# ChemEngfocus

August 2012
vol 5 issue 2

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MONASH University

August 2012

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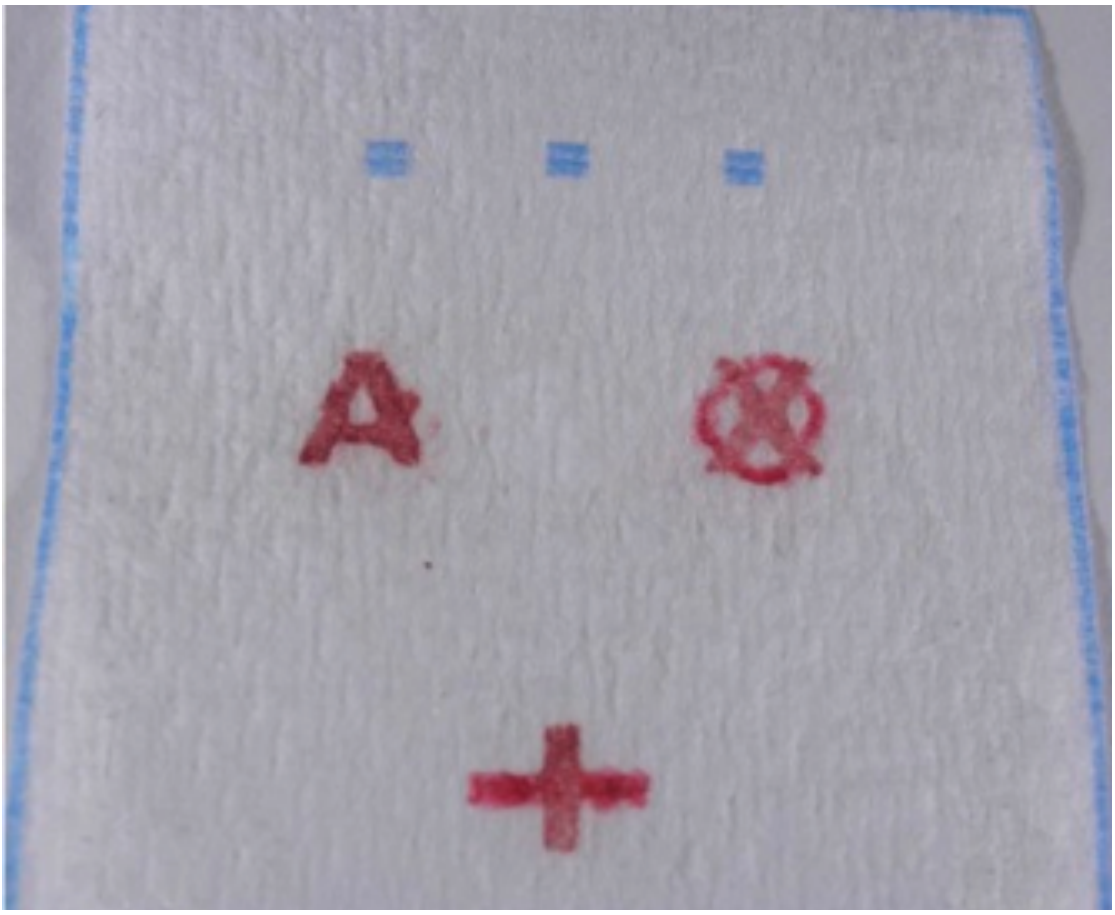


The easy to read blood test

# Harry Potter Inspires Easy To Read Blood Test

Inspired by the ideas of author J.K. Rowling, Australian scientists have created a rapid new blood test that spells out a patient's blood type on bioactive paper.

Using research patented by Monash University, and published recently in Angewandte Chemie, the technology is able to quickly perform ABO and rhesus blood typing tests, and then clearly spell out the results for a user-friendly diagnosis.

Created by Associate Professor Wei Shen, and colleagues at the Monash University Faculty of Engineering, the test is the first equipment-free, bioactive paper-based diagnostic device capable of reporting multiple conditions in written text.

Professor Shen said the research was inspired by the film adaptation of J.K. Rowling's novel Harry Potter and the Chamber of Secrets.

"In the film Harry Potter interrogates Tom Riddles' diary by writing on a page of paper in the Diary "Do you know anything about the Chamber of Secrets?"; and the paper responded with a "Yes" in writing," Professor Shen said.

