxh109@rsphysse.anu.edu.au
Prof Han Huang	University of Queensland	han.huang@uq.edu.au
Dr Buyung Kosasih	University of Wollongong	buyung@uow.edu.au
Mr Charles Moy	University of Sydney	c.moy@usyd.edu.au
Mr Guillaume Michal	University of Wollongong	gm97@uow.edu.au
Prof Paul Munroe	University of NSW	p.munroe@unsw.edu.au
Dr Michelle Oyen	University of Cambridge	mlo29@cam.ac.uk
Ms Arwen Pagon	RMIT	s3135103@student.rmit.edu.au
Miss Diana Pham	Flinders University	diana.pham@flinders.edu.au
Dr Donna Roberts	Antartic Climate and Ecosystems CRC	d.roberts@acecrc.org.au
Dr Simon Ruffell	Australia National University	simon.ruffell@anu.edu.au
Ms Rocio Seltzer	University of Sydney	r.seltzer@usyd.edu.au
Miss Stefanie Sham	University of Melbourne	p.sham@pgrad.unimelb.edu.au
Dr Krishna Shankar	Australian Defence Force Academy	k.shankar@adfa.edu.au
Mr David Sprouster	Australia National University	djs109@rsphysse.anu.edu.au
Miss Lihong Su	University of Wollongong	ls572@uow.edu.au
Mr Yong Sun	University of Wollongong	ys944@uow.edu.au
Dr Jen Weeks	Coherent Scientific	jen.weeks@coherent.com.au
Dr Amy P C Wo	University of NSW	a.wo@unsw.edu.au
Mr Kelvin Xie	University of Sydney	y.xie@usyd.edu.au
Ms Yimeng Yang	University of Western Australia	yyimeng@mech.uwa.adu.au
Dr Hongtao Zhu	University of Wollongong	hongtao@uow.edu.au
Mr Qiang Zhu	University of Wollongong	qz757@uow.edu.au
Dr Ruth Zoehrer	Flinders University	ruth.zoehrer@flinders.edu.au

MM2009 – Molecular Modelling Conference – Mantra Legends Hotel, Gold Coast, Queensland

Molecular Modelling 2009 – Final Report to the ARCNN

The Molecular Modelling 2009 (MM2009) conference was held from 26 to 29 July 2009 at Surfer's Paradise, Gold Coast, Australia. Chaired by Profs Sean Smith (UQ) and Alan Mark (UQ), and under the auspices of the Australian Molecular Modelling Association (AMMA), the conference focused on the latest developments in molecular modelling in both the life sciences and materials sciences, particularly in the areas of Methodology Development, Drug Design, Materials & Nanotechnology, Dynamics & Chemical Reactivity, Self Assembly & Biomolecular Simulations, and Sustainable Energy & Environment.
Using a framework of 14 sessions, the conference discussed the latest research and developments in molecular modelling. Of the overall 50 talks, the audience heard and enthusiastically participated in 5 plenary presentations (including the Hush Lecture by Prof Abraham Nitzan, Tel Aviv) and 6 keynote talks.

The conference was attended by 94 national and international (Israel, Japan, Korea, New Zealand, Singapore, Turkey, UK, USA) researchers, including 32 students. AMMA, MGMS and RACI members received a discount on the registration fees. Student registration was discounted by AUD 320 (early bird price) and AUD 330 (full price). **The grant of $5000 awarded by ARCNN** enabled the MM2009 conference to offer 16 students, who work and/or presented on nanotechnology studies, a discount on registration (see attached list). The remaining 16 discounts on student registrations were covered by other sponsor income.

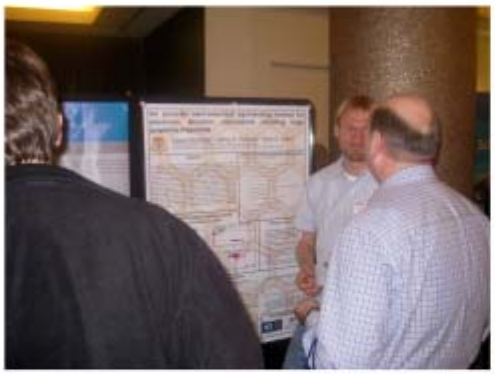
All sponsors of the conference were given a complimentary registration by the committee. In agreement with ARCNN, their registration was converted to the **ARCNN Student Prize**, the first award at a Molecular Modelling Conference. Student posters were assessed by judges chosen from the invited speakers (Gerit Groenhof, MPI Goettingen; Brett Church, University of Sydney) and the winner announced at the conference dinner. The ARCNN Student Prize, comprising a certificate and a cheque of AUD 300, was awarded to Sören Wohltat for his poster "An accurate semi-empirical tight-binding method for electronic structure calculations involving large graphene fragments".

MM2009 received press coverage by an interview with Teresa Head-Gordon about her work on causes of Alzheimer's in the Gold Coast Bulletin (28 July 2009).

The Molecular Modelling 2010 conference will be organised by Irene Yarovsky (RMIT University Melbourne).

The captivating opening plenary lecture by Prof Richard Catlow (UK).

Gerit Groenhof (center) assessing student posters during the lively poster session.



Sören Wohltat (2nd from right) presenting his poster on a new semi-empirical method on graphene nanotechnology.

Conference Chair Prof Sean Smith (center), Conference Secretary A/Prof Debra Bernhardt (left), and Johannes Reynisson from Auckland (right) take a break from the poster session.

Prof Sean Smith addressing the attendees at the Conference Dinner.

Conference: Molecular Modelling 2009 (#13118) Date Printed: 18 Jul 2009 10:50
Student Registrations Report
32 Tickets

Registration	Surname	First Name	Title	Company
AMMA Member	Chen	Po-chia	Mr	School of Physics
AMMA Member	Chen	Rong	Mr	UQ
AMMA Member	Mandumpal	Jestin	Mr	Curtin University of Technology
AMMA Member	Nair	Pramod	Mr	University of Queensland
AMMA Member	Puscasu	Ruslan	Mr	Swinburne University of Technology
AMMA Member	Schmitz	Christophe	Mr	The University of Queensland
AMMA Member	Treutlein	Herbert	Dr	Qubist Molecular Design
AMMA Member	Zeng	Jun	Dr	Qubist Molecular Design
AMMA Member	Todorova	Nevena	Ms	RMIT University
AMMA Member	Yiapanis	George	Mr	RMIT University
RACI Member	Amos	Ruth	Mrs	University of Tasmania
RACI Member	Brookes	Nigel	Mr	UTAS
RACI Member	Brookes	Sarah	Ms	Griffith University
RACI Member	Wohlthat	Soren	Mr	University of Sydney
Non-member	Arachchilage	Anoja	Ms	Swinburne University of Technology
Non-member	Bernardi	Stefano	Mr	Swinburne University of Technology
Non-member	Brzozowski	Martin	Mr	La Trobe University
Non-member	Davie	Stuart	Mr	Griffith University
Non-member	Fan	Samuel	Mr	Victor Chang Cardiac Research Institute
Non-member	Ganesan	Aravindhan	Mr	Swinburne University of Technology
Non-member	Jiao	Wanting	Miss	University of Canterbury
Non-member	Jiao	Yan	Ms	Centre for Computational Molecular Science
Non-member	Lyle	Matthew	Mr	University of Sydney
Non-member	Mathew	Mark	Mr	U. Queensland
Non-member	NEBIOGLU	Mehmet Dogu	Mr	Ankara University
Non-member	NEBIOGLU	Serpil	Mrs	Ankara University
Non-member	Oehme	Daniel	Mr	La Trobe University
Non-member	O'Reilly	Robert	Mr	The University of Sydney
Non-member	Ouyang	Defang	Mr	Centre for Computational Molecular Science
Non-member	Paul	Blessy	Ms	Structural Chemistry, Eskitis Institute, Griffith University
Non-member	Varano	Adrian	Mr	RMIT University
Non-member	Yeo	Wee Kiang	Mr	Novartis Institute for Tropical Diseases

