ChemEngfocus

October 2011
vol 4, issue 4

TOP DESIGN

How Monash students claimed the nation's top design award

also in this issue

4000+ attend
Open Day

Monash Uni improves it QS rankings

1st Annual Chem Eng Dept Conference

How a burning candle sparked a
Scientific Discovery

Distinguished Alumni Service Award

SMUCE wraps up 2011

and much more

MONASH University

October 2011

EDITOR
Lilyanne Price

DESIGN
Ben Weereratne

6

How a burning candle sparked a scientific discovery 2

Top Design
Monash Students win national design prize 3

also in this edition

5 Massive turn out at Open Day

8 Distinguished Alumni Dr Peter Rogers

thanks to our corporate sponsors

DAIRY INNOVATON AUSTRALIA

VISY

HRL

gsk GlaxoSmithKline

AMCOR

An instant that saw a simple observation of a burning candle spark into scientific discovery.

Bright idea

It was a light bulb moment for Associate Professor Wei Shen of the Engineering Faculty - an instant that saw a simple observation of a burning candle stick spark into scientific discovery.

"I was staring at the candle stick and thinking how the wick carries the wax fluid along the thread fibres. The idea of using thread to guide fluid wicking then grabbed me," Associate Professor Shen said.

In a world first, a team led by the chemical engineer used ordinary cotton thread and sewing needles to literally stitch together a stampsized microfluidic analytical device - transforming the humble material into a potentially life-saving instrument capable of detecting diseases such as kidney failure and diabetes.

"The concept was born from that initial idea, that it would be much easier to use thread to transport fluid than to make microfluidic tunnels through a solid material, which is how these devices are usually made," Associate Professor Shen said.

"Thread transports liquid through capillary gaps between fibres, so there is no need for an external pump to pump the fluid. And because it is white, thread can display colour changes. So it was an ideal, inexpensive material for making lab-on-chip diagnostic devices."

Microfluidic analytical devices, which have been produced from a range of materials over the last couple of decades, allow scientists to carry out chemical analyses of minute fluid samples, such as blood and urine.

They have generally been produced by carving channels into chips made of silicon, glass, ceramic or metal, or through a complicated and expensive photolithographic process.

The cotton-based device works by wicking fluid along the microscopic fibres of cotton thread sewn into a polymer film.

The thread's absorbent property ensures a defined flow for fluids, so complex channels and barriers do not need to be etched into the chip. The hope is that the cotton-based lab-on-chip concept will lead to the provision of low-cost disease screening in developing countries.

There are emerging technologies in the area of paper-based microfluidic diagnostic devices, however the disadvantage is that it requires expensive equipment to fabricate the sensors.

The benefit of cotton thread-based devices is that they can be made using simpler equipment, such as sewing machines, so they could be produced in developing regions. We are in the very early days of this research, but we are very excited about where it could lead.

Communities in the developing world are vulnerable to disease, so early detection and screening systems can save many lives.

However, many of the current commercial devices are not cheap enough for large-scale health-care projects involving disease detection, so an affordable alternative could make a huge difference. Associate Professor Shen has been invited to present his thread research at the fourth annual Annual Enabling Point-of-Care Diagnostics Conference, being held in Washington DC, later this year, and will showcase his innovation to representatives from the Bill and Melinda Gates Foundation.

Alexandra Rodriguez and David Bradford are awarded the Jacob's Design Prize

Jacobs Design Prize won by Monash students

The team that had previously won the Pratt prize has gone on to win the Jacobs Design Prize at the Chemeca Conference

The team of Chemical Engineering students; Sue Yeen Charlene Wee, Alexandra Rodriguez, Daniel Yong, David Bradford, Mohd Ariff Mohammad Diah and Mingda Wang have received not only the Pratt Prize but also the Jacobs Engineering Design Prize, 2011. The prize was presented at Chemeca 2011 in September and is the top Chemical Engineering Design Prize in Australia.

The 2011 Pratt prize is awarded to students who submitted the best chemical engineering design project submission in Victoria, Australia. It is organized by the Joint Victorian Chemical Engineering Committee (JVCEC).