"The artist's vision showed us that non-conventional mechanisms for reporting results using paper-based sensors should be explored.

"And now we have been able to create that same unambiguous response with a blood test."

The new test uses the same principles of determining blood type as traditional measures, mixing blood sample and blood typing antibodies and awaiting reaction.

The paper device was printed with a hydrophobic reagent (compounds that repel water) except for the areas marked with the blood type letters.

The team then introduced antibodies into each letter, for example, antibody A into letter A, antibody B into letter B.

A blood sample was then added into all the letters, mixed with corresponding antibodies and rinsed with a saline solution. If the red blood cells in letter A react with antibody A, they will clump together forming a large lump that will not rinse clear, leaving a clearly visible letter A.

Professor Shen said such low-cost and easy to understand sensors could be used in disease screening, medical emergencies and disaster response.

"Where sensors such as these are used in developing regions for large-scale disease screening, even if we can fabricate sensors that are robust enough to function under unsupported field conditions, misinterpretation of results may be a significant factor compromising the value of low-cost diagnostic sensors," Professor Shen said.

"The device our team developed has overcome a major obstacle in assay result interpretation.

"It is an easy to use, easy to understand alternative."

The research was funded by the Australian Research Council, and the technology is being developed for the market in partnership with an Australian company, Haemokinesis.


## Department Of Chemical Engineering Students Enjoy An

# Evening Of Celebration

The Faculty of Engineering has recognised the outstanding achievements of both students and staff during 2011 at the Annual Engineering Awards Presentation Dinner on 6th June at the Clayton Campus.

Dean of Engineering, Professor Tam Sridhar welcomed students, staff and distinguished guests, with over 190 guests attending the Awards Dinner to celebrate the Faculty's success. Among the guests attending were the Chancellor, Dr Alan Finkel, the Vice Chancellor, Professor Ed Byrne, and former Chancellor Mr Jerry Ellis.

Professor Sridhar congratulated award recipients and spoke about the excellence achieved by Monash Engineering students. "Monash Engineering attracts some of the brightest students, where we strive to create a high quality learning environment. Our goal is to attract the best minds of each generation and educate the future leaders of our profession. It is through our students that we ensure that our legacy reaches much beyond our lifetime."

Guest speaker for the evening, CEO of Minerals and Metals Group (MMG), Mr Andrew Michelmore spoke to students, staff and guests about the importance of investing in Monash engineering graduates and how they can make a difference and significant impact on their community. Mr Michelmore also discussed the diverse range of industry opportunities that exist for engineering graduates.

The Department congratulates the following students on their achievements:

**Owen Potter Award:** Teck Kwang Choo,
**Yong Cher Biau Award**: Liam Powles,
**The Ken Hunt Medal and The Molly Holman Award** *[best doctoral thesis in 2011]*: Xu Li
**Jacobs Scholarship**: Harriet Rappel
**Jenkins Family '*Follow your dream*' Bursary:** Karinna Saxby

# Advancing Chemical Engineering

**Monash Chemical Engineering Alumni now IChemE President**

Russell Scott
President of IChemE
CEO, Uhde Oil & Gas
Monash University Alumni
B.Eng [Chem Eng] 1968

The new President of IChemE Mr Russell Scott, recently spoke at the Institution's 90th Annual General Meeting in London, UK. Russell graduated from Monash University with a degree in chemical engineering in 1968. During his speech he told an audience of invited guests and IChemE members that chemical engineering is the profession for the future.

Drawing upon the upcoming Olympic Games in London, Russell used the words of Australian middle distance runner and 1960 gold medallist Herb Elliot for inspiration: "Elliot said that it was the inspiration of the Olympic Games that drives people not only to compete, but also to improve, and to bring lasting spiritual and moral benefits to the athlete and inspiration to those lucky enough to witness the athletic dedication.

"In order to improve and deliver new benefits, we must inspire those that we work with to challenge the status quo and drive innovation and new thinking. This applies to industry and business. It should apply to life in general and it should certainly apply to the professions," Russell added.

Russell, who succeeds Sir William Wakeham in office, went on to analyse IChemE's strapline, "Advancing Chemical Engineering Worldwide". He suggested that with more than 1000 chemical engineering university departments around the world, there would likely be an additional 1m chemical engineering graduates by 2018.

"With an extra 1m chemical engineers and IChemE, with 35,000 members, claiming to be advancing chemical engineering worldwide, I'm thinking small fish, big pond. And that pond is getting bigger all the time" Russell warned.

