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DAIRY INNOVATION AUSTRALIA



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Professor Dong Chen receives AFSIA Award for Excellence in Drying Research

At the 16th International Drying Symposium (IDS 2008), held in Hyderabad, India in November 2008, Professor Xiao Dong Chen was presented with the AFSIA Award for Excellence in Drying Research - recognising an individual's career achievements and contributions to drying. Professor Chen said, "This will motivate me towards more mentoring of younger academics to make real contributions to the community."

AFSIA is the French Association of R & D for Agricultural Industries and one of the most influential drying R&D professional associations in Europe. AFSIA have instituted this award since 1990, to recognise researchers who have contributed significantly to transferring the results of their academic research to industry and into real practice. This award encourages researchers to collaborate with industry and actively participate in extension activities.

Drying covers all aspects of removing water from materials such as agricultural products and foods including dairy products, pharmaceuticals, blood serum products, forest products and many other products to achieve a higher quality upon usage, longer shelf-life and



Professor Xiao Dong Chen at the Award Dinner event held at the Ramoji Film City in Hyderabad, India.

more cost-effective transportation around Australia and the world.

Over 80% of industrial production worldwide involves at least one unit operation of drying. The worldwide shortage of energy has placed drying research in great demand in recent years as water removal is very energy consuming.

Victoria has Australia's largest dairy based industry that relies on drying operations to make dairy powders for a primarily overseas market. Research undertaken at the Department of Chemical Engineering led by Professor Xiao Dong Chen, has been aimed at reducing energy consumption substantially and at the same time being able to maintain high qualities in food and biotechnology products.

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Million Dollar Grant Success!

Dr Warren Batchelor in collaboration with Profs George Simon (Materials) and Paul Stuart (Ecole Polytechnique) have been successful in obtaining a large grant. The research will study Novel Cellulosic Products and Sustainable Bioresource Engineering. The total value of funding will be \$1.15 million over the next three years, including a contribution from the ARC of \$660,000. This grant proposes a portfolio of linked projects to transform the Australian paper industry. Methods will be developed to assess industry and product sustainability and compare with competing

materials. Chemical and treatment technologies will be developed to radically reduce fresh water requirements for production. Innovative new products will be developed by controlling cellulose interaction with water to resist atmospheric and liquid water penetration, while reducing sheet density. Nano-structured zeolite-paper composites for greenhouse gas adsorption and storage and filtering applications will be developed and deployed for water use reduction. Innovative models will be developed relating structure to performance.

New grants totaling \$1.15 million dollars will be used to conduct research Novel Cellulosic Products and Sustainable Bioresource Engineering.

New staff to the Department



Dr. Michael K. Danquah completed his Bachelors degree at the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana and graduated with 1st class

Honours in 2004. In 2005, Dr Danquah joined Dr Gareth Forde's research group and conducted his doctoral research on the topic "Rapid production of therapeutic plasmid DNA via pilot-scale bacterial fermentation and monolithic purification for vaccination and gene therapy applications". In 2006, Dr Danquah won the Victorian Student Excellence Award in Biotechnology, a prestigious award from Ausbiotech. In 2008, Dr Danquah won the "Chemical Engineering Early Career Award" (see article on pg. 4). He completed his PhD in 2008 and joined the Department as a lecturer in January 2009. He is currently supervising five research students and will teach CHE3171 Bioprocess Engineering & co-teach CHE2165 Bio-Nano Engineering.



Dr. Bradley Ladewig completed his Bachelors degree with first class honours at The University of Queensland in 2002, and his PhD in 2006. His doctoral research focussed on the development of new polymer-inorganic nanocomposite membranes for the direct methanol fuel cell. He worked as a postdoctoral researcher for the CNRS in Nancy, France for a year, doing modelling and simulation for a fuel cell demonstration project.

Most recently he worked in the ARC Centre of Excellence for Functional Nanomaterials at The University of Queensland, developing novel nanocomposite membranes for water desalination by electrodialysis. Dr Ladewig is currently recruiting PhD students and will build a research group focussed on polymer and composite membranes for water and energy applications. He will co-teach first year unit ENG1010 Process Systems Analysis and ENG1061 Engineering Profession.

Technology in Schools Project

Three Monash chemical engineering students have gone back to primary school to teach school students about the science and technology behind everyday phenomena.