The prize is awarded in memory of the late Henry Pratt, a distinguished honorary professorial fellow at Melbourne University. Pratt was instrumental in the set-up of the Victorian IChemE Member group and was the first chairman of the National IChemE Committee (1967-68) in Australia. The prize was presented by IChemE Fellow Robert Pratt, son of Clive and the event was sponsored by Uhde Shedden, ExxonMobil and Wood Group PSN.

As a result of winning the Pratt Prize the team was entered into the Jacobs Engineering prize where they won the Jacobs Design Prize. They were awarded this at the Chemeca Awards dinner. The dinner was held on Tuesday 20th September at the Hilton Hotel, Sydney and was attended by team members Alexandra Rodriguez and David Bradford.

CHEMECA 2011 - "Engineering A Better World" is hosted by The Institution of Chemical Engineers In Australia (IChemE), Engineers Australia (EA), The Royal Australian Chemical Institute (RACI) And The Institution Of Chemical Engineers New Zealand (IChemE in NZ). These bodies represent over 100,000 engineers and chemists working across the world.

The Monash University team was awarded the prize for their final year project titled 'Timeolo Gas and LNG Plant'. The group looked at a gas processing facility in Timor-Leste to exploit the Greater Sunrise field in the Timor Sea. To deal with the demand of the booming Asian market, a novel processing objective was ethane recovery and pipeline gas for domestic consumption and LNG production for exports. The plant was also future-proofed by a requirement to be carbon-capture ready. Due to economic and technical rationale, recent development proposals have favored a floating LNG facility which has included distance from the Australian mainland and the deep active trench between the field and Timor-Leste. This option has since been rejected by Timor-Leste which prefers direct investment on its soil. The group was able to deliver its submission in just thirteen weeks, assisted by 24-hour access to the University's facilities and many sleepless nights. In industry a similar project would take many years and hundreds of engineers to complete its designs.

Monash University congratulates the students on their achievements and wishes them all the best with their future endeavors.

Monash University Engineering
OPEN DAY

7 August 2011

This year's Open Day recorded a whopping 4055 visitors over the course of the day.

Academics, Post Grads and SMUCE representatives provided a wealth of information to potential students and parents throughout the day, including what employment opportunities are available to a Chemical Engineer, how is Chemical Engineering used in society and what a degree in Chemical Engineering will provide.

As always our interactive displays were heavily attended throughout the day, with the bouncy balls being the most popular.

Once again SMUCE drew in the crowds with their BBQ, the wafting smells of Egg and Bacon rolls proving too tempting for most passers by.

A big thank-you to all the Academics and Post Graduate students who gave up their Sunday to help represent the department, in particular a special thanks to Ross Ellingham, Kim Phu and Ron Graham for ensuring all our displays were running smoothly.

a. Adam Rady and Ross Ellingham demonstrate dust explosions

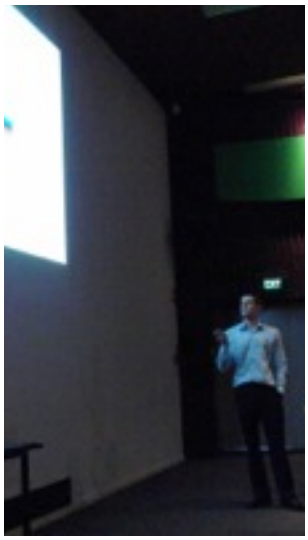
b. Attendees make their own bouncy balls

c. Panel of academics and undergraduate students talk to prospective students

d. Over 4000 visitors pass through Eng Halls

e. Prof. Paul Webley discusses the benefits of doing Chemical Engineering at Monash Uni.

f. SMUCE put on a BBQ for attendees



Department's 1st
Conference

The 1st Annual Monash University Chemical Engineering Conference was held on Thursday, September 29 2011, in Lecture theatres S3 and S4, Clayton Campus. The conference was attended primarily by students (undergraduate and postgraduate), research fellows and academic staff in the department of chemical engineering. Students and staffs from other departments (chemistry, mechanical engineering, material engineering, and CSIRO) also attended the event.