16th AINSE Conference on Nuclear and Complementary Techniques of Analysis 25/11/2009 - 27/11/2009

AINSE Ltd
ABN 18 133 225 331

18 December 2009

Ms Liz Micallef
Network Manager
Australian Research Council Nanotechnology Network (ARCNN)
Research School of Physical Sciences and Engineering (Building 60)
The Australian National University
Canberra ACT 0200 Australia

Dear Liz,

Report to ARCNN on funding support received for the 16th AINSE Conference on Nuclear and Complementary Techniques of Analysis. AINSE, Lucas Heights, 25 – 27 November 2009

The 16th AINSE Conference on Nuclear and Complementary Techniques of Analysis was very successful and we are very grateful to ARCNN for assisting us in staging the conference by providing funding support for student and ECR travel and accommodation.

The conference focused on papers and presentations in the following areas

- Nuclear and complementary techniques of analysis
- Surface science
- Ion beam analysis & interactions with matter
- Nanometre science and technology
- Neutron activation analysis
- Vacuum science and metallurgy
- Accelerator mass spectrometry
- Thin films & interfaces
- Ion beam modification of materials.

With emphasis on analytical techniques and interest in the following areas of application

- Advanced materials
- Environmental science
- Archaeology and art
- Geology and minerals
- Biology and medicine
- Synchrotron applications
- Structure of materials
- Electronic materials
- Zoology.

The conference had a strong student focus and featured a tour of the accelerator facilities at ANSTO. Invited speakers included Professor Andy Pitman, who spoke on Recent developments in climate science and climate projections and Professor Ian R. Gentle, who spoke on Science at the Australian Synchrotron.

The full program for the conference is attached as an appendix to this report.

Number of conference delegates: 88 with 81 from Australia and 7 New Zealand
Number of papers received: 98
Number of student delegates: 40
Number of ECRs: 7

Number of Abstracts Received in the Area of Advanced Materials: 39

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AINSE Home page www.ainse.edu.au

AINSE Ltd

ABN 18 133 225 331

Use of ARCNN Funding:
Funding from ARCNN was used to cover airfares and accommodation expenses of students and ECRs (airfares $2,070.40, accommodation $1,436.40).

Breakdown of flights and accommodation

Title	Fname	Sname	Uni/Org
Dr	Andrew	Alves	University of Melbourne
Dr	Jim	Lee	The University of Auckland
Dr	Bobby	Mathan	James Cook University
Mr	Mohammed	Ahsan	Queensland University of Technology
Mr	Lance	Karlson	Australian National University
Mr	Jack	Burgess	University of Melbourne
Mr	Zihan	Poh	University of South Australia
Mr	Robert	Piccinin	University of Melbourne
Total			

Total funding used $3,506.80 including GST
Total ARCNN support provided $3,300 including GST

AINSE thanks ARCNN in providing support for the NCTA 2009 conference.

Kind Regards

Dr Dennis Mather
Managing Directo
AINSE Ltd

Materials and Complexity V11 - 12/12/2009 - 16/12/2009

Event title Materials and Complexity VII
Venue ANU Costal Campus, Kioloa

International Speakers Prof. Norm Morrow, Dr. Gerd Schroeder-Turk, Dr. Philip Evans, Dr Jean-Marc di Meglio, Linnea Andersson

Registered delegates 42, including 15 students and 10 ECRs

Outcomes
This annual workshop has now been held for seven consecutive years. This year it took place 12th-16th of December. The ANU Coastal Campus at Kioloa proved once again to be well suited for this kind of event, offering a relaxed atmosphere on the NSW south coast; an ideal environment for stimulating scientific discussions. As in previous years, the theme for the workshop was centered around the theme ”Materials and Complexity”. The workshop is held by the Dept. of Applied Mathematics at ANU, and was this year organized by Dr. Rob Sok and Jill Middleton.

The participants arrived at Kioloa around noon on the 12th, proving time for all delegates to get to know each other. The first talks commenced the following day. A great variety of lectures, with topics ranging from knots and tangles to high-performance computing and design of complex materials structures made the workshop a great success. We had 42 scientists participating in the event, among them 25 students and ECR’s. The participants included representatives from Australian Universities and ADFA, as well as 5 universities outside Australia.

The aim of the workshop was to bring together researchers and students working across a wide range of topics in order to facilitate cross-fertilisation between research fields.
We covered computational, theoretical, and experimental work, with a main focus on the following areas

• Complexity studies
• Soft Matter and nanorheology
• Nanobubbles, surfactants, polymers and liquid crystals
• 3D Characterisation of material microstructure
• Imaging of complex objects from nano- to the metre-scale
• Transport and mechanical properties of porous and complex materials

We were fortunate to gather a number of prominent researchers on these topics from around the world, ensuring that the discussions following each session were fuelled by ideas from the forefront of materials science research.
The program followed an established and successful recipe to engage young scientists in discussions with their senior counterparts by having a good mix of overview talks given by senior scientists and presentations by students and ECRs. The sessions were chaired by students, ECRs or senior scientists of the host department (Dept. of Applied Mathematics, ANU).
The next event, Materials and Complexity VIII, is tentatively planned for March 2011.

Delegates attending the workshop

Name	University or organisation	Department
Jill Middleton	ANU	Applied Maths
Evgenia Lebedeva	ANU	Applied Mathematics
Shannon Notley	ANU	Applied Maths
Andrew Kingston	ANU	Applied Math., RSPE
Guangming Liu	ANU	Applied Mathematics
Stuart Ramsden	ANU	Dept. of Applied Maths
Vanessa Robins	ANU	Applied Maths
Drew Parsons	ANU	Applied Maths
Abid Ghous	ANU	Applied Mathematics
Mahyar Madadi	ANU	Applied Maths
Tim Senden	ANU	Applied Maths
Gerd Schroeder-Turk	Friedrich-Alexander Universität Erlangen-Nürnberg	Theoretische Physik
Johnny Valbuena	ANU	Applied Mathematics
Paul Veldkamp	ANU	App Maths
Alon Arad	ANU	RSES, RSPHYSSE
Holger Mitschke	University of Erlangen	Theoretische Physik I
Myfanwy Evans	ANU	Applied Maths
Ruud Boesten	ANU	applied mathematics
Liliana de Campo	ANU	Applied Maths
Jafar Qajar	ANU	Applied Mathematics
Rick Walsh	ANU	App Maths
Trond Varslot	ANU	Applied Mathematics
Vincent Tariel	ANU	applied mathematics
Jan James	ANU	App Maths
Norm Morrow	Uni of Wyoming	Chem. and Petr. Eng.
Vince Craig	ANU	Applied Maths
Shane Latham	ANU	Applied Mathematics
Glenn Myers	ANU	Applied Mathematics
Andrew Fogden	ANU	AM
Mohammad Saadatfar	ANU	Applied Mathematics
Philip Evans	University of British Columbia	Centre for Adv. Wood Processing
Jean-Marc di Meglio	University of Paris 7	Physics
Rob Sok	DCL/ANU	Applied Maths
Linnéa Andersson	Stockholm University	Department of Physical, Inorganic and Structural Chemistry
Toen Castle	ANU	Appmaths
Arthur Davies	ANU	Applied Maths
Joe Tayati	ANU	Applied Maths
nicolas francois	ANU	applied maths
Ben Young	DCL	
Yamunasri Palaniandy	Digital Core Laboratories	
Adnan Ahmed	UNSW@ADFA	SEIT
Kamaljit Singh	UNSW@ADFA	SEIT

WEBSITE

NANOTECHNOLOGY FACILITIES AND CAPABILITIES REGISTER

NEWSLETTER

MEMBERSHIP

PLANNED 2010 ACTIVITIES

WEBSITE

http://www.ausnano.net

The ARCNN Website is a very popular website and as at the end of 2009 it received more that 2,000,000 hits to the site, and it is believed that a significant amount of these are from Australia, and there is also interest from a number of other countries.

