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FOCUS

TEACHING AND RESEARCH NEWS FROM THE
DEPARTMENT OF CHEMICAL ENGINEERING

Chemical Engineering Focus Newsletter

focus

TEACHING AND RESEARCH NEWS FROM THE
DEPARTMENT OF CHEMICAL ENGINEERING

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WELCOME FROM THE HEAD OF DEPARTMENT

As the undergraduate students at Sunway and Clayton campuses complete their first semester, take a break and prepare to return for second semester, let us reflect on some of our achievements over the first six months of 2017.

Two Australian Research Council proposals for Industrial Transformation Research Hubs (ITRH) from our department won \$14.8 million funding over the next four years. These two hubs were out of only three hubs funded nationally, and is a recognition of the expertise and industry-focussed research that we undertake in this department. The proposals are in vastly different areas. One of the two is led by A/Prof Xiwang Zhang on Energy Efficient Separation with applications in mining, power, minerals and water treatment sector among others. The second one led by Professor Gil Garnier on Processing Lignocellulosics into High Value Products has applications in the renewable fuels and chemicals industry, pulp and paper industry among others. I thank Professor Garnier, A/Prof Zhang and all the participants who worked tirelessly to make these hubs happen.

The annual Academic Ranking of World Universities (ARWU) has been published in late June. Our department is now ranked 31st in the world, up from the 51-75 band last year. This ranking uses six indicators to rank the universities and the departments - including the number of alumni and staff winning Nobel Prizes and Fields Medals, number of highly cited researchers, number of articles published in journals of Nature and Science, number of articles indexed in Science Citation Index, and per capita performance of a university or department. As with the QS ranking published earlier this year, which uses different measures, we are number one ranked Chemical Engineering department in Australia. These are figures that all students and staff can be proud of, and provide further impetus to march towards higher ranking.

As we approach the 2017 Monash Open Day on 6th August, we have asked a number of our students to reflect on their time at Monash and tell us about their achievements at Monash University. We hope you enjoy reading about their journey at Monash as much as we do. We, as a Department, take great pleasure in seeing these fine young women and men taking lead roles in programs such as the Monash Industry Team Initiative (MITI) and supporting the Department by being part of the Society of Monash University Chemical Engineers (SMUCE).

We are always seeking industry input in to our undergraduate program and we welcome new members to our Industry Advisory Board from our many Alumnus working in industry. We are holding an Alumni event 6-8 pm on 26th July at the Melbourne Convention Centre at the sidelines of the RACI Centenary Congress; the department is pleased to sponsor the Academic Sharp Brain Event at the Congress.

To all our undergraduate and postgraduate students - if you have any concerns or suggestions, I am always available to hear from you. We have two professors of practice, Professor Ross Pilling and Professor Kerry Pratt. Professor Pilling came from a distinguished industry background, and Professor Pratt had a distinguished career in industry and academia. They are contributing to the department by advising the postgraduates and through postgraduate teaching. They remain available at the department once a fortnight at the least. Make the most of this opportunity by talking to them about your research, seek advice on the practical usefulness of your work.

Finally, we welcome Professor Udo Bach in our department. His introduction significantly enhances our research expertise, particularly in the areas of photovoltaics, nanoenergy and nanofabrication. Professor Bach will also be responsible for teaching at undergraduate and postgraduate levels.





IN PROFILE - OUR UNDERGRADUATE STUDENTS



Ben Costa

Final (6th) Year Chemical Engineering/Science (Chemistry Double Major, Maths Minor) Student

After four years of study, going to uni was like trying to drag myself out of bed for a run on a rainy day; you know you should do it, and it'll benefit you in the long term, but you still aren't going to enjoy it. I think I started feeling that way after undertaking a chemistry research project as a part of my science degree. Doing novel work suddenly made the everyday labs and projects feel much more like jumping through hoops than learning experiences. In short, I was restless. And with two years of my degree left, I needed to do something about it.