He went on to discuss the importance of getting chemical engineering students into IChemE membership during their academic studies and developing stronger links with industry employers. Russell also cited the need for a new social media and digital communication strategy that would position IChemE as 'the conduit to chemical engineers worldwide and their professional network for life".

"Networking has gone online and training, publications, events, recruitment and even professional peer review will ultimately follow. Our 35,000 members represent an asset that can be leveraged to do great things and if we go about this in the right way, then I believe that we can unlock the power of our membership, our brand and our reputation to truly advance the cause of chemical engineering worldwide both on the ground and on the web," said Russell.


# Monash Students Win Chinese Scholarships

The Chinese Scholarship Council (CSC) has awarded Monash University PhD students with the Chinese Government Award for Outstanding Self-financed Students Abroad

Yuan Zheng, Li He, Yi Chen, and Nan Fu from the Department of Chemical Engineering have all been presented with this honour.

The award was founded by the Chinese government in 2003 with the purpose of rewarding the academic excellence of self-financed Chinese students studying overseas. Only those with outstanding results in their PhD studies are considered by the award selection panel and no more than 500 awards are granted worldwide each year.

This year 39 were given to students in Australia, ranking the country fourth behind Canada, USA and Japan.

Professor Srinivasan said Monash had done extremely well in this year's round of scholarships, claiming six of the 11 scholarships given to students in both Victoria and Tasmania.

"The Consul General of the People's Republic of China in Melbourne, Dr John Shi, spoke very highly of Monash and was keen to hear about the University's progress in opening a campus in China," Professor Srinivasan said.

Nan Fu, who studied biochemical engineering at Monash University, is currently working as an Associate Professor at Suzhou University in China.

**“I look forward to making some useful contribution to the field of peptide biologics and peptide surfactants”**

**Dominic Agyei**

# Chemical engineering HDR student wins AINSE award

Chemical engineering HDR student Dominic Agyei has received an AINSE Postgraduate Research Award.

20 scholarships were awarded to students in 14 universities covering NZ and six states in Australia.

The AINSE Postgraduate Research awards are offered to promising HDR students with projects associated with nuclear science. The recipients receive a supplement stipend as well as a yearly sum to cover costs involved in accessing top of the line facilities at the Australian Nuclear Science & Technology Organisation (ANSTO).

“I feel excited about the rare opportunity to be sponsored to conduct part of my study with the Australian Institute of Nuclear Science and Engineering (AINSE). It will require some hard work, I know, but I trust that the outcome will be rewarding. I look forward to making some useful contribution to the field of peptide biologics and peptide surfactants,” Dominic said about his achievement.

Dominic received the award for his thesis “Interfacial properties of stimuli-responsive peptide biosurfactants and their interaction with chemical surfactant’s for advanced foaming control.”

“Soft matter foams have a large market share because they are utilized in many industrial settings such as mineral processing, oil recovery, waste-water treatment, paper production, chemical industries, fermentation, pharmaceutical formulation and food processing.”

“The project seeks to use advanced neutron reflectometry to study and unravel the foam stabilization mechanisms of biosurfactant and establishing the link between interfacial structure, properties and application,”

Dominic’s project will address the research gap within the development of foam and their application.

“The outcome will be a better understanding of foam structure and design with improved function, performance and added functionality,” Dominic said.

Dominic would like to acknowledge his faith, academic staff of the Department of Chemical Engineering and Monash University for providing the support and opportunity that has allowed him to gain this award.

The Department would like to congratulate Dominic for winning the AINSE Postgraduate Research Award.

Ze Xian Low at an exhibition in Hong Kong

# Chemical engineering student aims to improve desalination technology

Chemical engineering HDR student Ze Xian Low has been awarded a 2012 NCEDA Supplementary PhD Scholarship for his research in desalination technology.

The NCEDA leads and coordinates Australia's research in desalination technology. The NCEDA Supplementary PhD Scholarship is offered to outstanding PhD Students and has a maximum value of $30,000 payable over 3 years.

Of his achievement Ze Xian said "It definitely feels great to be one of the recipients of the NCEDA scholarship."

Ze Xian says his research will be able to be used in a range of applications including forward osmosis and ultrafiltration processes for seawater desalination and waste water treatment and pressure-retarded osmosis (PRO) for generation of electricity.

"I am currently working on a metal-organic framework-polymer mixed-matrix membrane for liquid separation."