A separate website page with logo below was added specially for the International Conference on Nanoscience and Nanotechnology that will be held in February 2010 and we will have an ICONN2010 logo on the site.

http://www.ausnano.net/iconn2010/

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
- Nanotechnology Facilities and Capabilities Register
- Reports from Young Nano Ambassadors
- Employment Opportunities
- Links to other websites and events

The website is continually being maintained and updated and there are links to various sites including various surveys, other networks and related activities.

In 2009 the website had 43377 visits from 134 countries. Google was our largest source of traffic with the search terms "iconn" and "arcnn" driving the most traffic to the site.
The most viewed pages on the site where as follows:
* Main page
* List of members
* ICONN 2008
* List of groups

A demographic list of website hits can be found in Appendix B

ACADEMY'S NANOTECHNOLOGY REPORT

The Australian Academy of Science has undertaken a research project for the ARC examining Australia's Nanotechnology trends, applications and collaborations.

ARCNN provided assistance by sending out the survey to members of ARCNN and encouraged them to participate in the survey.

Professor Jagadish (Network Convenor), Prof Gordon Wallace(ARCNN Management Committee member) and Prof Frank Caruso (member of ARCNN) served on the steering committee for the Nanotechnology project.

NANOTECHNOLOGY FACILITIES AND CAPABILITIES REGISTER

The Nanotechnology Facilities and Capabilities Register was established at the end of 2006 and the list of registered facilities and their capabilities can be accessed on the following page
http://www.ausnano.net/index.php?page=facilities
Members and visitors to the site are able to access specific nanotechnology facilities and expertise that is available across Australia.

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 information and 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 the 19th Edition of the ARCNN Newsletter is in Appendix C

This newsletter is not only sent to all members but also to the Friends of the ARCNN.

A list of Friends is in Appendix D

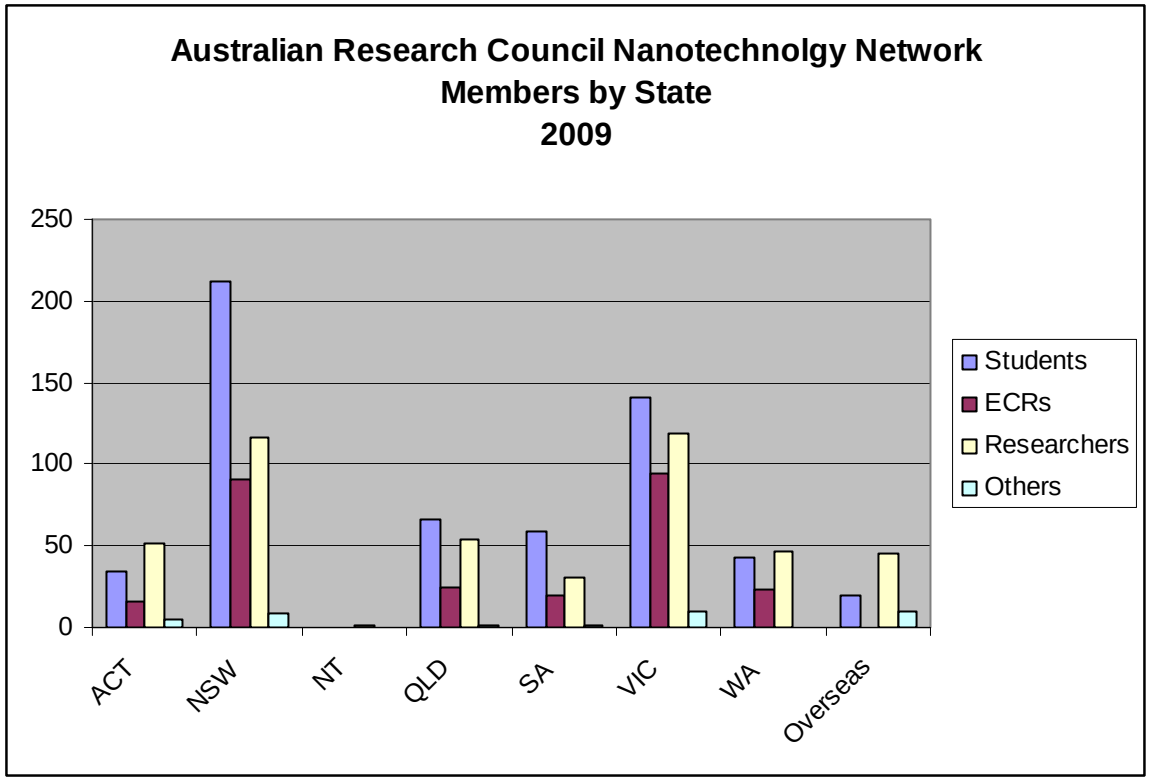
NanoQ (Nano Quest Magazine)

The purpose of this magazine is to highlight resent developments in the field of Nanotechnology in Australia and also to provide information of interest to policy makers and the public.
The second issue was distributed to several schools.
A copy of the second edition is attached to this report.

MEMBERSHIP

The ARCNN membership consists of established researchers, Early Career Researchers, PhD students whose research field is in the area of Nanotechnology. It also consists of members from Government departments and business.

The following is a chart representing ARCNN members per state.



State/Terr	Students	ECRs	Researchers	Others	Total
ACT	34	16	51	5	106
NSW	212	91	116	8	427
NT			1		1
QLD	66	25	54	1	146
SA	59	19	31	1	110
VIC	141	94	119	10	364
WA	43	23	47		113
Overseas	20		45	10	75
TOTAL	575	268	464	35	1342

A list of ARCNN members per state including their affiliations can be viewed in Appendix A

PLANNED 2010 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:

The management committee has also been involved in preparing for the

- **International Conference on Nanoscience and Nanotechnology 2010(ICONN)** which will be held at the Sydney Convention Centre on the 22nd to the 26th of February 2010 which is shaping up to be as outstanding as the previous two conferences.

Planning is also underway for joint ARNAM (Australian Research Network for Advanced Materials) ARCNN ECR and Post Grad Symposium

- **ARNAM/ARCNN Early Career Researcher and Postgraduate Student Symposium** *19/07/2010 -23/07/2010* – Flinders University

There will be a continuation of the successful Overseas Travel Fellowships and Young Nanoscience Ambassador Awards.