I'd begun to seriously research the prospect of exchange, and had even selected preferences of exchange universities, all of which were in either the US or the UK, when I received a fateful email inviting me to apply for the New Colombo Plan; an Australian Government Initiative to generate interest in the Indo-Pacific region. A few months later, and yes it was easier said than done, I was on an aeroplane to Singapore for a year-long exchange at the National University of Singapore.

My time on exchange was undoubtedly the highlight of my studies, and realistically my life, to date. I would strongly encourage all students to consider study, or even short courses, abroad at some point during their degree. I would also suggest that you don't write off Asia as a destination; yes it's closer than some of the other options, but there is such a diverse range of cultures and it's really cheap so you can do all kinds of crazy things while you're there. I travelled to 14 countries over my exchange and picked up multiple scuba diving certifications as well.

I'm now halfway through my sixth and final year and can happily say that going on exchange was the change of pace I needed to rediscover why I chose chem eng. It's funny; you only get a pass/fail on your Monash transcript for exchange subjects so there's really no motivation to work hard, especially when you factor in all of the travel and other adventures you'll have along the way, but I actually think that helped me realise that I do enjoy and engage with the content of chem eng. Anyway, since I got back I've completed a research project with Monash through the Summer Research Scholarships. At the time of writing I'm also two days away from finishing a 16-week Industrial Placement at Visy Industries' Clean Energy Cogeneration Plant at Campbellfield and am juggling that with being the Academic Vice President of the Society of Monash University Chemical Engineers. With all of that behind me I feel qualified to say that the more involved you get with uni, the more you'll enjoy it, both in and out of the lecture theatre, so make the most of your time at uni!



Christopher Schumacher
Fifth Year Chemical Engineering/Pharmaceutical Science Student.



When I came out of high school, I always wanted to pursue engineering. I decided to do the double degree and add pharmaceutical science because I thought:

“It’s only one extra year and I get an extra degree out of it”

Now, I am in my 5th year of university of studying a Bachelor of Chemical Engineering and Bachelor of Pharmaceutical Science and I can fully appreciate the benefits that I have gained from completing a double degree. I now have a unique skill set that is identified by industry and has provided me with a competitive edge when I have applied for engineering opportunities. Even more importantly, I have first hand experience of how the scientific understanding I have developed will make me a better engineer.

Through a Monash program, MITI, I have been fortunate to have had summer placements at Burra Foods, Fonterra and most recently, Bega Cheese. Doing engineering

work at a company before completing your degree is both an enjoyable and a challenging experience. You get a fantastic opportunity to apply what you have learnt and work on real projects that will make a difference, unlike university assignments. You’re also put out of your comfort zone and expected to deliver positive results. At the completion of the placement, you get a rewarding sense of accomplishment.

I have also come back to university with more vigour about my studies. I can begin to relate what I am now learning could have helped me on my previous projects. The challenge of the double degree is that you’re at university for a long time. Most of my friends from high school are now working full time and I feel like I am stuck here. But, I continue to remind myself that I will eventually spend 30+ years working full time and there is no race to graduate. Plus, being able to sleep in on weekdays helps too.

IN PROFILE - OUR UNDERGRADUATE STUDENTS



Claire Stephens **Third Year Chemical Engineering Student**

January 2013, resignation letter handed in, all possessions packed in boxes, removalists locked in, one way ticket from Perth to Melbourne booked and eagerly awaiting an acceptance letter from Monash.

Thankfully an acceptance letter for chemical engineering at Monash finally came through and here I am half way through my penultimate year.

The path I have taken up until now is probably very different to most reading this. Before starting at Monash, I was working full time as a pharmacist in Perth until I discovered that this career path did not provide the challenge I desired, and I just felt like it was not the right fit for me. Through various avenues of research, I discovered chemical engineering. It had never been an option presented to me at school hence I'd never considered it until recently.