Ze Xian says that his proposed project fits well with the NCEDA's research roadmap. He is excited that his efforts will help improve current desalination processes.

"Metal Organic Framework (MOF) is a promising material as it provides an innovative approach to produce porous light-weight materials with a large internal surface area. It easily exceeds the limitations of many previously known porous materials such as zeolite and activated carbon." Ze Xian said.

"I would like to thank Monash University for giving me the opportunity and scholarship to further my studies under the supervision of Professor Huanting Wang. Thanks Monash!" Ze Xian said.

The Department of Chemical Engineering would like to congratulate Ze Xian on his scholarship.

# Jenny Flies North!

Jenny Chhen left Boronia this weekend for a 3 month stint at the GSK Suzhou site in China.

Jenny joined GSK as a graduate from Monash being the first of our graduates to come through our "Finishing School". It is has been an intensive 5 months working on a range of projects here with the technical team and under the guidance of David Coe.

When asked what she was most looking forward to in China Jenny said "Dumplings" – she is definitely a foodaholic and lists in her CV as 'Baking and frosting cupcakes' as one of her interests.

Jenny has a bubbly outgoing personality and has completed a double degree from Monash University in Pharmaceutical Science/Chemical Engineering. She spent a semester studying at Purdue in the USA and has had a number of leadership roles in her student life and is fluent in Mandarin and English and has for the past 4 years worked part time at a Chinese language school teaching students Chinese.

Jenny Chhen
GSK Boronia
Technical Team –
Centre of
Innovation with
Monash University

Her challenge when getting to Suzhou is to work with the site team to design and commission a MDI line, as well as prepare supporting documentation. There are a number of pieces of equipment at the site as well as a packaging hall that needs to be prepared for the package line. Jenny has spent quite a bit of time working on the line at Boronia learning how the equipment works and is laid out as well as understanding the key elements in getting the line to run well

We all wish Jenny well in her new venture and will miss her outgoing personality and feel confident she will enjoy her time at Suzhou.

## Mollie Holman Medals

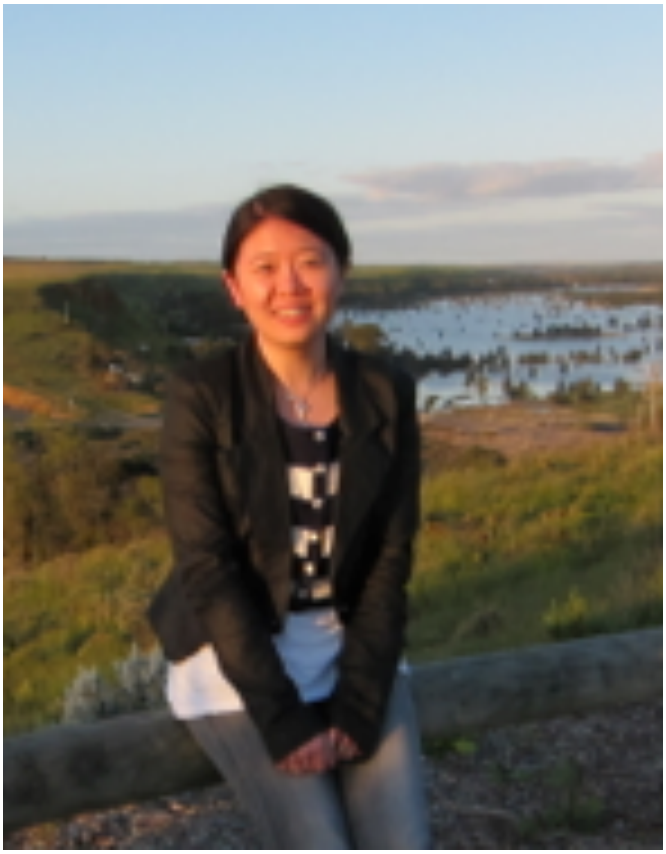
# Dr Xu Li takes out The best of the best in PhD theses


Monash University's most outstanding PhD graduates have been honoured with prestigious Mollie Holman Medals. 10 awardees were nominated by their faculties for the annual Vice-Chancellor's commendation for doctoral thesis excellence. The awards recognises the best PhD thesis in each faculty, and take into account criteria such as the quality and scope of the research conducted, and the publications and patents that arise directly from the thesis.

Dr Xu Li won for her PhD thesis titled *"Low-cost microfluidic diagnostics based on paper and thread"*.