Sponsorships for the Following Events during 2010:

- **27th Australian Colloid and Surface Science Student Conference –University of Adelaide** *1-5th February 2010*
- **1ST Australian Symposium of the Membrane Society of Australasia- University of Wollongong** - *18-20th February 2010*
- **9TH International Conference of Excitonic and Photonic Processes in Condensed and Nano Materials 2010 (EXCON/10) - Brisbane - 10-15th July 2010**

Appendix A - ARCNN Members by State

ACT

Arns	Christoph	Dr	ANU
Ashrafi	Almamun	Dr	ANU
Barik	Satyanarayan	Mr	Australian National University
Bartholomew	John	Mr	Australian National University
Beck	Fiona	Miss	Australian National University
Boswell	Rod	Professor	Australian National University
Bradby	Jodie	Dr	Australian National University
Brett	David	Dr	Australian National University
Buda	Manuela	Dr	Australian National University
Burgess	Tim	Mr	Australian National University
Caillard	Amael	Mr	Australian National University
Chadderton	Lewis	Professor	The Australian National University
Charles	Christine	Dr	Australian National University
Charnvanichborikarn	Supakit	Mr	Australian national University
Chen	Ying	Dr	Australian National University
Chen	Yong Jun	Dr	ANU
Chen	Hua	Mr	ANU
Choi	Duk Yong	Dr	ANU
Cifuentes	Marie	Dr	Australian National University
Cleary	Sarah	Dr	ANU
Corr	Cormac	Dr	Australian National University
Craig	Vince	Dr	Australian National University
Dall (Weijers)	Tessica	Dr	Australian National University
Deenapanray	Sanju	Dr	Australian National University
Deshmukh	Rajeev	Mr	IP Australia
Devine	Natasha	Ms	Australian National University
Du	Sichao	Mr	ANU
Elliman	Robert	Professor	Australian National University
Faunce	Thomas	Dr	ANU
Fletcher	Neville	Professor	Australian National University
Francis	Emma	Miss	IP Australia
Fraser	Michael	Mr	Australian National University
Freeman	Darren	Mr	ANU
Fu	Lan	Dr	Australian National University

Gao	Qiang	Dr	Australian National University
Gardner	Ian	Associate Professor	Defence
Gareso	Paulus	Mr	Australian National University
Giulian	Raquel	Mrs	ANU
Glover	Chris	Dr	Australian National University
Glushenkov	Alexey	Mr	ANU
Haberl	Bianca	Miss	ANU
Hackett	Suanne	Ms	Invest Australia
Hammond	Dr	Tom	ANU
Han	Ting	Mr	Australian National University
Henry	Christine	Ms	Australian National University
Hilder	Tamsyn	Miss	Australian National University
Howard	Shaun	Mr	Australian National University
Hsieh	Andy Shang-Yuan	Mr	ANU
Hu	Julia	Ms	IP Australia
Humphrey	Mark	Professor	Australian National University
Hussain	Zohair	Mr	Australian National University
Jagadish	Chennupati	Professor	Australian National University
Johannessen	Bernt	Mr	Australian National University
Jolley	Greg	Mr	ANU
Joyce	Hannah	Miss	Australian National University
Kang	Jung Hyun	Mr	ANU
Karouta	Fouad	Dr	Australian National University
Kluth	Patrick	Dr	Australian National University
Kluth	Susan	Dr	Australian National University
Lakshmanasamy	Raghuveerasamy	Mr	Australian National University
Li	Bill	Dr	ANU
Li	Wen	Dr	ANU
Li	Qing	Dr	ANU
Luther-Davies	Barry	Professor	Australian National University
Lysevych	Mykhaylo	Mr	Australian National University
Mackinnon	Ian	Dr	Australian Research Council

McKerracher	Ian	Mr	Australian National University
McMurtrie	Roger	Mr	ANU
Mitchell	Jonathon	Mr	ANU
Mokkapati	Sudha	Ms	Australian National University
Nawaz	Muhammad	Mr	ANU
Neshev	Dragomir	Dr	Australian National University
Oliver	David	Mr	Australian National University
Paiman	Suriati	Mrs	ANU
Pas	Steven	Dr	Australian Pesticides and Veterinary Medicines Authority
Petravic	Mladen	Dr	Australian National University
Prasad	Amarita	Miss	ANU
Qin	Qinghua	Prof	ANU
Ramdutt	Devin	Mr	ANU
Ridgway	Mark	Dr	Australian National University
Rixon	Peter	Mr	Parliament of Australia
Rode	Andrei	Dr	Australian National University
Ruan	Yinlan	Dr	Australian National University
Samoc	Anna	Dr	Australian National University
Samoc	Marek	Dr	Australian National University
Shalav	Avi	Dr	Australian National University
Sheppard	Adrian	Dr	ANU
Smith	Nathanael	Mr	Australian National University
Sprouster	David	Mr	ANU
Stewart	Kallista	Ms	Australian National University
Talanina	Irina	Dr	IP Australia
Tan	Hark Hoe	Dr	Australian National University
Varslot	Trond	Dr	ANU
Weckert	John	Professor	Australian National University
Weigold	Erich	Prof	ANU
Wilkinson	Andrew	Mr	Australian National University
Williams	James	Professor	Australian National University
Wong-Leung	Jennifer	Dr	Australian National University
Xu	Wen	Dr	ANU
Yu	Jun	Mrs	ANU
Zhang	Hongzhou	Dr	Australian National University
Zin	Ngwe Soe	Mr	ANU
Tayati	Ponlawat	Mr	Australian National University

New South Wales

Surname	First Name	Title	
Wallace	Gordon	Professor	University of Wollongong
Chen	Patrick	Mr	Macquarie University
King	Bruce	Associate Professor	University of Newcastle
Lee	Andrew	Mr	Macquarie University
Moulton	Simon	Dr	University of Wollongong
Nelson	Andrew	Dr	ANSTO
Read	Marlene	Dr	University of New South Wales
Coleman	Victoria	Dr	National Measurement Institute
Taylor	Tony	Dr	ANSTO
Wintrebert-Fouquet	Marie	Dr	Macquarie University
Zeng	Qinghua	Dr	University of New South Wales
Muller	Karl-Heinz	Dr	CSIRO
Xie	Fang	Ms	Macquarie University
Neto	Chiara	Dr	University of Sydney
Harris	Andrew	Dr	University of Sydney
Stadtmueller	Lisa	Mrs	The University of Sydney
Hoft	Rainer	Mr	University of Technology Sydney
Marceau	Ross	Mr	The University of Sydney
Xu	Xiaoda	Mr	University of Technology Sydney
Milev	Adriyan	Dr	University of Western Sydney
Pilehrood	Saeid Hessami	Mr	University of Wollongong
Di Maio	Isabelle	Dr	University of Technology Sydney
See	Chee Howe	Mr	University of Sydney
Florin	Nicholas Haley	Mr	University of Sydney
Bikram	Shakya	Mr	University of Sydney
McCamey	Dane	Mr	University of New South Wales