The day was opened by a plenary speech from our current Head of Department. In his speech, Paul Webley discussed the history of chemical engineering and predicted that the discipline would, in the next 50 years, evolve into a more molecular-based engineering with an emphasis on bio-systems and nanomaterials. The conference was then split into two sessions based on the prevalent themes of research in the department: One session held oral presentations related to Energy, Fuels, Biotechnology, Food and Pharmaceutical Engineering, while the other one held oral presentations related to functional nanomaterials, colloidal science, and rheology. The conference showcased the myriads of cutting-edge research carried out by postgraduate students in the department. It highlighted how hardworking our students are as each presentation was dynamic, highly informative, and well-prepared. Based on the evaluation by our academic panel, the following students were declared winners of the oral and poster competition

1st prize for oral presentation: Parama Banerjee
2nd prize for oral presentation: Benjamin Weereratne
Outstanding poster presentation: Waithira Kariuki

The Chemical Engineering Postgraduate Association would like to thank all of the volunteers who contributed and assisted the conference. We hope that this conference is the first of what will become a rich and long tradition in the department.

Department takes part in
Big Cake Bake

Staff and students of the Department worked to raise a lot of dough this October by supporting the first Australian Red Cross national Big Cake Bake. To assist, the Department held a special morning tea on Monday 17th October 2011.

All members of the Department dug out their delicious cake and slice recipes, and some even went the added mile and bargained with their mums for their help for the big bake!

There was something for everyone's taste buds with a delicious spread of cakes, slices, and muffins. "It is a great community fund-raiser to get behind, with all money raised going towards the ongoing commitments of the Australian Red Cross," Adam Rady said.

SMUCE 2011 Wrap Up

James Walter // 2011 President

2011 has been one of the biggest years SMUCE has had on record! With 152 members SMUCE has grown by 40% in 2011 alone, with hopefully more growth to come in 2012. This year we again had a huge range of seminars from industry representatives and also from industry societies such as IChemE and SPE (Society of Petroleum Engineers). The social events were also the best the club has had. 2011 started off with a bumper Sign-Up BBQ followed by the N64 Tournament Night later on in the semester with both a great success with everybody having a great time.

Second semester saw the start of a huge array of vacation work seminars with presentations from IChemE, Shell, Qenos, ExxonMobil, DIAL, Price Waterhouse Coopers and many others. Second semester also had the Masterbrewer BBQ, where all of the brews from the beer lab of CHE3163 – Sustainable Processing are put on show for everyone to try and vote for the best tasting brew. This years' SMUCE ball was an amazing night with the theme 'A touch of red for RedR' continuing to support 2011 as the Year of the Humanitarian Engineer which raised in total $1595 for Engineers without Borders and RedR.

Our final event for 2011 will be SMUCE Lawn Bowls, happening on Friday the 28th of October at the Melbourne Lawn Bowls Club (near Windsor station just off Chapel Street), starting from 2:30 in the afternoon till 5pm. This event will offer a great chance to kick back and relax at the start of the summer season, celebrate the end of the year (and also the end of Design Project). Cost is just $15 per person (pay on the day) with a sign up sheet on the SMUCE office door (or just email smuce@monashclubs.org).

I would like to take this opportunity to thank all those who have been involved in SMUCE this year. Without the hard work of the SMUCE committee as well as the amazing support we have received from the Chemical Engineering Department we would not be where are today as one of the most successful and active clubs at Monash. I wish everyone all the best for their future studies and endeavours and hope that SMUCE can continue to grow in 2012.

SMUCE – The Society of Monash University Chemical Engineers

"Linking Students with Industry"

Check out our Facebook group - facebook.com/groups/smuce

For more info on Redr, please visit www.redr.org.au

Dr Peter Rogers

Dr Peter Rogers

Distinguished Alumni Service Award 2011

Dr Peter Rogers (BE 1967, PhD 1974) is a long term supporter of the Faculty of Engineering and its alumni community.

He started volunteering with the University after meeting a former Monash Vice-Chancellor and Chair of the Engineering Foundation at an alumni event.

