

# ChemEng *focus*

TEACHING AND RESEARCH NEWS FROM THE  
DEPARTMENT OF CHEMICAL ENGINEERING,  
MONASH UNIVERSITY

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DAIRY INNOVATION AUSTRALIA



May 2009

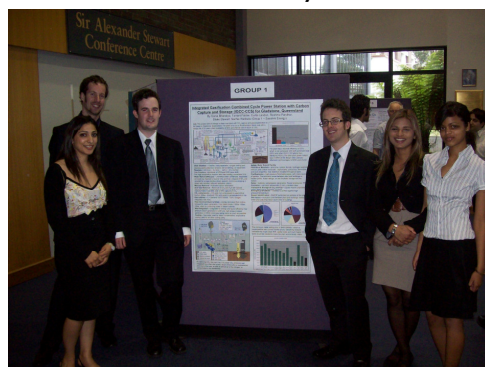
Volume 2, Issue 2

## Chemical Engineering wins the prestigious “IChemE MacNab Medal for Excellence in Design”

The Department of Chemical Engineering received news of an exciting win. Our top 4th year design team has been awarded the 2008 IChemE MacNab Medal for Excellence in Design! This special international medal given by the I.Chem.E for public recognition of excellence in chemical engineering design was awarded Soma Bharatiya, Tarrant Falcke, Curtis Landon, Reshma Pandher, Blake Stewart and Sachie Welikala.

Chemical Engineering 4th year students undertake a design project in their final semester. In 2008 the design project was the design of an Integrated Gasification Combined Cycle (IGCC) Power Station with Carbon Capture. Each group of 6 students was given a specific location in Australia, Japan or China with different carbon capture requirements ranging from 50 to 85%. Each group were assisted by Uhde Shedden who provided the technology package for the entrained flow gasifier and who also facilitated the group HAZOPs. HRL and International Power hosted

an all day site visit to the HRL IDGCC pilot plant and Loy Yang B power station in the Latrobe Valley.



**Soma Bharatiya, Tarrant Falcke, Curtis Landon, Reshma Pandher, Blake Stewart and Sachie Welikala**

Dr Andrew Hoadley said “This year the report by Tarrant Falcke was submitted. His report mark was 95%, the highest mark which has been achieved since my involvement in the design project.”

Congratulations to Tarrant and his team for their excellent work. Their project will also be submitted to the Victorian Pratt Prize and the International Student Design Competition at WCCE8 Congress in Montreal.

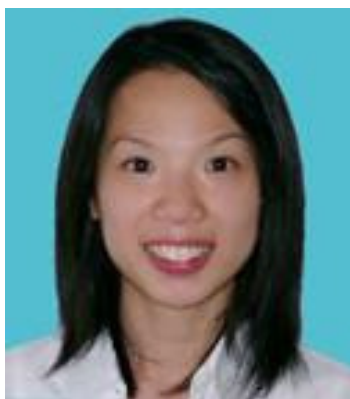
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## Two new staff join the department

### Dr. Peggy Chan

Dr Peggy Chan completed her Bachelors degree (Bioprocess Engineering) and PhD at The University of New South Wales, Sydney. Her doctoral research focussed on the design,



development, simulation and verification of catalytic membrane reactor for  $H_2$  recovery from  $H_2S$ .

She worked as a postdoctoral fellow for Institute of Bioengineering & Nanotechnology (IBN) Singapore for 4 years, her research focussed on novel biomaterials synthesis, self-assembly nanoparticles, drug, DNA & siRNA delivery for cancer therapy. Later Peggy worked in IBN as a research scientist for 1 and half year. She developed novel biodegradable and injectable hydrogel system for therapeutic protein delivery and tissue engineering.

Most recently, Peggy is awarded with a Lectureship from Dairy Innovative Australia for teaching at Monash University's Department of Chemical Engineering, with the goal to boost the dairy research base and attract young engineers and food technologist to a career in the dairy industry. She is currently supervising 3 post-graduate students for dairy research. She will teach CHE2163 Heat & Mass Transfer, and co-teach ENG1031 Engineering Profession, and CHE3163 Sustainable Process

### A/ Prof. Sankar Bhattacharya

A/Prof Bhattacharya holds a Bachelor of Engineering degree in Mechanical Engineering from Jadavpur University (India), Master of Engineering degree in Energy Technology from the Asian Institute of Technology (Thailand)



and a PhD in Chemical Engineering from the University of Newcastle. His Doctoral research focussed on the effects of physical and chemical properties of coal and ash on radiative heat transfer in power station furnaces.

