MCNews
Melbourne Centre for Nanofabrication
ANFF

Announcing the MCN Technology Fellows…

The MCN Technology Fellows were appointed in July and are now officially in residence within the MCN facility. The team comprises highly specialised academic and CSIRO expertise within the field of nanofabrication, device design, drug delivery, thin film membranes, microfluidics and photonics. This team forms a consulting base that MCN can provide freely to its industry partners. We are pleased to announce our MCN Technology Fellows and their current research interests:

James Friend, RMIT – Rapid fluid flow in nanochannels induced by surface acoustic waves.

Raymond Dagastine, The University of Melbourne – Utilisation of lithography and deposition techniques to customise nano- and micro-sized tools to investigate the macroscopic behaviour of soft material interfaces.

Saulius Juodkazis, Swinburne University of Technology – Development of high-precision nanofabrication protocols for use in deposition, dry etching, and electron beam lithography.

Tim Davis, CSIRO - Investigation into the interactions between light and assorted metallic nano-structures using the electron beam lithography system.

Christina Cortez-Jugo, Monash University – Efficient transport of large therapeutic molecules across cellular membranes observable via Atomic Force and Confocal Microscopy.

Wenlong Cheng, Monash University – Specialising in methods of photolithography, e-beam lithography and focused ion beam lithography to develop multipurpose nano-bio membranes.

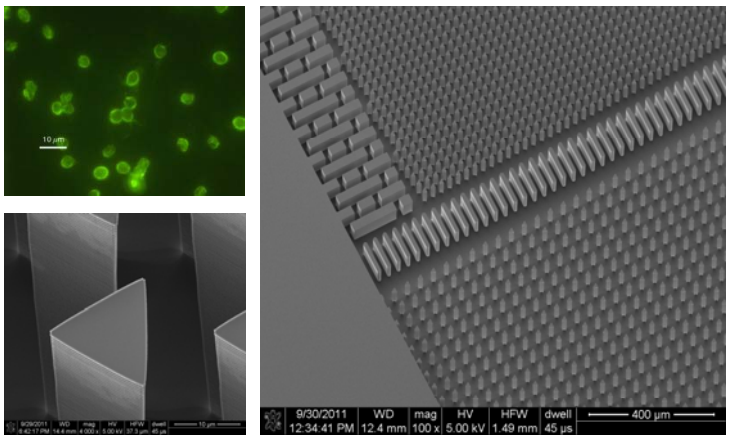
Udo Bach, Monash University – Improvement of photovoltaic technologies via novel self –assembly techniques using photolithography

Yonggang Zhu, CSIRO – Advanced microfluidic and nanofluidic chip design as a novel method for synthesising new enzymes using photolithography.

The MCN Technology Fellows bring a broad base of expertise in many areas of nano design and fabrication that can be made available to MCN clients.

In this edition....

Protecting the national water supply



Cryptosporidium Parvum Bacterium (top left). Nanostructured features fabricated on a microfluidic wafer (bottom left and right).

Microfluidic Sensing platforms capable of sorting and filtering nano-particles within Aquatic Sensor Systems may hold the key for future pathogen detection within community water supplies. Using a fluid separation element fabricated within MCN's state-of-art photolithography and clean room facility, the device harnesses the process of Surface Acoustic Waves to actively filter harmful disease-causing pathogens. Such pathogens include the Cryptosporidium Parvum Bacterium, responsible for the 1998 Sydney water crisis. Using the expertise and unique array of equipment available with the MCN, the facility has allowed the technology to be completely transposed from design to development within a single location. The work, hosted by MCN, forms part of a cluster collaboration between CSIRO and Australian Universities to create an integrated device capable which may one day filter our nations water supply.

MCNews
Melbourne Centre for Nanofabrication
ANFF

The STIUP program – connecting industry with Australia's innovators

The Small Technologies Industry Uptake Program (STIUP) is a Victorian Government initiative aimed at facilitating entrepreneurial business access to goods, equipment, services, advice or expertise from industries specialising in the field of 'small technologies'. The STIUP program administers a voucher program, for which the funds may be transferrable to receive 'micro or nanotechnology-based development activity – such as assistance for small scale product prototyping, laboratory verification, field testing and fabrication of small technology demonstrators'.