Feeling he was at a stage in his life and career where he had the interest and capacity to give back, he joined the Monash Engineering Foundation in 2004. He took on the chairman's role in 2009.

As chairman, Dr Rogers is determined to encourage other graduates, particular those who studied a Monash during its early years, to get involved with the University again. This passion has encouraged many new members

Dr Rogers has formed a fundraising subcommittee, which aims to build relationships with industry, alumni and the community.

Dr Rogers gives freely of his time to Monash University staff and is a strong supporter of the faculty's Engineering Leadership Program, which provides students with important leadership training and links them with key industry contacts.

Since 2007 the program has enabled high achieving students to learn about themselves and about how to become leaders in the wider world. The program is now Dr Rogers's top fundraising priority.

After graduating from Monash, Peter began his engineering career at ICI Australia as Sulphuric Acids Superintendent. He was appointed staff manager at the company in 1980 and in 1984 moved to London to take up a position HR Director, Overseas Group Operations.

He has also held positions as Director of ICI Bangladesh (a pharmaceutical company) and ICI Bangladesh Operations (a trading company) and HR Director of ICI's extensive India operations.

He was a director of the London-based board of Employment Conditions Abroad Ltd (ECA) for two four-year terms between 1985 and 2000.

Since 2001 Dr Rogers has been Managing Director of International Consultants Centre Pty Ltd, the Mobility consulting arm of MERCER.

In 2011 Mr Rogers was elected to the Board of Hepburn Wind – Australia's first community-owned wind farm based at Daylesford, Victoria.

Distinguished Alumni Awards - Your chance to nominate someone you know from The Department of Chemical Engineering!

Join us in recognising the outstanding achievements of our alumni by nominating your alumni colleagues for a 2011 Distinguished Alumni Award. Nominations are open in five categories:

Distinguished Alumni Lifetime Achievement Award
Distinguished Alumni Professional Achievement Award
Distinguished Alumni Service Award
Distinguished Young Alumni Award
Alumni Student Award (open to current full-time undergraduate students)

Monash alumni and staff members are eligible to nominate. More information, including nomination forms and conditions, is available at the Distinguished Alumni Awards website.

Monash achieves personal best in rankings

Vice Chancellor Ed Byrne AO

Monash University has achieved its best result ever in the Academic Ranking of World Universities compiled by Shanghai Jiao Tong University.

The University has moved up more than 70 places in the last five years and in the latest round now sits at the top of the 151-200 band, estimated at 159th in the world.

Vice Chancellor Professor Ed Byrne said achieving such a good result highlighted the University's commitment and dedication to the highest level of academic performance and was a testament to the extraordinary work by staff.

"Monash takes pride in its standing as one of the most respected universities around the world. We have improved every year since 2007 and this is our greatest result to date," Professor Byrne said.

"This position acknowledges the fantastic work by staff, recognising their commitment to strive for excellent research on a global level and educational outcomes.

"One of the most respected universities around the world"

"Evidence suggests that university rankings can influence prospective staff, students, employers and partners. Accordingly, we will examine these statistics, looking at the factors which have contributed to our performance and identify the areas where we have changed and where we can improve in our educational and research performance."

Universities are ranked by several indicators of academic or research performance, including highly cited researchers, papers published in Nature and Science, papers indexed in major citation indices, alumni and staff winning Nobel Prizes and Fields Medals and the per capita academic performance of an institution.

"the University has an unstinting dedication to achieving the highest levels of academic excellence"

QS rankings released

Monash University has improved its position in the QS World University Rankings, moving up one place to be ranked number 60 in the world.

Vice-Chancellor Professor Ed Byrne said that while it was pleasing to see the improvement in the overall ranking of the University, it should also be noted that Monash ranked in the top 50 universities in more of its key learning areas than last year.

"The results show that the University has an unstinting dedication to achieving the highest levels of academic excellence and are a testament to the extraordinary work of our staff," Professor Byrne said.

According to the 2011 QS World University Rankings, Monash is among the top 50 universities in the world for Chemical Engineering.