What attracted me most to chemical engineering was the large scope of applications it has. You could take your career in any direction you desire in just about any industry. Why Monash? Through studying pharmacy, we spent a bit of time at various universities around Australia and Monash was one university that always sparked my interest. Plus, it has the bonus of being in the city synonymous with the home of football, how could a girl resist? Since then I have been working part time, studying 3 units per semester and am secretary of SMUCE (Society of Monash University Chemical Engineers). During the last summer holidays, I completed a 12-week vacation program with Fortescue Metals Group, which are an iron ore mining company based in the Pilbara, WA. It was the most fantastic experience! And an opportunity that I would most certainly recommend to all students. It was fantastic seeing the sheer magnitude of mining and seeing all the processes, not just reading about them in text books or tutorial questions. Being iron ore, we could see and touch samples from various stages of the iron ore processing facility and really understand how physical separation processes work.

A great thing about vacation programs is that they are only 12 weeks, making them a great way to get involved in an industry that interests you and experience the company's culture to see if it really is a good fit for you. On that note, my advice to current and potential students is get involved in clubs at uni since I found it a great way to meet other students and develop new skills, endeavour to complete at least one vacation program to get a real feel for industry and the practical applications of what we learn in the class room. Cultural fit in a company is important for your job satisfaction even though you may feel sceptical about it (as I did) after you've heard every single recruiter talk about it, and finally never, ever be afraid to change your career path if you find yourself somewhere that is not the right fit for you.



Levi Jackson **Fourth year Chemical Engineering/Commerce Student**

Through high school, I always imagined that someday I would wake up and know exactly what I wanted to do with my life, that my future career plans would just click one day. That day never came, and so when I had to decide what to do post high school, I chose engineering at Monash because I was good at maths and didn't really know what else I wanted to do. I was fascinated by engineering. It seemed to present many opportunities, provided a broad range of career choices and I didn't have to decide which branch of engineering to choose immediately, that also helped.

After a year of university, I knew that Chemical Engineering was for me. Of the various first year units taken it immediately drew my attention. The combination of science and theoretical based work, design work and lab work was and has continued to be challenging yet rewarding. I am now 21, halfway through my fourth year of Chemical Engineering and Commerce and I am thoroughly enjoying myself.

Whilst the content is interesting, it is the friendships and relationships you build with others that make the university experience most enjoyable. Through joining the Society of Monash University Chemical Engineers committee and through participation in many other university activities both engineering based and otherwise, I have developed great friendships and this is what I enjoy most about University. The opportunity to meet people, to engage and learn with others, to work hard but in the process, have fun and develop friendships I hope will last for a long time.

I am still unsure about my future career past university. I have a great interest in the mining industry and was lucky enough to receive the Australasian Institute of Mining and Metallurgy Education Endowment Fund for Award for Academic Achievement. However, what I am most appreciating about a double degree in Chemical Engineering and Commerce is that there are so many possibilities and such a broad range of employers looking to hire students with these credentials, and I am very much looking forward to seeing where the next two years will take me.



Shahzad Billimoria **Final Year Chemical Engineering /Commerce Student**

While studying chemical engineering and commerce, I was coincidentally exposed to the ideas of sustainable processing and sustainable business models through units such as CHE3163 Sustainable Processing and BEX3150 Sustainability Practice and Organisations. I had never really thought about sustainability before, but after studying those units and becoming involved in related groups and communities, I've developed a passion for the field. I used to think chemical engineering was only about implementing processes economically, but now I see that the environmental and social impacts are extremely important too, and that we chemical engineers are in a unique position to use our process knowledge and problem solving skills to have a broader positive impact than merely improving the financial bottom line.

One of the main reasons I chose Monash was the opportunity to study a double degree. I love thinking technically and getting into the nitty gritty theoretical core of a process or concept, but I also wanted to learn about the world of business and commerce,

which is why I was attracted to the double degree of engineering and commerce. I was also attracted to Monash's strong ties with industry. I chose chemical engineering as my major because it's really all about turning raw, unrefined materials into usable, valuable products in a cost-effective way. I liked that there was an inherent element of commercialisation in chemical engineering in the sense that we're always thinking about how to take some chemical process from the lab and implement it on a large, economically viable scale.

What I most enjoy at uni is being in an environment where curiosity is actively encouraged and fostered. Uni is also a great place to build friendships and networks.