Alongside other industry leaders, the MCN is an approved supplier and key supporter of the STIUP program.

Being a part of the STIUP program forms part of our continued commitment to the development and utilisation of nano-based technologies. We are pleased to be a supporter of the overall growth in this exciting and dynamic industry, and can assist industry partners in developing their applications for STIUP funding.

For more information on the STIUP Program visit:
http://www.business.vic.gov.au/BUSVIC/STANDARD/PC_64109.html

Liquitab seeks the expertise of MCN Technology Fellow Friend

The involvement of Professor James Friend, an MCN Tech Fellow, in collaboration with industry will potentially assist millions in taking their daily medications.

The impedance analysis and clean room facility at the MCN has enabled the development of a unique technology capable of crushing and grinding commercially pressed-pill medications into a palatable liquid. The technology harnesses high frequency ultrasonic vibrations to grind pressed-pill medicines and is aimed at assisting those who have difficulty swallowing conventional tablets.

The Liquitab tablet-crushing technology involves the deformation of a metal ring embedded with a removable non-reactive cup. The pressed pill is placed into the cup and ground using the resonant frequency omitted by a transducer. The result is a powdered medication that can be mixed with water to assist with administration.

Professor James Friend applied his expertise and knowledge of ultrasonics to enhance performance of the device. According to James, "tweaking and refining the design of the connecting arm, and adjusting the resonant frequency omitted by the transducer" producing a far more efficient delivery of ultrasonic vibration. Upon completion of the simulation, design and testing phases, the transition time from solid to tablet powder was reduced from 6 minutes to approximately 1 minute.

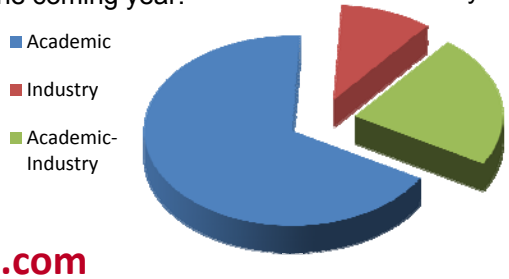
This collaboration was facilitated by Grey Innovation and further highlights how the STIUP program (*see story above*) can facilitate innovation between industry and academia, hosted by MCN.

MCN – a destination for industry

A recent survey of our clients revealed that, in addition to the 10% of our clients that come directly from industry, a further 25% of all academic client hours are supporting direct industry relationships.

The academic clients were linked to commercial industry partners either via ARC linkage grants (15%), direct industry contracts (7%) or CRC projects (2%). Another 21% of our academic clients indicated that they intended to undertake industry-funded projects at MCN within the coming year.

Client survey summary showing Industry, Academic, and joint collaborations.



MCNews
Melbourne Centre for Nanofabrication
ANFF

New Equipment Update

Plasma Assisted Atomic Layer Deposition (ALD) System

The Fiji F200 from Cambridge Nanotech was installed at MCN in September and compliments the existing Savannah thermal ALD system. The F200 is a modular high-vacuum ALD system that accommodates a wide range of deposition modes using a flexible system architecture and multiple configurations of precursors and plasma gases. The result is a new generation ALD platform that is capable of doing thermal as well as plasma-enhanced deposition which opens up a wider range of materials, faster deposition and higher purity films. .

The newly comissioned Plasma Assisted ALD System being operated by Instrument Manager Douglas Mair.

A workshop was run by Cambridge Nanotech to introduce MCN clients to the ALD system and applications early in October as well as giving in depth training to key staff and clients over a two day period. According to Instrument Manager Douglas Mair "one example of our work is a collaboration with Dr Gerry Triani and Dr Peter Evans from ANSTO to investigate new opportunities for Alumina and ZnO films.
The capability at MCN will be bolstered early next year with the purchase of a spectroscopic ellipsometer for detailed film characterisation.