The Mollie Holman Medal is named after the late pioneering physiologist, Emeritus Professor Mollie Holman AO.

For more information on the awards, see the Mollie Holman Awards page.



**"My research project is about developing a new class of microfluidic sensing devices for human healthcare, rapid disease detection and large scale disease screening in developing regions of the world."**

**Xu Li**

## Meet our HDR student
# Xu Li

My research focuses on the development of a new class of microfluidic sensing devices for biomedical analysis. My PhD thesis was entitled "Low-Cost Microfluidic Diagnostics Based on Paper and Thread". The distinctive aspect of these devices is that they are made of low-cost and universal materials, such as paper and thread. Moreover, these devices are portable, easy-to-use and do not need external forces or pumps to operate. Since human health and disease control are important global issues of our time, my research also investigates the intended applications of these low-cost microfluidic devices for human healthcare, rapid disease detection and large scale disease screening in developing regions of the world where medical facilities and healthcare situations are much more challenging than in the developed world. The Australian Pulp and Paper Institute in the Department of Chemical Engineering has an innovating research atmosphere, a group of friendly and helpful students and experienced supervisors who really know the needs of PhD students. I learned in my research how to think out of the box for research ideas, how to do research efficiently, how to write great research articles, how to give attractive presentations, and how to become a wise teacher. My research has been highlighted by the American Chemical Society, and I have received the Mollie Holman Medal for the best PhD thesis in 2012. I thoroughly enjoyed my research. I am also glad to see that my research outcome has attracted interests of Australian diagnostic

## Meet our student
# Karinna Saxby

**Bachelor of Engineering in the field of Chemical Engineering and Bachelor of Science**

Karinna Saxby is currently undertaking one of the many engineering double degree programs that Monash University has to offer.

"I chose Monash because I thought it had a great Engineering program and because it offered the double degree with Science."

Having developed a strong interest in science and a "crazy, nerdy love of maths" as a teenager, Karinna combined her interests and chose Chemical Engineering as her engineering field.

"Chemical Engineering encompasses a broad range of topics; looking at process control, material and energy balances, and design for a variety of processes."

"Chemical Engineering students can specialise in sustainable processing, biotechnology, or nanotechnology streams. I chose the biotechnology stream as it is a fantastic way of combining both of my disciplines and because I find microbiology and molecular biology particularly interesting."

During her time at Monash, Karinna has had the opportunity to study on exchange in Canada.

"It was an incredible experience and taught me a lot about myself as well as provided me with different perspectives both culturally and educationally."

After graduating, Karinna would like to work for a pharmaceutical company assisting in disease prevention and treatment.

**"Chemical Engineering encompasses a broad range of topics; looking at process control, material and energy balances, and design for a variety of processes"**

Karinna Saxby

# School and Workshop on: Fluid-Structure Interactions in Soft-Matter Systems: From the Mesoscopic to the Macroscale

## TOPICS INCLUDE:

- Mesoscopic simulation techniques (Lattice Boltzmann, Dissipative Particle Dynamics, Smoothed Particle Hydrodynamics, Multi-Particle Collision Dynamics, Brownian Dynamics)
- Coupling fluid and solid motion (boundary conditions, forces)
- Thermal fluctuations
- Soft Matter applications (polymers, membranes, blood flow, multiphase flow)

## SPEAKERS

R. Adhikari (Chennai)
S. Ansumali (Bangalore)
D. Bernhardt (Brisbane)
J. Brady (Pasadena)
M. Cates (Edinburgh)
P. Daivis (Melbourne)
R. Delgado-Buscalioni (Madrid)
A. Donev (New York)
M. Ellero (Munich)
P. Español (Madrid)
D. Fedosov (Jülich)
A. Fogelson (Salt Lake City)
I. Ginzburg (Paris)
G. Gompper (Jülich)
M. Graham (Madison)
J. Harting (Eindhoven)
T. Lee (New York)
A. A. Louis (Oxford)
S. Melchionna (Rome)
I. Pagonabarraga (Barcelona)
M. Sbragaglia (Rome)
F. Schmid (Mainz)
U. Seifert (Stuttgart)
E. S. G. Shaqfeh (Palo Alto)
V. Sofonea (Timisoara)
S. Succi (Rome)
H. Tanaka (Tokyo)
F. Toschi (Eindhoven)
F. Varnik (Bochum)
A. Wagner (Fargo)
R. Yamamoto (Kyoto)