Ams	Martin	Mr	Macquarie University
Burkhard	Raguse	Dr	CSIRO
Bursill	Robert	Dr	University of New South Wales
Butcher	K. Scott	Dr	Macquarie University
Cameron	Fiona	Dr	CSIRO
Clark	Robert	Professor	Uinversity of New South Wales
Cortie	Michael	Professor	University of Technology Sydney
Coutts	David	A/Prof	Macquarie University
Dastoor	Paul	A/Prof	University of Newcastle
Dawes	Judith	Associate Professor	Macquarie University
Dowd	Annette	Dr	University of Technology Sydney
Dzurak	Andrew	Associate Professor	University of New South Wales
Eggleton	Benjamin	Professor	University of Sydney
Fernades	Alanna	Miss	Macquarie University
Gal	Michael	Professor	University of New South Wales
Goldys	Ewa	Associate Professor	Macquarie University
Gooding	John	Dr	University of New South Wales
Hamilton	Alex	Associate Professor	University New South Wales
Kane	Deborah	Professor	Macquarie University
Lamb	Robert	Professor	University New South Wales
Wieczorek	Lech	Mr	CSIRO
Lewis	Roger	Associate Professor	University of Wollongong
Martin	Donald	Associate Professor	University of Technology Sydney
Micolich	Adam	Dr	Unviversity of New South Wales
Newbury	Richard	Associate Professor	University of New South Wales
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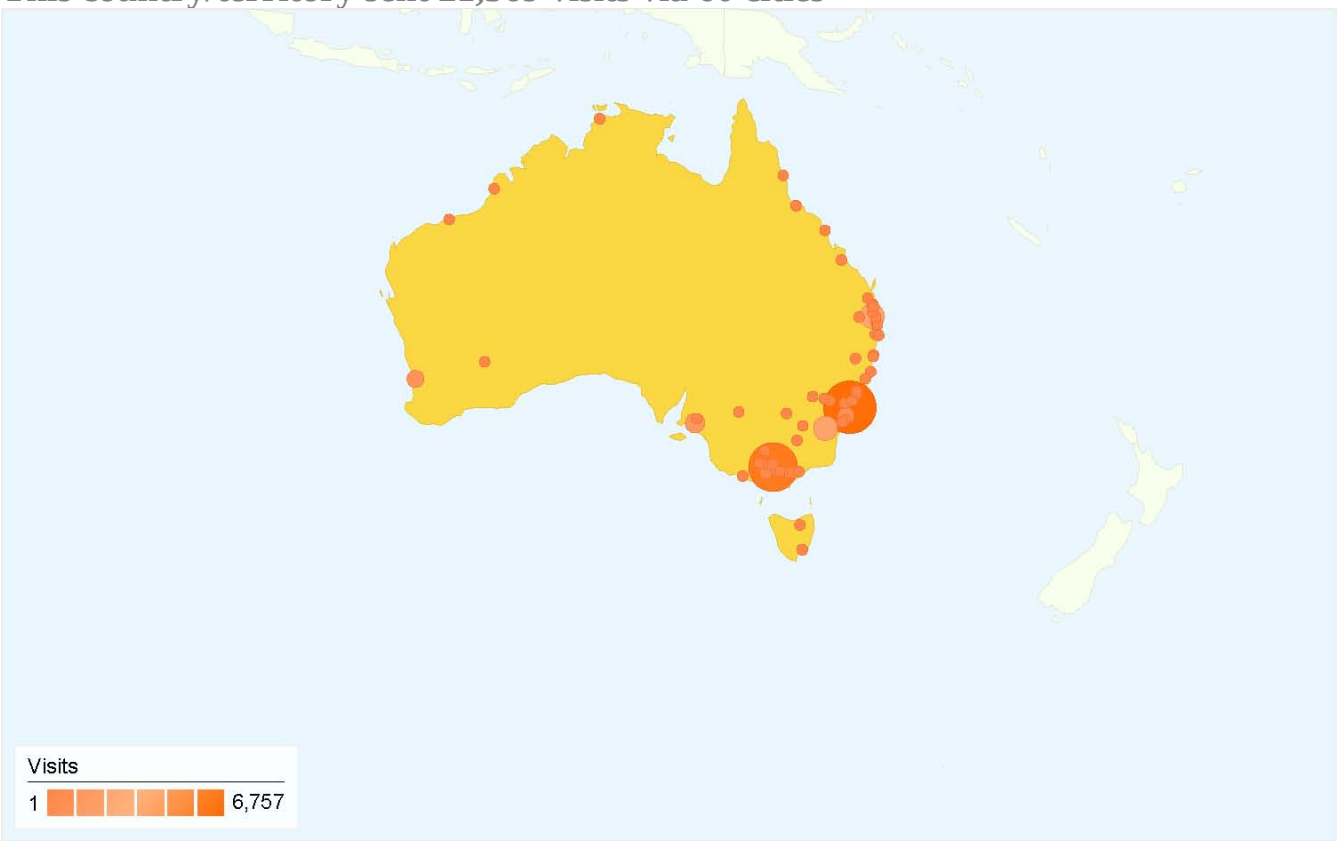
Kimura	Hideo	Dr	National Institute for Materials Science
Kora	Aruna Jyothl	Mrs	CCCM Hyderabad
Kowalczyk	Pawel	Dr	University of Canterbury
Kruglyak	Volodymyr	Dr	University of Exeter
Lansley	Stuart	Dr	University of Canterbury
Lee	Jeon-Kook	Dr	Korea Institute of Science
L'Hostis	Florian	Mr	University of Canterbury
Liu	Xianming	Dr	University of Canterbury
Mackenzie	David	Mr	University of Canterbury
Markwitz	Andreas	Dr	Institute of Geological & Nuclear Sciences Rafter Laboratory
McCarthy	David	Mr	University of Canterbury
Moore	Ciaran	Mr	University of Canterbury
Moudgil	Brij	Dr	University of Florida
Ogden	Kimberly	Prof and Assoc Head	University of Arizona
Ozawa	Kiyoshi	Dr	National Institute for Materials Science
Pereira	Rosa Elizabeth Valente	Mrs	Universiti Teknologi Mara
Pleasants	Simon	Dr	Macquarie University
Raineri	Vito	Dr	Italian National Council for research (CNR) Institute for Microelectronics and Microsystems (IMM)
Raper	Judy	Dr	Missouri University of Science & Technology
Reichel	Rene	Mr	University of Canterbury
Robinson	Katie	Dr	AJ Park
Rosei	Federico	Professor	University of Quebec (Montreal)
Ruda	Harry	Professor	University of Toronto
Said	Ressa	Mr	Macquarie University
Sarma	Shilpanjali	Ms	The Energy and Resources Institute (TERI)
Sattar	Abdul	Mr	Canterbury University
Schrader	Glenn	Prof and Department Head	University of Arizona

Sewell	Rob	Mr	Imperial College London
Shastry	Rahul	Mr	University of Canterbury
Skandan	Ganesh	Dr	NEI Corporation
Srinivasa Kannan	Lakshmi	Dr	SDNB Vaishnav College for Women
Starke	Kai	Dr	Freie Universitaet Berlin
Stephens	Ashley	Dr	National Institute of Informatics
Stern	Richard	Dr	University of Western Australia
Tan	Seng Sing	Dr	Nanyang Polytechnic
Thickett	Stuart	Dr	University of Sydney
Willmott	Geoff	Dr	Industrial Research Limited New Zealand
Wolter	Joachim	Professor	Eindhoven University of Technology
Yu	Samuel S.C	Dr	University of Canterbury
Yusoff	Hamdan Mohamed	Mr	University of Canterbury
Zhao	Hongyang	Dr	National Institute of Materials Science
Zwanenburg	Floris	Dr	University of New South Wales

Appendix B – Demographic list of ARCNN Website Hits

Country/Territory Detail: Jan 1, 2009 - Dec 31, 2009

This country/territory sent 21,569 visits via 60 cities



Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
21,569	4.64	00:03:33	47.50%	40.04%
% of Site Total:	Site Avg:	Site Avg:	Site Avg:	Site Avg:
49.72%	4.30 (7.82%)	00:03:26 (3.25%)	56.89% (-16.51%)	41.65% (-3.86%)

City	Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
Sydney	6,757	4.36	00:03:24	47.64%	39.34%
Melbourne	6,131	3.99	00:03:04	51.26%	42.26%
Brisbane	2,223	4.47	00:03:07	52.63%	44.58%
Canberra	2,160	7.71	00:05:53	33.89%	33.29%
Adelaide	1,419	3.90	00:03:13	48.77%	40.17%
Perth	1,003	3.56	00:02:39	56.53%	46.26%
Wollongong	854	6.30	00:04:15	29.86%	31.62%
Geelong	371	5.54	00:04:18	28.84%	34.23%
Newcastle	160	5.98	00:05:00	40.00%	26.25%