Assoc. Prof. Sankar Bhattacharya joined the department in April 2009. His most recent appointment was at the International Energy Agency (IEA) in Paris managing the Cleaner Fossil Fuels program for the G8 governments. He was also involved with the IEA's Carbon Capture and Storage program. Assoc. Prof. Bhattacharya previously worked in India on design and commissioning of coal-fired power stations, in Thailand on biomass pyrolysis, and in Australia with the Lignite CRC and Anglo Coal on pilot scale Research & Development in coal combustion, gasification and drying. Assoc. Prof. Bhattacharya is the author of a patent, four book chapters, numerous technical reports, several journal publications in heat transfer, coal and biomass applications and has presented widely in conferences including invited speeches as panelist and keynote speaker on technical and policy matters.

Dr. Bhattacharya will expand the coal and biomass research group at the department and is currently seeking PhD students to work on different aspects of coal gasification and combustion. He will teach CHE3164 Chemical Reaction Engineering.



## Vice-Chancellor's commendation for thesis excellence award

The 2008 Vice-Chancellor's commendation for thesis excellence award has been awarded to Mr Junfie Tian.

Since 1998, each Faculty at Monash University nominates their best doctoral and research masters thesis. Examiner reports, publications arising from the thesis and a case made by the supervisor, head of department and dean are reviewed by a central selection committee of the Research Graduate School Committee.

Junfie's thesis was on the physical chemistry principles that maintain the properties and functions of the planographic printing plates for ink transfer and refusal were investigated in detail in this thesis. This thesis focuses on two major planographic printing processes, i.e. lithographic and waterless offset printing

**Mr Junfie Tian was awarded the 2008 Vice-Chancellor's commendation for thesis excellence award**

This research is an extension of the recent research on ink transfer theory which established that the dominating factor of the creation of the image and non-image areas on the planographic plates is the selective formation of weak boundary layers.

The research concentrates on developing and applying new methods to characterize properties and strengths of the weak boundary layers in lithographic and waterless offset printing processes. The work enhances our understanding of the adhesion aspects of the ink transfer mechanisms in planographic printing. Moreover, the understanding developed can be used to control adhesion and anti-adhesion in many other engineering applications. such as food processing, coating and bio-engineering.

## SMUCE opens their new student office

Professor Paul Webley officially opened the SMUCE student club room on 29th May 2009. At the opening, the Department's staff enjoyed drinks and nibbles while catching up with the students.

Professor Webley said "The student club room was established in recognition of the continuing support the students have given to the Department over the years such as Open Days etc."

The Department continues to grow with the help of the student's positive support to these marketing events. Each year, a dedicated group of students work tirelessly throughout the year organising various activities such as "SMUCE Dinner", weekly industry lunch time speakers which includes free

pizza and drinks for all who attend.

This year's committee members are Adrian O'Brien (President), Ben Weeraratne (Vice President [Social]), Jane Espie (Vice President [Academic]), Ben Asquith (Treasurer), Alice Mildren (Secretary), Michael Davidson, Matthew Uhe, Phoebe Chen (4th Year Reps), Alistair Michener, Catherine Simpson (3rd Year Reps).

SMUCE also launched their new design T-shirt which are available from the student

club room during office hours. If you are interested in purchasing a T-shirt contact one of the SMUCE committee members or call the Department General office on +61 3 990553555.



**sMuce**

**"The student club room was established to recognise the continuing support that SMUCE has given to the Department over the years"**



## 5 mins with Michael Roberts, visiting student from Loughborough University, UK

### Question: What brought you to Monash University?

I am studying for a master's degree in chemical engineering at Loughborough University in the UK. A requirement of my masters is to spend a semester completing a research project. Luckily for me where I did the research project was entirely up to me! Many of the students in my course decided to complete their research project at Loughborough University. However, I was very keen to experience living in another country before I embarked on a career. In addition, I felt this would be a good way to pad out my CV. I had previously completed an industrial placement year working in an oil refinery in Grimsby, on the east coast of England. I found this to be very interesting work and I could have done my research project within this area. But to make the most of my next opportunity, I decided to try completing a research project in a different area of chemical engineering.