During my degree I have been lucky to participate in two vacation work placements. The first was at the Kilsyth plant of Henkel, a multinational manufacturer of adhesives, beauty care products and laundry care products. The second placement was with Warrnambool Cheese and Butter through the Monash MITI program in partnership with the Gardiner Foundation. Both placements were extremely valuable in that I learnt about the internal workings of a business and was exposed to how large corporations and business work while also applying my knowledge and skills to real problems.

The flexibility of Monash degrees has also enabled me to keep my interest in the Chinese language alive. I completed a Diploma in Languages in Chinese in 2014 after deferring my engineering and commerce studies for a semester in 2012 to avail of a Chinese government scholarship to live and study in Beijing. Thanks to the support of the university, I have represented Monash Uni and Australia in the Hanyuqiao International Chinese language proficiency competition in 2014. These experiences have been an invaluable addition to my engineering studies and have helped me become a more well rounded person.

I am also grateful to have been selected for the Ancora Imparo Leadership Program and the Engineering Leadership Program. Through these programs, I have met some of the most dynamic and inspiring people and I have cherished the opportunity to learn from their experiences and wisdom.

I believe that business can be a hugely positive driver of change in our communities and I want to be involved in the process of helping businesses become more sustainable, which is why I am extremely excited to be working with the Climate Change and Sustainability Services team at EY next year. As I near the end of my undergraduate experience, I have come to appreciate the Monash motto 'Ancora Imparo' more than ever. After gaining some industry experience I plan on returning to Monash in the future to study a Masters degree. Learning really is a mindset more than anything else, and I really do hope to be forever learning in whatever I do.

SUPPORT MY RIDE

Department staff member Dr Akshat Tanksale will be riding 210 km in Around the Bay to help raise money for disadvantaged Australian children.

In Australia, 1 in 7 children are growing up in disadvantage, where even the basics in life are hard to come by. But together we can break this cycle by helping these children to succeed at school so they can realise their full potential.

Please support my ride! I have set a target of raising \$210 (only \$1 for every km I ride in the event). Your donation will provide a child in need with essentials like school books, bags, uniforms, shoes and the support they need to make the most of their education. This will be the longest single ride I have done in my life so I'll be putting in plenty of hours of training for the big day and I promise to give my personal best, so these kids can achieve theirs.

Not only does your donation help the kids but it will give me great motivation on the ride!

Please visit my fundraising page [HERE](https://secure.aroundthebayfundraising.com.au/registrant/FundraisingPage.aspx?RegistrationID=1068568) (https://secure.aroundthebayfundraising.com.au/registrant/FundraisingPage.aspx?RegistrationID=1068568) to donate. Thanks for your support.

MONASH STUDENTS WINNERS OF THE PRATT PRIZE

Monash undergraduate Chemical Engineering students have won the Pratt Prize and had the special honour of receiving their awards from Robert Pratt, son of Professor Clive Pratt after whom the award is named.

The Monash students won the prize for their evaluation of the feasibility of a 20kta biomethanol facility using biogas from the WWT plant at Luggage Point, Brisbane.

The Pratt Prize is award annually to the best Chemical Engineering Design Project in Victoria. Professor Clive Pratt was a leading Australian Chemical Engineer. The students now go on to the next level - Australia/NZ wide competition. We wish them luck; winners will be announced at the Chemeca Conference.



Award winners from left: Samuel Franklyn, Bradley King, Dennis Pratt (prize presenter) and Kenneth Lee

SCHOLARSHIP AND AWARD WINNERS

We are pleased to announce the recipients of this year's Chemical Engineering awards and scholarships. Congratulations to all the students on their hard work and dedication to their study.