New capabilities in 2012....

Diamond deposition | Laser writer | Spectroscopic ellipsometer
Dicing saw | Non-contact 3D profilometer | Furnace stack
Particle/zeta sizer | Photovoltaics characterisation suite
ToF-SIMS | Polymer fibre electrospinning

NanoPrint Microarrayer

The NanoPrintTM LM60 microarrayer is a microarray-manufacturing platform for research and diagnostic applications, with the ability to miniaturise and multiplex many types of traditional assays such as ELISA and Real-time PCR. The ability for MCN to further support biology research at nano-scale will significantly increase by making this innovative microarray spotting technique available to researchers, students and commercial clients. According to Instrument Manager Varsha Lal "the NanoPrint microarrayer platform will be useful for applications including biomarker characterisation, gene expression, genotyping, comparative genomic hybridisation and immunoassays. This system also allows the fabrication of microarrays (DNA, carbohydrate and protein) at lower cost in comparison to other traditional assays." Having the microarrayer ideally situated in the biology laboratory also complements the current bio/chemistry and characterisation capabilities of the facility.

Instrument Manager Varsha Lal and the new NanoPrint MicroArrayer

MCNews
Melbourne Centre for Nanofabrication

ANFF

MCN Vendor Week – A showcase of nanotechnology: present & future

Leading up to ICONN 2012 which is being held in Perth in February, the MCN will host its own Vendor Week – to be held at MCN from **1-3 Feb 2012**. This event will allow the manufacturers of our fabrication and characterisation equipment to demonstrate their current products and demonstrate new developments and applications. The event will feature a collection of technical seminars, short-course workshops and equipment demonstrations facilitated by the leading national and international nanotechnology equipment vendors as well as the opportunity to meet and discuss current issues with our resident team of MCN Technology Fellows and the MCN Instrument Managers.

shortly at the MCN website. For more information or if you would like to attend the conference please forward your details to manoj.sridhar@monash.edu. Vendors who will be participating in the MCN Vendor Week include:

- Vistec
- Oxford
- SciTech
- Coherent Scientific
- Realtek/EVG
- Agilent
- Nanospec
- nanoTechnology Systems
- ATA Scientific
- 3D Printing solutions

Breaking news....

Local members of federal parliament visit MCN. For more information, visit www.nanomelbourne.com

Victorian Nanotechnology: a major theme for ARC grants

Given the contribution that nanotechnology can provide towards our food, clean energy, pharmaceutical, electronics, and biomedical industries, it is not surprising that projects relating to the field of nanotechnology were particularly successful within the Australian Research Council's recent round of research funding. Within all Discovery Project (DP) grants awarded to Victorian Universities by the ARC, more than $26 million in funding was related to nanotechnology research and applications. Such projects cover a broad range of areas including Science, Pharmaceutical and Health Science, Medicine and Dentistry, and Interdisciplinary Engineering. An additional $7.9 million was also announced in ARC-Linkage Project (LP) grants that are likely to utilise nanofabrication facilities in Victoria to support industry partnerships (*see "MCN – a destination for industry" on page 2*). These investments reflect the international trend for increasing deployment of nanotechnology techniques and materials as a toolset for many diverse research objectives.

CSIRO · Victoria The Place To Be · MONASH University · Australian Government · THE UNIVERSITY OF MELBOURNE · SWINBURNE UNIVERSITY OF TECHNOLOGY · DEAKIN UNIVERSITY AUSTRALIA · RMIT UNIVERSITY · LA TROBE UNIVERSITY

Melbourne Centre for Nanofabrication (MCN)
151 Wellington Road, Clayton VIC 3168
mcn-enquiries@monash.edu www.nanomelbourne.com www.anff.org.au

Dr Dwayne Kirk, MCN Managing Director 03 9902 4049 dwayne.kirk@monash.edu
Dr Gareth Moorhead, MCN Science Director 03 9902 4073 gareth.moorhead@csiro.au