Blake Stewart, Hugh McKeown and Priya Srikantharajah taught the school students about maths and engineering concepts. Some topics covered overall by students in the program included 2D and 3D shapes, design procedures, what makes a strong shape, angles, balance, and how to use the 3D computer drawing program Google Sketch Up.

The project is part of a Monash unit called the **Schools' Technol-**

ogy Studies Project (ENG4616). The fourth-year elective unit is offered to engineering students by Monash's Faculty of Education.

Unit coordinator Robyne Bowering said the unit aimed to provide engineering students with opportunities to develop the interpersonal and communication skills that were essential for becoming a successful leader in the modern engineering industry. "These skills include being able to effectively communicate information to technical and non-technical personnel, leadership and organisational skills, problem solving skills, teamwork and how to be an effective life-long learner."



Integrated Industrial Placements

For the second year, five of our top final-year students will be skipping all classes, and instead spending their 1st semester working on a significant project in an industry setting. Five companies—VISY, AMCOR, Melbourne Water, Orica and GlaxoSmithKline—are hosting 5 students to work on a range of industrial projects. Ria Amelia, who undertook a placement during Semester 1 of 2008 with GSK said "This industrial experience was an extraordinary opportunity for an international student like me, to experience Australia's working environment. The project provided for me was an interesting one since it was based on a new developed theory against an existing problem in a production line. This project was also a big challenge for me and GSK. We were working from developing the method of observation until the implementation of the finding and reporting. Overall, this experience was irreplaceable, nurturing me with knowledge that can only be found in an industrial environment."

Five Engineering Graduates awarded 2009 postgraduate scholarships

Five Engineering graduates have been awarded dual scholarships during the 2008-2009 scholarship round. The successful awardees are: Ria Amelia, Anushi Kulasiri, Siew Pei Hoo, Amanthi Jayemanne and Junfei Tian. The Department received 60 applications from a combination of national and international candidates. Dr Wei Shen said "The quality of candidates this year, as in previous years, was extremely high! The students who received the 2009 scholarships are selected on their academic performance, work/research experience, and publications. We are looking forward to these students starting in the Department.." The Department currently has 65 postgraduate students. The new students will be joining an existing elite group of students within the Department.

Faculty of Engineering Alumni Awards

The Faculty of Engineering Alumni Awards cocktail evening (21st October 2008) was a huge success with over 200 people attending the evening. Alumni from all five Engineering Departments enjoyed catching up on each others career paths and reminiscing over stories of earlier student years at Monash University. Professor Sridhar gave a welcome speech, and then handed the ceremony over to Professor Peter Darvall to announce the individual winners from each Department. The winners for Department of Chemical Engineering are;

Dr. Roy Armfield - Distinguished Alumni Award.

Dr Armfield combined an undergraduate and postgraduate degree from Monash University. During his time at Monash University, Dr Armfield was a member of the Students' Representative Council. Dr Armfield was one of the pioneers in the area of computer control during his PhD degree. Dr Armfield's international professional accomplishments took him through ICI Australia, Cadbury Schweppes, and ultimately became the worldwide Director of Scientific Services based in Virginia, USA (headquarters of the US\$21billion global food and pet care firm). His responsibilities spanned Mars Incorporated's global operations covering over 215 sites, 100 manufacturing facilities, and sales in more than 100 countries. He established and ran the Mars Scientific Advisory Board, which comprised a group of 8 university-based academics with outstanding credentials in nutrition, epidemiology, medical science, and process engineering. These scientists undertook specific research projects, and collectively reviewed them together with the senior research associates of Mars Incorporated. A number of significant research papers in relation to nutrition and health resulted. The overall goal was to put Mars in the leading global position with its products and product knowledge on nutrition and health. The concept of health includes all aspects of bodily functions, disease prevention and treatment, and mental well-being. In addition to his professional interests, his community service contributions continue to the present. Dr Armfield is a member of the Flood Levy Committee based at Cobram and a member of the Moira Shire Tourism Council, based on Yarrowonga and Cobram. This body encourages activities which supports tourism and includes the region from Shepparton (to the border), Rutherglen and Echuca. Dr Armfield remains an enthusiastic advocate of Monash University Alumni and a willing presenter to the Monash Undergraduate Leadership Program.