QS bases its rankings on academic reputation, employer reputation, citations per faculty, faculty/student ratio, proportion of international students and proportion of international staff.

Meet our Research Student

Nan Fu

Nan Fu is a PhD student in Chemical Engineering. She started her PhD study at Monash in 2009 after completing Master of Applied Science and Master of Science (Honours) at University of Western Sydney.

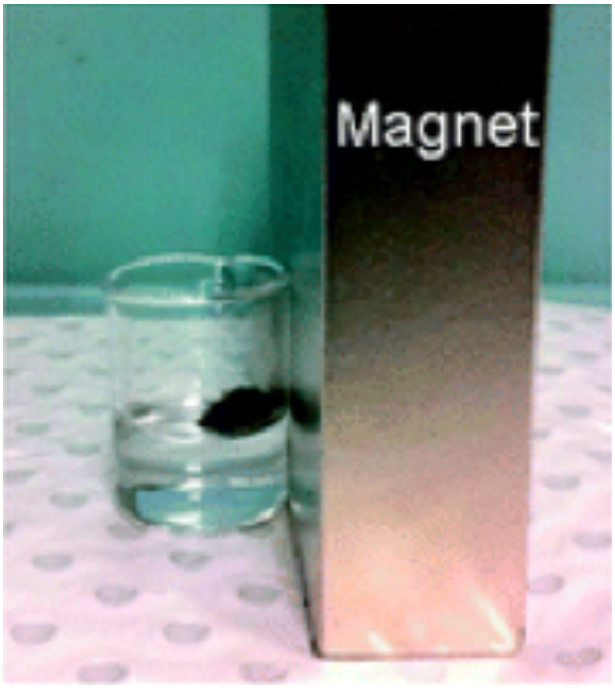
Nan identifies her interest in creating something useful with her own hands as key factor in motivating her to study Engineering. She chose Monash because of its outstanding research facility, the generous resources and support Monash provides to research students. She said, "Learning new research techniques and meeting new people are some of the highlights of my research experience at Monash" and she describes Monash as being "dynamic, innovative and practical".

Through her PhD program at Monash, she is studying how beneficial bacteria (probiotics) can survive the industrial drying processes. Her research aims to improve the survival ratio of probiotics during mass production that will result in a significantly reduced price of the relevant commercial products.

"Learning new research techniques and meeting new people are some of the highlights of my research experience at Monash"

Nan Fu

"These new materials increase evaporation by 230%"



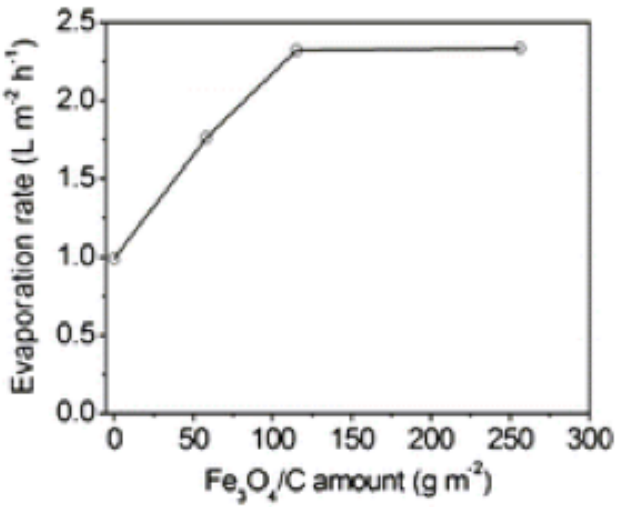
Floating platform uses sun energy to get salt from water

A team from the Department of Chemical Engineering has used floating light-absorbing materials to build an improved solar device for desalination.