The Owen Potter Award for Chemical Engineering Excellence	Top graduate in Chemical Engineering	Kenneth Lee
The Yong Cher Biau Memorial Award	Top student in the third year of the Chemical Engineering course	Alastair George Katrivessis
The Philip Barclay Memorial Prize for Chemical Engineering	Student with highest average across all units taken in the 2nd year of the Bachelor of (Chemical) Engineering degree	Adam Elias Romas
The Gregory Barclay Prize for Chemical Engineering	Student with the highest marks in 3rd year subject CHE3172 Nanotechnology & Materials 1	Li Li Poh
The Jenkins Family "Follow Your Dream" Award	Enrolled undergraduate full time in their 3rd year with a minimum GPA of 55. Priority will be given to eligible students in the following order: i. Indigenous students ii. Rural students iii. Female students	Mitchell Drowley
Austrade Craig Senger Memorial Scholarship	Leadership scholarship in the course Bachelor of Engineering/ Bachelor of Commerce	Marissa Thomas
Dr CM Tay Leadership Scholarship	Leadership scholarship in the course Bachelor of Engineering/ Bachelor of Science	Ben Costa
GSK Leadership Scholarship	Leadership scholarship in the course Bachelor of Engineering (Hons)/Bachelor of Pharmacy	Maggie Du
Nick Apostolidis Leadership Scholarship	Leadership scholarship in the course Bachelor of Engineering/ Bachelor of Commerce	Marina Deletic
The Sir John Monash Medal	Awarded to the Bachelor degree student eligible to graduate/ course.	Mitchell Drowley
AusIMM Academic Awards	Levi Ray Jackson (2nd year) Claire Stephens (3rd year) Rosemary Margaret O'loughlin (4th year)	

PROFESSOR HUANTING WANG'S RESEARCH RECEIVES A BOOST WITH AN ARC LINKAGE GRANT



A sample of the non-polyamide based polymer.

Professor Huanting Wang and his departmental colleagues, Associate Professor Xiwang Zhang, Professor George Simon, Dr Lian Zhang, Mr Stephen Wee and Mr Baitao Guo, have been awarded an ARC Linkage Project grant of \$469,000 to further develop non-polyamide-based polymer membranes for efficient water processing.

This funding will allow the team to develop and test an innovative reverse osmosis membrane that simplifies the complex, costly process of cleansing industrial waste water of contaminants and recycling it for drinking and other uses. Ultimately, the technology offers huge potential for commercial development and broad applications across international markets.

In Australia and elsewhere, industries as diverse as mining, dairying and textiles are keen to reduce the financial and environmental costs associated with the large volumes of water waste they produce.

About Professor Wang:

Professor Huanting Wang is a Professor in the Department of Chemical Engineering and Associate Dean (International) of Faculty of Engineering. Originally qualified in material science and engineering at the University of Science and Technology of China, he completed a postdoctoral research fellowship in Chemical Engineering at the California Institute of Technology

and University of California Riverside. Professor Wang was awarded an ARC QEII Fellowship in 2004 and an ARC Future Fellowship in 2010. He was a member of the ARC Future Fellowship selection advisory committee in 2011, and a member of the ARC College of Experts in 2012-2015. He is a Fellow of The Royal Society of Chemistry, a Senior Member of The American Institute of Chemical Engineers, a Council Member of the Aseania Membrane Society and a Board Member of the Membrane Society of Australasia.

CONGRATULATIONS PROFESSOR GIL GARNIER - RECIPIENT OF THIS YEARS DEAN'S AWARD FOR EXCELLENCE IN RESEARCH



It is wonderful to announce that the Dean's Award for Excellence in Research has returned to the Department of Chemical Engineering after several years. Professor Gil Garner was announced as this year's recipient.

Professor Gil Garnier is the Director of the Australian Pulp and Paper Institute (BioPRA). His current research interests are focused on the application of colloids and polymers to surfaces, adhesion, composites, and the process of paper making. At BioPRA he is head of a multidisciplinary team which uses nanotechnology for surface engineering, bioprinting and the development of novel specialty papers.

The Dean's Award for Excellence in Research is given to a researcher with a strong publication record in high impact journals and presentations at high impact conferences, a good track record in attracting both nationally competitive and industrially competitive research grants, and with strong postgraduate supervision and successful training of higher degree candidates. Further criteria include establishing and building national and international research collaborations and networks, invitations to present at national and international conferences, serving on editorial boards of prestigious international journals and strong evidence of innovation.