Dr. Michael K. Danquah - Chemical Engineering Early Career Award. Dr Danquah undertook his Bachelors degree at the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana and graduated with 1st class Honours in 2004. In 2004, Dr Danquah was awarded two Postgraduate Research scholarships (MDS

and MIPRS) from the Monash Research Graduate School at Monash University. In 2005, Dr Danquah joined Dr Gareth Forde's research group and conducted his doctoral research on the topic "Rapid production of therapeutic plasmid DNA via pilot-scale bacterial fermentation and monolithic purification for vaccination and gene therapy applications", as plasmid molecules have proven to be future vectors in medicinal biomolecule development. In his research, Michael developed an integrated design and downstream process environment for plasmid production that allows a single-stage purification of supercoiled plasmid based products on both analytical and semi-preparative scales with maintained product integrity. This body of work represents a great breakthrough in bioprocess engineering, as purification of biomolecules for product development can now be performed rapidly at high throughput with reduced number of unit operations required in downstream processing and increased productivity. A PCT patent application has been filed on this technology and discussions are now ongoing with different companies and industries for commercialisation.



Dr Danquah & Professor Webley (HOD)

In 2006, Dr Danquah won the Victorian Student Excellence Award in Biotechnology, an Ausbiotech prestigious award. The award was presented to him during the 2006 Ausbiotech Conference in Sydney. Dr Danquah completed his PhD in 3 years with 12 peer-reviewed internationally recognised journal papers as well as several conference papers. Dr Danquah continues his collaboration with the Department of Chemical Engineering as a lecturer. Dr Danquah is working on an Australian Research Council (ARC) linkage project between Monash University and Bio-Fuels Pty Ltd. Dr Danquah enjoys mentoring new PhD students in the Bio Engineering Laboratory (BEL) research group and plans to be an inspiration to other students wishing to come from Ghana to study at Monash University.

Alumni Profile: Art Looi

Degree: BE(HonsI), PhD (Chemical Engineering)

Graduating Year: 1995, 2001

The 12-week vacation employment with the Strategic Research Division of Generation Victoria at the end of my third undergraduate year had stimulated my interest in engineering research. I subsequently undertook a research project as an elective in my final year. Then, I successfully co-developed a prototype high-pressure-low-flowrate coal feeder, which was made an essential part of a drop tube furnace research facility, for the Cooperative Research Centre for New Technologies for Power Generation from Low-Rank Coal [CRC].

Prior to completing my undergraduate program, I had already decided to pursue my PhD. I accepted a generous scholarship & the opportunity to work with Prof Martin Rhodes. Coupled with my interest in energy resources, Prof Rhodes & I developed a project to investigate the prospect of pressurised steam-fluidized bed drying. As part of my PhD work, I designed & supervised the construction & commissioning of a pressurised steam-fluidized bed coal dryer pilot plant & a full-size pressurised cold model of the dryer. The ambitious project, unfortunately, had to be scaled down & the pressurised cold modelling component subsequently became a separate PhD project.

Not wanting to simply complete a "traditional academic" PhD, I accepted the CRC's offer to fund my project. Consequently, I joined a larger research program to improve the efficiency of power generation from low-rank coal. The commercially focussed collaborative program had provided me with the opportunity to learn the intricacy of intellectual property protection & project management. Beside qualifying for my PhD, I also gained the knowledge of developing commercialisation potential of new technologies.

It is essential for a young engineer to gain as much practical experience as possible during the early stage of his/her career. South East Asia was the ideal place to acquire the hands-on experience I needed when I completed my PhD in 2000. I was subsequently appointed a Process Engineer by MEMC, a multi-national silicon wafer manufacturer, in Malaysia. As a principal engineer, I was in-charge of the final cleaning & inspection of silicon wafers. I was also given the responsibility to transfer technology from a sister plant in Japan

to the labour intensive Kuala Lumpur plant. The exercise successfully raised the production yield from 84% to 90% within the first 6 months. Personally, I have been enriched by the cross-cultural experience.