## ORGANISERS


- Burkhard Dünweg
  Max Planck Institute for Polymer Research
- Ravi Prakash Jagadeeshan
  Monash University


*Prato, Italy*
*26-30 Nov'12*

**Abstract Submission Deadline: 31 August 2012**

http://users.monash.edu.au/~rprakash/cecam_wrkshp/home.html

MONASH University | cecam Centre Européen de Calcul Atomique et Moléculaire | $(SM)^2$ | Max Planck Institute for Polymer Research

# More news...

## Awarded Degrees

The Department would like to congratulate the following people on their wonderful achievements

### Doctor of Philosophy
### Feb - Jul 2012

**Trent Harkin,** Thesis title: *Multi-objective optimisation of CCS using simulation, heat integration and cost estimation,*
Supervisors: : A/Prof Andrew Hoadley (Main), Mr Barry Hooper (External)

### Masters of Engineering
### Feb - Jul 2012

**Khee Chaw Ng,** , Thesis title: *Self-assembly of gold nanorods*
Supervisor: Dr Wenlong Cheng (Main)

### News from Bhattacharya

A technical policy paper *What are the future prospects for the Low Rank Coal industry* co-authored by Joanne Moore and Chiranjib Saha was adjudged the winner at the International Low-rank Coal Symposium. They were part of a group of Young Energy Professionals consisting of four other members from the IEA Clean Coal Centre, Solid Energy New Zealand, Kawasaki Heavy Industries and an utility from Poland

A paper co-authored by PhD students Kawnish Kirtania and Md Asyraf and undergraduate student Janik Jashua won the best presentation award at the International Workshop on Clean. Technologies of Coal and Biomass Utilization in China

A/Professor Sankar Bhattacharya has been invited to act as an Expert Reviewer of the Inter-Governmental Panel on Climate Change (IPCC).

### New President of APTS

Dr Cordelia Selomulya has taken over the President position at the Australasian Particle Technology Society (APTS), which was previously occupied by A/ Prof Karen Hapgood. APTS is a technical society of Engineers Australia, which was formed in 1998 with the aim to promote the connection, interaction and the cooperation between all organizations working in particle technology area - including academic and industrial research, government organisations and commercial manufacturers. APTS helps organize the particles stream at Chemeca conferences every year and offers a major prize for the best Postgraduate student paper at Chemeca each year.

### Sponsorship Winners

Zhengyang (Jason) Zhao and Dominic Agyei, have been awarded EMBL Australia Student Sponsorship to attend the 2012 Australian Protein Production Symposium (APPS), University of Queensland, Brisbane, Australia.
The symposium will be held in Brisbane from July 9th - 11th, 2012

### HOD in Germany

A/Prof Karen Hapgood visited Germany last month, to deliver some lectures on granulation at a Graduate Summer School in Berlin. Organised by Otto van Guerike Magdeburg University, the Summer School was held over 5 days and included presentations by a number of invited Professors plus research students. Following the summer school, A/Prof Hapgood visited the university in the medieval town of Magdeburg, and plans future collaborations with Prof Evangelos Tsostas and his research group

### HOD in Singapore

A/Prof Karen Hapgood was a member of the International Organising Committee for the 5th Asian Particle Technology 2012 conference, and gave an invited talk at the conference in July.

### Dean awarded AO

Monash University's Dean of Engineering, Professor Tam Sridhar, has been made an Officer in the Order of Australia (AO) in the 2012 Queen's Birthday Honours List. Professor Sridhar received his honour for distinguished service to tertiary education, particularly the discipline of chemical engineering, and to the forging of international strategic educational relationships.

### Share your experience - as an alumni mentor

As a graduate, you have a great deal of experience to contribute. Why not share this with current students by joining our Alumni-Student Mentoring Program? Mentors work with students to help them refine their career goals and find direction in their studies. The program also enables alumni to reconnect with the University and fellow alumni. This year we introduce e-mentoring, allowing alumni from around the world to participate.
http://www.monash.edu.au/alumni/news/mentoring-reg.html

### Share your profile with us?

The Department of Chemical Engineering would like to have some graduate profiles listed on the Faculty site. Please visit this website to fill out a quick form and upload a photo http://www.eng.monash.edu.au/contact/gpf.php

## 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 Lilyanne.Price@monash.edu with the details and she will get back to you shortly.

## ChemEng Focus subscription

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## Disclaimer



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ChemEngFocus
AUGUST 2012

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