I started searching the world looking at various chemical engineering departments reading through their research areas. It was not long before my search was mainly focused on universities around Australia and New Zealand. By this



*"I have become an avid Saints fan & I am frequently in or around Melbourne taking the opportunity to do as much as I can"*

time I knew I was looking for some bioengineering and/or environmental focused research. I was attracted by the Bio-engineering Laboratory (BEL) work done by Dr Gareth Forde at Monash. I was attracted to the research area of biofuel from algae and the plasmid DNA vaccine areas. I had heard excellent tales from friends who told me about Melbourne being the cultural and sporting capital of Australia. Since being in Australia, I have become an avid Saints fan and I am frequently in or around Melbourne taking the opportunity to do as much as I can in the time I have here.

Since joining the BEL group at the start of February, I have been engaged with research around the physical and chemical stability of the polymethacrylate monolith which is used to purify plasmid DNA for use as a vaccine. This is very interesting research which is part of a larger project looking at the opportunities of plasmid DNA in vaccines. The BEL group has been very welcoming, as has the whole department, and I am looking forward to my remaining time here in the department.

## Faculty of Engineering Awards Presentation Dinner

The annual Faculty of Engineering Awards Presentation Dinner was held on 20th May 2009. **Mr Tarrant Falcke**, who graduated from the Department of Chemical Engineering in 2008 scooped the student prize pool, winning the Sir John Monash Medal, Engineers Australia and The Ian Langlands Award, Owen Potter Award for Chemical Engineering Excellence, Victorian Pratt Prize and the International Student Design Competition as well as the IChemEMacnab Medal for Excellence in Design. The **Sir John Monash Medal** is awarded to the Bachelor degree student from each faculty who has an excellent academic record, and has demonstrated a significant commitment while at Monash to advancing the University's goals of social justice, human rights and a sustainable environment. **Engineers Australia and The Ian Langlands Award** is awarded annually to a student who, on completion of the final year, is considered to be the most outstanding from *all engineering branches and Victorian campuses*. **Owen Potter Award for Chemical Engineering Excellence** was established in 1991, in recognition of the contribution made foundation profes-

sor O E Potter to the department and to the chemical engineering profession in Australia. Congratulations to Tarrant on winning all of these prestigious awards. **Soma Bharatiya, Tarrant Falcke, Curtis Landon, Reshma Pandher, Blake Stewart, Sachie Welikala** also received the IChemEMacnab Medal for Excellence in Design (see front page).

**Mr David Bradford** received the ExxonMobil Award for Excellence. **Mr Zhi Yu Xia** received The Yong Cher Biau Memorial Award. This award was established by Mr A P Yong in memory of his late son, Yong Cher Biau, who passed away having successfully completed almost three quarters of a Bachelor of Engineering in the field of chemical engineering.

In addition, two of our staff members received an award on the evening. **Dr Karen Hapgood** received the 2008 Deans Award for Excellence in Teaching and **Professor Dong Chen** received the 2008 Deans Award for Excellence in Research. Congratulations to all for your outstanding achievements!

## Lecture Series by Burkhard Duenweg—July 15th – September 11th, 2009

### **“Mesoscopic Simulation Approaches for Soft-Matter Systems: Statistical-Mechanical Foundations and Applications”**

**An intensive 9 week Course**

**by Professor Burkhard Duenweg,**

**Max Planck Institute for Polymer Research, Germany.**

Professor Duenweg will visit the Department of Chemical Engineering from 13th July-27th September. During his visit he will deliver a course of 35 lectures on “*Mesoscopic Simulation Approaches for Soft-Matter Systems: Statistical-Mechanical Foundations and Applications*”. These lectures are a fantastic opportunity for young researchers in Australia to learn new “mesoscopic” computer simulation methods that are not taught currently in any of Australia’s universities.

The last two decades have seen the development of these methods that lie somewhere between Molecular Dynamics and continuum hydrodynamics. They aim at the description of complex fluids like colloidal dispersions (like paint, blood, etc.), polymer solutions, or fluids in porous media (like oil in an underground reservoir), etc., on “intermediate” length and time scales. These methods will have a large potential in the future, and will be important for many soft-matter applications, in particular in chemical engineering, biological physics, and related disciplines. The main target audience for the lectures is advanced students on the graduate level, and interested postdocs and researchers. Due to the broad interdisciplinary applicability of these methods, however, it is being advertised for physicists, chemists, and applied mathematicians, and will be open for students and researchers from all universities within and outside Melbourne.