Having delivered all the key performance targets, I left MEMC to return to the chemical/process engineering sector. I joined Trident Consultants Far East (Malaysia) [TCFE], a safety & risk management & dynamic simulation service provider to the oil & gas industry, as a Lead Consultant. This proved to be a significant career move; as I developed my technical specialist competencies, I also acquired the essential business management skills at TCFE. In addition to supervising up to 10 engineers in multiple concurrent projects, I was also involved in pre-contracts & budget management. I have always been passionate about process safety & TCFE was the ideal launching pad for my career in risk management. However, the company valued my process modelling skills more highly, so I was predominantly charged with the responsibility to manage & execute projects in the niche dynamic simulation market. TCFE was a small consultancy when I joined the company & my professional growth was tremendously accelerated by the diverse project exposure. I recall managing a project to simulate the surge protection of a compression system designed for a gas field in the Middle East. The job was executed in Kuala Lumpur while the clients were located in Italy (the compressor manufacturer) & Korea (the EPCC company).

After returning to Melbourne, I was appointed a Risk Engineer by the Metropolitan Fire & Emergency Services Board [MFESB]. I started to assume significant roles in general & corporate management since my promotion to the position of the Dangerous Goods Department Manager. As a senior technical strategy leader, I provide safety & sustainability expert advice. My pragmatic approach, which I attribute to my engineering training, influences senior regulatory policy makers not only in Victoria but also in other jurisdictions of the Commonwealth. My current role also includes quality management of deliverables, performance assessment,

personnel supervision & resource allocation.

The autonomy I enjoy has allowed me to put in place very rewarding organisational changes to the business unit which I manage. I have introduced knowledge management principles to the department & also established a staff development program to facilitate effective succession planning & business continuity. On the technical front, I have successfully established & implemented a risk management framework to evaluate emergency plans & fire protection adequacy of dangerous goods sites. The outcome of these initiatives significantly enhance operational risk management of the organisation & community safety at large.

Since the change in the Victorian dangerous goods related legislation in 2000, the MFESB has retained the associated responsibilities without the authority to enforce. Losing the status as a regulator, coupled with the shift from the formerly prescriptive regulatory regime to the current performance based laws, was extremely challenging for the MFESB. It was, therefore, inevitable to transform the Dangerous Goods Department to adopt partnership & relationship management philosophy. To effect this cultural change, mentoring & staff capability development became the main focus of my current role.

To perform my executive role effectively, I have to continually acquire non-engineering skills, such as financial management, corporate risk management & corporate governance. Having equipped myself with these competencies, I decided to expand my horizon by assuming a governance role as I sit on the Board & the Audit, Finance & Risk Committee of the Institute of Public Administration Australia (Victoria).

My career has evolved across a wide range of industries. The geographical & cultural diversity experience is priceless. My experience in the public sector has helped me to appreciate the "human side" which is rarely seen by an engineer. Am I still a chemical engineer or have I become a public administrator? Despite my career progression to general management, I remain a keen chemical engineer. My technical knowledge is regularly updated by participating in IChemE & IEAust activities & contributing to these professional bodies is very rewarding, & I encourage all engineers to do the same. It was a very fulfilling experience to be Treasurer of the highly successful Chemeca 2007 & I look forward to my first assignment as an IChemE course accreditation assessor.

*"From the research
lab to the boardroom
... from particle
technology to risk
management ...
from international
manufacturing and
consulting to
emergency services
... this is my story"*



Monash researchers awarded funding to strengthen Australia-China science links

Monash researchers collaborating with scientists from Shandong University and Wuhan University of Technology in China have been awarded \$250,000 from the Australian government to assist with two scientific research projects.

Senator Kim Carr, Minister for Innovation, Industry, Science and Research awarded the funding to strengthen Australia's national research effort and boost the nation's innovation performance.

Professor Edwina Cornish, Deputy Vice-Chancellor (Research) said that she was proud that Monash was one of twelve Australian universities to attract funding. "International collaboration in the name of research literally opens up a whole new world of opportunities for Monash researchers," she said.

"By collaborating with China, Monash researchers are able to utilise global networks, technologies and infrastructure leading to greater research outcomes and solutions."

One project lead by Dr Jian Li, aims to develop novel antibiotics against "superbugs," multi-drug resistant bacterial infections through the use of myxobacteria. As a special class of soil bacteria, myxobacteria is becoming one the world's best producers of novel antibiotics. This collaboration with Shandong University will provide Dr Li and his team access to the largest myxobacterial bank in Asia.

The other successfully funded project, lead by **Professor Paul Webley**, examines the synthesis, characterisation and performance testing of advanced nanomaterials based on carbon for application to new energy related technologies.