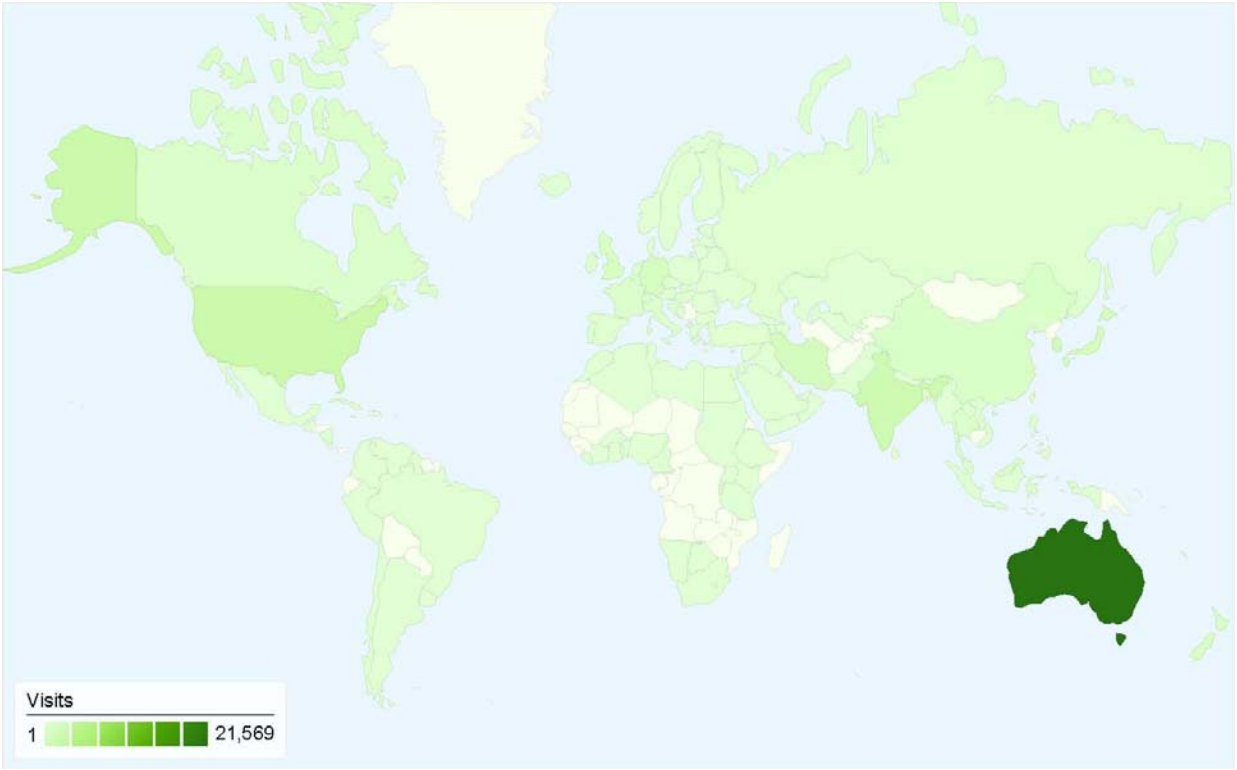
(not set)	126	4.90	00:02:58	25.40%	30.16%
Hobart	63	3.17	00:01:50	73.02%	46.03%
Morwell	47	7.11	00:07:52	48.94%	27.66%
Cranbourne	38	3.50	00:03:37	86.84%	44.74%
Darwin	27	5.48	00:08:13	40.74%	37.04%
Nerang	25	2.64	00:04:17	72.00%	44.00%
Richmond	22	1.50	00:01:27	86.36%	68.18%
Townsville	14	3.07	00:01:03	78.57%	57.14%
Gold Coast	12	4.50	00:03:33	66.67%	50.00%
Toowoomba	9	11.67	00:09:43	66.67%	22.22%
Ballarat	8	4.25	00:01:23	100.00%	62.50%
Melton	7	3.00	00:01:05	85.71%	42.86%
Victoria Point	7	1.00	00:00:00	85.71%	100.00%
Craigieburn	6	3.67	00:01:56	83.33%	50.00%
Port Macquarie	6	1.83	00:02:45	83.33%	50.00%
Kiama	6	17.33	00:10:22	33.33%	0.00%
Wagga Wagga	5	5.40	00:03:31	60.00%	0.00%
Rockhampton	5	1.60	00:00:07	80.00%	60.00%
Bathurst	3	1.33	00:00:03	100.00%	66.67%
Central Coast	3	1.67	00:00:37	100.00%	66.67%
Moe	3	5.00	00:06:24	66.67%	33.33%
Traralgon	3	2.00	00:03:48	100.00%	33.33%
Armidale	3	2.00	00:00:26	66.67%	66.67%
Lismore	3	2.00	00:01:13	100.00%	33.33%
Ballina	3	1.67	00:00:12	33.33%	66.67%
Redcliffe	2	1.00	00:00:00	100.00%	100.00%
Raymond Terrace	2	3.50	00:00:23	100.00%	0.00%
Mackay	2	1.00	00:00:00	100.00%	100.00%
Mildura	2	3.00	00:01:01	100.00%	50.00%
Coffs Harbour	2	8.00	00:00:47	0.00%	50.00%
Cairns	2	4.00	00:15:43	50.00%	0.00%
Gawler	2	4.00	00:01:28	100.00%	50.00%
Warrnambool	2	3.00	00:01:15	100.00%	0.00%
Bendigo	2	1.00	00:00:00	100.00%	100.00%
Parkes	2	1.50	00:00:02	100.00%	50.00%
Taree	2	1.50	00:00:12	100.00%	50.00%

Launceston	1	1.00	00:00:00	100.00%	100.00%
Broome	1	1.00	00:00:00	100.00%	100.00%
Pakenham	1	1.00	00:00:00	100.00%	100.00%
Albury	1	1.00	00:00:00	100.00%	100.00%
Kalgoorlie	1	2.00	00:00:11	100.00%	0.00%
Sawtell	1	1.00	00:00:00	100.00%	100.00%
Maroochydore	1	3.00	00:00:46	100.00%	0.00%
Buderim	1	3.00	00:00:10	100.00%	0.00%
Nowra	1	1.00	00:00:00	100.00%	100.00%
Gympie	1	1.00	00:00:00	100.00%	100.00%
Sale	1	1.00	00:00:00	100.00%	100.00%
Caloundra	1	1.00	00:00:00	100.00%	100.00%
Griffith	1	4.00	00:08:28	100.00%	0.00%
Port Hedland	1	1.00	00:00:00	100.00%	100.00%
Orange	1	5.00	00:01:44	0.00%	0.00%
					1 - 60 of 60

Map Overlay Comparing to: Site

Jan 1, 2009 - Dec 31, 2009

ARCNN



43,377 visits came from 134 countries/territories

Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
43,377	4.30	00:03:26	57.01%	41.65%
% of Site Total: 100.00%	Site Avg: 4.30 (0.00%)	Site Avg: 00:03:26 (0.00%)	Site Avg: 56.89% (0.21%)	Site Avg: 41.65% (0.00%)