Burkhard Dünweg obtained his Ph.D. degree in the group of Prof. K. Binder at the University of Mainz in 1991. He was then an Alexander von Humboldt Fellow, collaborating with Prof. D. P. Landau, at the Center for Simulation Physics at the University of Georgia, Athens, USA. He returned to Prof. Binder’s group in Mainz in 1993. In 1996 he joined the Max-Planck Institute (MPI) for Polymer Research, where he is currently a group leader in the Theory Group of Prof K. Kremer. In January 2008, he was appointed “Extraordinary Professor” in Theoretical Physics at the University of Mainz. He is an Associate Editor for Physical Review E since April 2004. His scientific background is in statistical physics, phase transitions, random processes, transport theory, hydrodynamics, polymer physics, and computer simulation methodology. He has made seminal contributions to the development of mesoscopic simulation algorithms—most notably, the invention of a simple and efficient algorithm to simulate soft-matter systems in solution, such that hydrodynamic interactions are faithfully taken into account.



**Interested participants are requested to contact Dr Ravi Jagadeeshan for further details. [Ravi.jagadeeshan@eng.monash.edu.au](mailto:Ravi.jagadeeshan@eng.monash.edu.au)**

**To register to attend the free Lecture Series [click here](#). Each Lecture will be recorded and the notes will be made available on-line for those who are registered by the closing date of 1st June 2009**





## Alumni Profile: Leslie Chang, Site Director, GSK Tianjin, China.

**Degree: Bachelor of Engineering (Chemical Engineering)**  
**Graduating Year: 1996**

Like most graduates, I struggled to find out exactly what I wanted to do as a career after leaving University. Maybe not knowing wasn't such a bad thing because it gave me an open mind about what I could achieve. One thing was for certain. Getting some technical grounding in an industry where Chemical Engineering was a core competency was a key factor to successfully building on the skills I had learnt at University.

I joined the Oil & Gas industry where heat exchangers, distillation columns, pumps, tanks and the like were the mainstay. My student industrial experience was a key in forming that early career decision. So the message to 3<sup>rd</sup> and 4<sup>th</sup> year Chemical Engineering students: take your industrial placements very seriously and learn about the "real world" as much as you can.

I spent a few years with an engineering consultancy company where I learnt the ropes of delivering projects. Consultancy was an interesting start especially when I had zero experience but I learnt on the run! Being good at process engineering was one thing; I also had to deliver projects on time and within budget. I realised that success in the workplace was very much about working together with different people. Some people you'll like and some you will need to exercise a great degree of personal will to get along with. One of my Project Managers gave me an early lesson: *"I did not hire you to be popular so it's about you getting the job done. But if you can be popular at the same time, it's a bonus"*.

Project work took me to Vietnam for several months where I was a project engineer charged to commission a Bitumen plant. I was exposed to a

different culture and faced the challenge of getting a plant fired up! I also managed to be part of an interesting resins project in China.

After several years in project work, I was attracted to work in the pharmaceutical industry for GlaxoSmithKline Singapore. What attracted me was the direct impact I would make on the well being of people around the world. You might find yourself gagging whilst reading this, but this was a pivotal moment in my career: choosing to do what you are passionate about! I wanted to



***"So the message to 3<sup>rd</sup> and 4<sup>th</sup> year Chemical Engineering students: take your industrial placements very seriously and learn about the "real world" as much as you can "***

choose to make a difference. After all I was going to spend most of my waking hours slaving to the cause!

In GSK, I worked to scale up drug molecules from R&D to industrial plant levels (grams to tonnes of material). The work was technical with reactor and heat exchanger sizing, corrosion protection, emergency vent sizing and computer modeling of vessel mixing characteristics. This role allowed me to travel to the UK to visit R&D facilities and to Europe to work with equipment suppliers. I also got involved in my first experience leading a shift team. I learnt what it was like working in a world-class manufacturing facility, as well as project management, virtual collaboration (talking to colleagues you've never met in person via Video Teleconferenc-

ing) and learning to present myself professionally. On reflection, this experience gave me my first taste of leadership.

The next step in my career was driven by a personal need to return to Melbourne. This is reality: at some point in time there will be need to review your work-life balance and for a season in your life, there will be a compelling need to focus on your family & personal needs.

So what can a Chemical Engineer do apart from Chemical Engineering? Anything really! I took a role in the Melbourne GSK facility in Quality Assurance, before finally becoming the Head of Quality Assurance. In this senior role, I spent time working with the Australian Therapeutic Goods Administration and was involved in starting up a collaboration with Monash University (hence this article!). You can see that as you progress in your career, you'll have a chance to influence the strategy and the direction of a company. This is a privilege and something worth aspiring to.