Specifically, the researchers expect that in the future, cars and trucks will be powered by electric power provided either by batteries and supercapacitors or by fuel cells. Currently, materials that are able to store electricity or store hydrogen for use in fuel cells can only power cars for up to 100kms before needing to recharge. Professor Webley and his team aim to develop improved materials to store enough electricity (or hydrogen to generate the electricity) for a range of up to 500km - similar to current petrol engine cars.

The materials proposed in this project will be developed at Monash University and tested at Wuhan University of Technology. This project has the potential to reduce the world's reliance on petroleum and diesel for transport and reduce carbon emissions.

"On behalf of Monash University, I would like to congratulate the researchers involved in these research collaborations with China," said Professor Cornish.

"Professor Webley and his team aim to develop improved materials to store enough electricity (or hydrogen to generate the electricity) for a range of up to 500km—similar to current petrol engine cars"

Company participation?

Would your company like to offer any of the following?

- * Vacation Work Experience to our undergraduate students?
- * Graduate Position (Undergraduate and Postgraduate)?
- * Speak to undergraduates students at a lunch time seminar about your company?

Then send a email to either wren.schoppe@eng.monash.edu.au or Lilyanne.Price@eng.monash.edu.au with the details and they will get back to you shortly.



Dr. Ravichandra Potumarthi—Awarded Endeavour Research Fellowship

Dr. Ravichandra Potumarthi joins Chemical Engineering after winning the prestigious Endeavour Research Fellowship awarded by the Australian Department of Education, Science and Technology. He will be working on **“Enzymatic transesterification of algal oils in biodiesel” in Bio Engineering Laboratory (BEL)**. Dr. Ravichandra Potumarthi said “Biofuels are gaining importance in the era of depleting fossil fuels and the contribution of these fuels to the accumulation of carbon dioxide in the environment. Renewable, carbon neutral, transport fuels are necessary for environmental and economic sustainability. At this juncture, algal oils are promising source for the biodiesel. However, technological constraints for converting algal oils into biodiesel in a technoeconomically viable manner is a hard task”. Dr. Ravichandra Potumarthi completed a B.E and M.Tech in Chemical Engineering and Ph.D in Bioprocess and Biochemical Engineering from reputed institutes of India. He has more than 7 years of research and industrial experience in the area of “Bioprocess development for Industrial and Environmental Biotechnology”. Earlier he has been awarded Andhra Pradesh Akademi of Sciences Young Scientist Award-2007 in the area of Earth, Atmospheric and Engineering Sciences and The Biotechnology Research Society of India Young Scientist Award-2007 for his research contributions in the area of bioprocess development. He has presented his research work in Malaysia (2005), Singapore (2007) and USA (2008).



**“Biofuels are gaining importance
in the era of depleting fossil fuels”**

NEWS in brief.....

- Professor Owen E. Potter has been awarded the **“Lifetime Achievement Award”** in recognition of his outstanding and sustained contributions to global drying R&D.
- Postgraduate student Trent Harkin received a \$600 award from the Australian Institute of Energy Melbourne. Trent was awarded “Best Carbon Capture & Storage Project” at the Energy Awards held on the 4th September 2008, for his work on “Integration of Carbon Capture and Storage into a Brown Coal”. Trent is supervised by Dr Andrew Hoadley.
- Dr Karen Hapgood helped co-run a seminar on “Future Academics” for female engineering postgraduates and postdoctoral researchers. Organised by the Equity and Access Committee in September 2008, approximately 17 women attended to learn about academic career options and strategies for success.
- Congratulations to Kate Frueh, Tomasz Mackowiak, Marco Rullo, Chirot Saranniyatham, Mark Wheeler & Mohammad B. Zaman, members of this year’s winning CHE4170 poster prize team – Group 3. During 2008 the Design Project class consisted of 10 groups of 6 students, who in addition to giving a detailed presentation, each created a technical poster for their project. These posters were judged by Academic Staff and visitors on the following categories: Technical content, organisation (easy to follow) and visual appeal. The prize awarded to each group member was a Monash Bookshop Gift Voucher.
- The 2009 Engineering Careers Expo will be held on 25th March. Companies interested in attending can book a booth by contacting Lilyanne Price [Lilyanne.Price@eng.monash.edu.au]



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