Country/Territory	Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
Australia	21,569	4.64	00:03:33	47.50%	40.04%
United States	2,533	3.53	00:02:29	79.98%	53.65%
India	2,219	5.67	00:04:47	71.92%	37.67%
Iran	1,428	3.65	00:04:35	55.39%	37.89%
South Korea	1,425	4.80	00:04:24	54.88%	32.56%
Japan	1,310	4.13	00:03:09	49.16%	36.95%
Germany	1,181	3.39	00:02:21	64.94%	43.61%
Taiwan	1,033	3.75	00:03:23	40.27%	46.18%
United Kingdom	899	2.92	00:02:01	82.54%	51.72%

New Zealand	**847**	4.09	00:03:25	49.59%	31.64%
China	**838**	4.23	00:03:34	68.02%	44.03%
Singapore	**730**	5.04	00:04:25	51.78%	36.30%
Canada	**587**	3.04	00:01:52	73.76%	51.28%
France	**534**	3.39	00:02:23	75.28%	47.75%
Malaysia	**512**	3.48	00:03:15	66.60%	46.09%
Thailand	**479**	4.44	00:04:14	62.84%	37.37%
Italy	**405**	5.99	00:05:03	67.16%	38.77%
Russia	**319**	3.23	00:02:38	61.76%	47.65%
Switzerland	**308**	3.55	00:02:38	77.92%	44.48%
Netherlands	**303**	3.32	00:01:56	67.66%	41.91%
Turkey	**212**	3.96	00:03:33	77.36%	38.68%
Spain	**211**	3.36	00:02:23	75.36%	45.97%
Ireland	**196**	2.26	00:01:04	82.14%	57.14%
Hong Kong	**188**	5.01	00:04:13	59.57%	37.23%
Sweden	**177**	3.25	00:02:09	77.40%	44.07%
Finland	**162**	2.90	00:02:20	79.63%	46.30%
Brazil	**143**	3.43	00:02:47	90.21%	46.85%
Indonesia	**137**	3.60	00:05:28	79.56%	39.42%
Pakistan	**134**	4.76	00:06:47	70.90%	32.09%
Belgium	**133**	3.29	00:01:46	80.45%	42.11%
Austria	**118**	3.33	00:02:08	69.49%	59.32%
Poland	**116**	3.35	00:02:21	81.90%	50.86%
Bangladesh	**102**	2.59	00:02:50	50.98%	42.16%
Saudi Arabia	**101**	3.22	00:01:45	69.31%	52.48%
Portugal	**99**	3.88	00:03:48	52.53%	46.46%
Israel	**98**	4.49	00:03:32	70.41%	45.92%
Egypt	**98**	6.32	00:04:26	78.57%	43.88%
Denmark	**96**	3.25	00:02:05	78.12%	51.04%
Mexico	**94**	2.96	00:01:51	86.17%	53.19%
Czech Republic	**79**	3.25	00:03:46	56.96%	36.71%
Ukraine	**75**	5.41	00:03:40	72.00%	42.67%
(not set)	**65**	2.06	00:01:17	55.38%	61.54%
Serbia	**61**	3.90	00:04:21	32.79%	34.43%
Romania	**58**	2.57	00:00:52	84.48%	51.72%
Greece	**52**	3.06	00:01:47	86.54%	51.92%

Philippines	49	2.63	00:02:03	85.71%	57.14%
South Africa	47	2.36	00:01:48	85.11%	48.94%
United Arab Emirates	45	3.42	00:01:38	84.44%	46.67%
Norway	45	2.36	00:01:39	80.00%	53.33%
Sri Lanka	34	3.88	00:02:47	88.24%	41.18%
Venezuela	33	2.85	00:01:07	87.88%	42.42%
Nigeria	32	2.72	00:06:57	90.62%	37.50%
Hungary	32	1.91	00:01:35	87.50%	68.75%
Slovenia	28	2.39	00:00:52	89.29%	57.14%
Vietnam	27	3.44	00:03:11	81.48%	40.74%
Latvia	27	2.41	00:01:52	74.07%	59.26%
Croatia	22	3.77	00:01:57	90.91%	59.09%
Algeria	21	2.48	00:01:25	95.24%	42.86%
Lithuania	20	2.80	00:02:43	50.00%	60.00%
Peru	20	3.10	00:03:01	60.00%	60.00%
Slovakia	20	2.70	00:01:15	70.00%	45.00%
Sudan	19	3.05	00:03:40	100.00%	42.11%
Jordan	19	3.58	00:01:54	89.47%	57.89%
Côte d'Ivoire	18	3.72	00:04:39	83.33%	50.00%
Bulgaria	17	1.29	00:00:09	100.00%	76.47%
Ghana	16	2.44	00:13:23	81.25%	31.25%
Argentina	15	2.87	00:01:34	86.67%	33.33%
Armenia	15	1.80	00:00:58	93.33%	73.33%
Kuwait	15	3.87	00:04:06	73.33%	26.67%
Tunisia	15	1.67	00:00:28	53.33%	53.33%
Mauritius	14	1.86	00:01:27	78.57%	78.57%
Colombia	13	2.15	00:02:44	100.00%	69.23%
Bosnia and Herzegovina	13	1.31	00:00:24	53.85%	76.92%
Kenya	12	2.50	00:01:41	66.67%	33.33%
Puerto Rico	11	2.45	00:01:25	63.64%	63.64%
Morocco	11	3.91	00:01:20	90.91%	72.73%
Oman	8	2.50	00:01:03	50.00%	62.50%
Nepal	8	2.50	00:04:41	100.00%	62.50%
Georgia	8	4.62	00:05:57	12.50%	50.00%
Chile	8	2.25	00:00:45	100.00%	37.50%
Lebanon	8	1.38	00:01:05	100.00%	87.50%

Appendix C - ARCNN News, Edition 19, August 2009

ARCNN News. Edition 19, August 2009

Australian Research Council Nanotechnology Network

Welcome

Dear Members and Friends

Welcome to the nineteenth edition of the ARCNN News.

The ICONN 2010 preparations are now well underway. It will be held in Sydney at the Sydney Convention Centre on the 22nd to the 26th of February 2010.

The Australian Academy of Science is carrying out a Nanotechnology survey on collaborations, please participate in the survey.

Congratulations go to the winners of the Overseas Travel Fellowships, Young Nano Ambassador award,to the Short Term visit awardees and to the attendees at the Asia Nano Camp.

Though the ARC funding to the Network is coming to an end, we are exploring other funding avenues to continue the network activities at some level. We will update you on this when funding eventuates.

Look forward to your active participation in the network activities

C Jagadish, Convenor

ARCNN Awards and events

The Overseas Travel Fellowships were awarded to Mr Mohammad Choucair and Dr Oleh Klochan from the Unversity of New South Wales, Miss Bianca Haberl from the Australian National University, Dr Edin Nuhiji from Deakin University, Dr Yong Wang from Queensland University and Mr Michel Giulianini from the Queensland University of Technology.

The Young Nano Ambassdor award for South Australia was awarded to Dr Mahaveer Kurkuri from the Ian Wark Research Institute at the University of South Australia

The ARCNN PhD and ECR Symposium was held at the Research School of Physics and Engineering at the Australian National University on the 19th and 20th of February and was chaired by Dr Adam Micolich and Ms Hannah Joyce. Thank you to everyone for your contribution in making the symposium a successful one.

Australian Research Council Nanotechnology Network

Update profiles, address changes etc

Please remember to advise address and email changes so that the ARCNN member database is kept up to date. Your current details can be checked on your online profile at http://www.ausnano.net/index.php?page=profiles.

If you have not submitted an online profile, we would encourage you to do so as this provides a valuable resource for researchers seeking collaboration with people who have experience or expertise in a particular nanotechnology area. A search facility is provided on the Members Profiles webpage. Researchers looking to fill postdoc positions may also use the member database to locate students with research interests and experience in particular fields.