As part of my development, I began to learn a lot about Lean Manufacturing and how we can use this methodology to transform businesses —how to get more with less. I worked with consultants on how to diagnose businesses from a productivity standpoint. Once trained, I was able to run these diagnostics on our facilities in Japan, India and China.

So what did I learn at this stage of my career? Grab hold of your career and drive it. Don't wait for your manager / supervisors to drive it for you. Also, leadership matters: Never be a victim of circumstance: always be accountable for success and failure.

I write this article from China having taken a new role as Site Director of a GSK facility in Tianjin (150 km south of Beijing). I am now accountable for 150 employees and the site's operations. It is true that I now spend less time with chemical engineering matters but I remind myself that **engineers can be leaders too.**

## NEWS in brief.....

- **Faculty of Engineering 2009 Distinguished Alumni Awards.** The Faculty of Engineering Distinguished Alumni Awards recognise the achievements of outstanding members of the Monash University Engineering alumni community. There are two categories for each Department: the **Distinguished Alumni Award** and the **Distinguished Early Career Alumni Award**. Monash alumni worldwide are invited to nominate fellow alumni and to seek a second supporting nominator (who does not need to be a Monash graduate). **Nominations are now open, closing date Friday 31 July 2009.** To nominate an Alumni read the award guidelines and complete the relevant form available from this website: [www.eng.monash.edu.au/news/shownews.php?year=2009&nid=13](http://www.eng.monash.edu.au/news/shownews.php?year=2009&nid=13)
- **Mark Toner** just joined the University's Commercialisation and Intellectual Property Advisory Committee (CIPAC) which provides advice to Professor Edwina Cornish (DVC - Research) on IP issues, including patents. As a member of CIPAC, Mark will be particularly involved in processes for commercialising IP developed in the Engineering Faculty.
- **Dr Ravi Jagadeeshan** has been asked to give two plenary lectures
  - "20th Anniversary Symposium of the Korean Society of Rheology" which will be held in Seoul, August 19th-23th 2009, and
  - "Flowing Complex Fluids: Rheological Measurements and Constitutive Modeling" which will be held in September 14th-18th 2009 at the Institute for Mathematics and Its Applications (IMA) at the University of Minnesota, USA
- **Associate Professor Raman Singh** has edited a book called "Weld Cracking of Ferrous Alloys " which is now available. ISBN 1 84569 300 0 or ISBN-13: 978 1 84569 900 8. <http://www.woodheadpublishing.com/en/book.aspx?bookID=1351>
- **Dr Huanting Wang's** group has recently synthesized micron-sized cubes of zeolite A having a monocrystalline shell and an amorphous core, which reveals a new zeolite crystallization mechanism. This work has been published in a top-ranking journal - Angewandte Chemie International Edition. <http://www3.interscience.wiley.com/cgi-bin/fulltext/121428454/PDFSTART>
- **Xu Li** won the "APPITA Young Speakers" award at the recent APPITA conference representing Victoria with her paper paper-based diagnostics and environmental sensors. Xu was competing against native English speakers from Tasmania and Queensland. She won the award based on her excellent organisation of the presentation materials and, more importantly, on the high quality of her research. Paper-based diagnostics and environment sensors has been listed by MIT as the top 10 hottest frontier research areas. The prize includes a \$4000 travel grant. For a more detailed report click here. <http://www.eng.monash.edu.au/news/shownews.php?year=2009&nid=23>
- **Congratulations to our recent Postgraduate graduates (Jan 08-May 09): PhD—**Y. Yang, F. Rahman, Kh. Thapa, A. Akhavan, J. Y. Yoo, K. Patel., M. Danquah, N. Shah, J. Ho, S. Kar, J. Pan **Masters—** M. Acharya, J. Tian, W. L. Yuen, K. Chen
- **Recent graduates joining the Department:** Ali Akhavan has joined the Department working on the the gasification project which is headed by Assc. Prof. Sankar Bhattacharya.
- **Trans Tasman Commercialisation Fund:** All academics from the Department of Chemical Engineering should note there is a small seed capital fund at Monash University and it's an invitation to send in proposals by researchers who are working on something that is innovative with a market potential. More details can be found at this website [www.ttcf.com.au](http://www.ttcf.com.au) or by contacting email: [info@ttcf.com.au](mailto:info@ttcf.com.au)

**The Department Chemical Engineering wishes all the graduating students of 2008 the best for their future careers. We hope you will keep in touch with the Department during your careers.**

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