The materials consist of Fe_3O_4/C particles and can be used as an alternative to black plastic bubble sheets that are placed at the bottom of solar ponds to increase sunlight absorption. Existing bubble sheets increase evaporation by 10%, but these new materials **increase evaporation by 230%.**

We have demonstrated a new strategy for enhancing solar evaporation by using floating light-absorbing materials. Floating Fe_3O_4/C magnetic particles with an average size of 500 nm were synthesized by carbonization of poly(furfuryl alcohol) (PFA) incorporated with Fe_3O_4 nanoparticles. The Fe_3O_4/C particles had a BET surface area of 429 m^2 g^{-1}, and a density of 1.44 g cm^{-3}. Because of their hydrophobicity and a bulk packing density of 0.53 g cm^{-3}, Fe_3O_4/C particles were floatable on water. Our results indicated that these Fe_3O_4/C particles enhanced the water evaporation rate by as much as a factor of 2.3 in the solar evaporation of 3.5% salt water. In addition, Fe_3O_4/C particles were easily recycled using a magnet, and stable after being recycled three times. Our work provides a low-cost and highly effective way for accelerating solar evaporation for industrial applications such as solar desalination, salt production, brine management and wastewater treatment.

This work was mainly done by Yao Zeng, who is a 1st year PG student in the Department. Read the just published EES paper at: http://blogs.rsc.org/ee/2011/08/04/floating-platform-for-desalination/



Awarded Degrees

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

Doctor of Philosophy
July - October 2011

Debadi Chakraborty (RJ),
Adel Fickak (DC)
Margarita Vargas (RS)
Alan Chan (MD)

Masters of Engineering Science (Research)
July - October 2011

Amanthi Jayemanne (DC)
Lin Wang (WS)
Hue Chen Au Yong (PW),
Ria Amelia (CS)
Parikshiti Mhaispurkar (IP)

Best Student Paper awarded to
Wenjie Liu

Congratulations to Wenjie Liu who won the Fell Consulting Award for best Student Paper at CHEMECA 2011 and was the runner up for the 2011 Graeme Jameson prize.

Parama wins

Annual Brian Cherry Forum

Congratulations to Parama Banerjee who secured first place in the Annual Brian Cherry Forum and won a cash prize of $1000 and a plaque. The Annual Brian Cherry Forum is a prestigious event which is named after the eminent corrosion scientist Professor Brian Cherry. The event showcases PhD thesis in the area of corrosion science and engineering. The event consists of 4 student presentations, each for 15 minutes. The presentations are judged by a panel of three renowned corrosion scientists including Professor Cherry himself. The first two places win cash prizes and an Australasian Corrosion Association plaque. The 2011 Annual Brian Cherry Forum was held at Monash University on 14th September, 2011.

Diary dates

Farewell for Professor Paul Webley
Faculty Club, Monday 12 Dec 2011, 4pm-6pm

After 15 years as part of the Department of Chemical Engineering Paul Webley has decided it is time for a change. Please join us to celebrate his time here and wish him the best for the future. Please register using this link

Department of Chemical Engineering End of Year party

Date: Wednesday 14 December.

Departing campus: 10am and to reach Healesville around 11am.

Returning to Clayton Campus: Around 3pm (arriving at ~ 4pm).

Registration: Available at the end of November.

Cost: $15 each (towards the cost)

Department photos
Date: Friday 18th November
Time: 12.30PM
Where: The grass outside building 32 (Same as last year)
There will be three photos taken:
1. Final year students and academics
2. All Chem Eng staff - Academics, admin and tech staff, research staff and post grads
3. Post graduate students only.

SMUCE Lawn Bowls
Date: 28th October 2011
Time 2:30 - 5:00PM
Where: Melbourne Lawns Bowls Club (near Windsor station just off Chapel Street)
Cost: $15 per person (pay on the day)
Sign up on the sheet on the SMUCE office door (or just email smuce@monashclubs.org).

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

Would you like to receive future issues of ChemEng Focus?

If so, please email lilyanne.price@monash.edu and we will add you to our newsletter mailing list.

Disclaimer

The statements made or opinions expressed in this newsletter do not necessarily reflect the views of Monash University.

Prof Paul Webley
Head of Department

ChemEngFocus
OCTOBER 2011

Dept Chemical Engineering
Monash University Building 36,
Room 226
Phone: +61 3 9905 3555
Fax: +61 3 9905 5686
E-mail: lilyanne.price@monash.edu