ARCNN Awards and Deadlines - 2009

ARCNN Long and Short Term Visits

The ARCNN offers Long term and Short term funding for visits within Australia to successful applicants throughout the year. Further information about any of the funding available can be found at: http://www.ausnano.net/content/funding_and_sponsorship

Young Nanotechnology Ambassador Awards

The ARCNN will award selected students/ECRs in each state/territory of up to $2000 to present and facilitate interest in Nanotechnology at local schools.

Reports of some of the Young Nano Ambassadors can be found at: http://www.ausnano.net/content/reports

Further information about the Program can be found at: http://www.ausnano.net/content/young_ambass_awards

NANOQ

Our second publication of the NanoQ magazine has now been completed and it is available. It contains articles about anything and everything Nano. It is a twice a year publication, and we are accepting contributions. The deadline for the next issue is the 28th September 2009. So if you have anything that you believe deserves to be published, please send us your contributions. Anyone interested in obtaining a copy of NanoQ, send an email to arcnn@ausnano.net along with a mailing address.

Upcoming ARCNN Supported Events

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International Conference on Nanoscience and Nanotechnology (ICONN 2010)
22nd-26th February 2010
Held at: Sydney Convention Centre
Chair: Dr Calum Drummond, CSIRO
Co-Chairs: Dr Cathy Foley,CSIRO and Prof Andrew Dzurak UNSW

Abstract deadline is the 18th of September 2009.

Further details about invited speakers and varous symposia can be found on the ICONN website at **http://www.ausnano.net/iconn2010**

Australian Research Council Nanotechnology Network

16th AINSE Conference on Nuclear and Complementary Techniques of Analysis

25/11/2009 - 27/11/2009
Held at: Lucas Heights, Sydney
Details: http://www.ainse.edu.au/ainse/events/ncta_2009.html

Other NanoNews

Nano Survey

The Australian Academy of Science is undertaking a research project for the ARC led by Prof Chennupati Jagadish, Prof Frank Caruso and Prof Gordon Wallace. The Academy is examining Australia's Nanotechnology trends, applications and collaborations. THe short online survey can be found on http://www.esurveyspro.com/Survey.aspx?id=13c64163-2e2a-466f-8c13-37495596052c

All individuals who complete the survey will be included in a prize draw. One person will be randomly selected to receive an ipod Nano (colour of your choice, after the survey closes on the **4th September 2009**

The collated data of the Academy's research will be published and available late 2009. For any information or help with regards to this survey please contact Fiona Leves at the Australian Academy of Science on fiona.leves@science.org.au

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IEEE Nanotechnology Council 2008 Awards – Call for Nominations

Nominations are sought for the following awards.
(i) Nanotechnology Pioneer Award
(ii) Early Career Nanotechnology Award
(iii) NTC Distinguished Service Award
The Deadline for 2009 Awards is October 15, 2009. Further information can be found at http://www.ewh.ieee.org/tc/nanotech/nominations.html

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Australian National Fabrication Facility

The Australian Government's Education Investment Fund - Super Science program has allocated $50m for research infrastructure to the Australian National Fabrication Facility Ltd. The program embraces NCRIS principles, enhancing collaborative research and open access, focussing on internationally recognised areas of expertise, and maximising contributions to economic development. The investments will enhance the innovation capacity, the research capabilities and the international competitiveness of Australia.

The ANFFL is currently preparing the investment plan for strengthening Australia's nanotechnology infrastructure. Further information is available from the website: www.anff.org.au

Australian Research Council Nanotechnology Network

National Enabling Technologies Strategy

The Government is committing $38.2 million over four years to the National Enabling Technologies Strategy. The Strategy will provide a framework for the responsible development in Australia of enabling technologies such as biotechnology, nanotechnology and other technologies as they emerge.

The development of the Strategy commenced on 1 July 2009. It forms part of the Government's innovation agenda for Australia over the next decade, described in Powering Ideas: An Innovation Agenda for the 21st Century. The funding is split between developing biotechnology and nanotechnology measurement capabilities at the National Measurement Institute and a range of activities including policy coordination, public awareness/community engagement and industry uptake.

The Strategy will initially focus on nanotechnology and biotechnology but will also begin looking at other new technologies. The Strategy will build on the work carried out by two previous strategies: Biotechnology (2000-2008) and Nanotechnology (2007-2009).

To date the Government has been consulting broadly on the detailed development of the Strategy. The consultation process has run through August, visiting Sydney, Melbourne, Brisbane, Adelaide and Perth. The outcome of these consultations will inform advice to the Minister for Innovation, Industry, Science and Research about the strategy, with the expectation of a public announcement later in 2009.

Any queries on NETS can be directed to enablingtechnologies@innovation.gov.au.

Nanowerk

The Nanowerk website lists all the International Nano events that you will ever need to know about: http://www.nanowerk.com/phpscripts/n_events.php

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Nanotechnology Facilities Database

ARCNN has added a Nanotechnology Research Facilities and Capabilities database onto our site. The aim of this database is to be a first access site to all the Nanotechnology Infrastructure facilities and capabilities available to nanotechnology researchers. All group leaders who are interested in adding their facilities onto the ARCNN site are asked to add facilities/equipment/infrastructure. NCRIS people have been using the Network web page to get information about activities in various institutions in the country.

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ARCNN Admin Contact

Network Manager: Ms Liz Micallef

Tel: 02 6125 5952

Or email Liz at arcnn@ausnano.net

Fax: 02 6125 3915

For further information on ARCNN events, contact Liz or go to: www.ausnano.net

Appendix D - List of ARCNN Friends

ARCNN Friends as at 31/12/2009

Surname	First Name	Department
Tegart	Alistair	Standards Australia
Oldfield	Anthony	ACT Govt
Paterson	Chris	DEWR
Atkinson	David	DEH
Willcocks	Deborah	NICNAS
Pianca	Dennis	ACT government
Hall	David	Treasury
Papadakis	Elim	NHMRC
Keogh	Geoff	ACT Govt
Harvey	Graham	NICNAS
Barber	Greg	Health
Koerbin	Gus	ACT Govt
Ahmet	Halil	work cover Vic Govt
Dyne	Heather	DEWR
Morris	Howard	DEWR
Copeland	Ian	Health
Gardner	Ian	Defence
Somina	Irina	ARC
Niall	Jane	Vic Govt
Thomas	Janet	Defence
Gardiner	Jennifer	DIISR
Miles	John	National Measurement Institute
Moore	Joslin	DEWR
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 Matthews	Paul Mohan	AusIndustry DFAT
Haynes	Peter	DEEWR
McInnes	Peter	DEH
Holgate	Robert	ACT Government
Keir	Roland	Defence
Brooke	Shelley	Invest Australian
Utick	Stephen	DEEWR
Walker	Stephen	ARC
Zaluzny	Stephen	NICNAS
Rothnie	Tony	DEEWR

Swan	Verity	DEEWR
Creaser	Wayne	DEEWR
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

Appendix E – ICONN 2010 Poster

ICONN 2010

www.ausnano.net/iconn2010

22 - 26 February 2010
Sydney Convention Centre

The 2010 International Conference on Nanoscience and Nanotechnology (ICONN 2010) will bring together the Australian and International community working in the field of nanoscale science and technology to discuss new and exciting advances in the field. ICONN will cover nanostructure growth, synthesis, fabrication, characterisation, device design, modelling, testing and applications.

Image: David Iliff

CSIRO

Australian Government
Australian Research Council

Australian Research Council
Nanotechnology Network

UNSW
THE UNIVERSITY OF NEW SOUTH WALES