IN PROFILE – OUR POSTGRADUATE STUDENTS



Negin Amini

I completed my Bachelor of Chemical Engineering and Bachelor of Science (Applied Chemistry) at RMIT University in 2012 and a Masters in Engineering Project Management at the University of Melbourne the year after in 2013.

My interest in postgraduate studies developed while working in industry in an occupational health and safety field. It was a very intensive role which required me to put in many extra hours. I gained a lot of experience and knowledge in that position. The time spent away from university made me realise how much drive I had to go back and pursue a PhD. I chose Monash University because of its outstanding reputation worldwide and the opportunity I had to be a part of the research group led by Dr Akshat Tanksale.

At Monash I really enjoy meeting new people, learning from others and the independence to do your own research. Doing a PhD requires a lot of focus and time management on the student's part. If you keep your motivation there and plan your time accordingly, the whole experience can be very enjoyable and not so stressful.

I received a scholarship to attend the Alumina Quality Workshop in Perth in my first year of PhD. It was a week-long conference which was one of the best experiences I've had. There are other opportunities for conference travel both nationally and internationally.

As for future plans, you never know where you may end up working this time in say 5 years. I do know that I enjoy university and if I find an opportunity to pursue a career within an Australian University I would take it. In saying that, my other passion lies in project management so pursuing a career in that field would be my next choice.

I would recommend Monash Chem Eng for post grad study because the staff and students are all very welcoming. There is a postgraduate committee (CEPA) which I have been a part of for 2 years of my candidature. They organise social and professional networking events among other things. There is always something happening which keeps the environment very dynamic!



Uthpala Manavi Garusinghe



I did my bachelors in Chemical Engineering at Monash University, and currently I am at the last 3 months of my PhD in the field of Chemical Engineering. I am a part of Bioprocessing Advanced Manufacturing Initiative (BAMI), an Industry Transformation Research Hub, hosted by Bioresource Processing Institute of Australia (BioPRIA) and funded by the Australian Research Council (ARC), industry partners and Monash University. Therefore, I work in a cellulose related area. My PhD topic is novel nanocellulose-nanoparticle composites.

My desire to research motivated me to apply for a PhD right after my undergraduate study. Achieving first class honours allowed me to pursue my dream of higher degree studies as scholarships covered my tuition fees and living costs.

My hope after finishing my PhD is to work in industry, particularly in the R&D sector. I personally recommend Monash University to do your higher studies because 1) it is well recognized; 2) the multicultural environment and interactive activities conducted by Monash throughout the year makes it feel like home for you; 3) Monash university prepares you for the life after higher studies. Therefore, I highly recommend starting a higher degree at Monash University. During the course of your PhD, you get to participate in international conferences and also other travel opportunities. I once travelled to Humboldt University, Berlin under a travel grant for two weeks to conduct my experiments and I am expected to go for a conference in Spain in October this year.

Llyza Mendoza

I graduated from the University of Queensland with a combined Bachelors and Masters of Chemical and Materials Engineering. I've always wanted to further my knowledge in chemical engineering and at this stage of my career I feel that right now is the most opportune time to do a PhD. I have chosen to study at Monash University because it is highly reputable with a competitive Chemical Engineering Department. I would recommend Monash Chemical Engineering because of the diversity of fields of study one can undertake. Also, we have access to top-notch laboratories and equipment.

In terms of my studies, I like that I get to work on an interesting topic and also tackle problems independently. Outside PhD, I like that the Monash Clayton Campus is spacious and have heaps of restaurants and cafes. I also enjoy being able to use different amenities such as Monash Sport.

I am now approaching the end of my 2nd year. One of the big lessons that I have learnt in my PhD is that you need to be comfortable with the unknown. Everything was nicely structured when I was studying for my undergraduate and masters (coursework) degree. But in PhD, the interesting (and hopefully publishable!) stuff always lies in the things that we don't know yet.

At this point in time, my focus is on doing experiments and writing. Further on, I'd like to be able to join the workforce in industry.

IN PROFILE - OUR POSTGRADUATE STUDENTS

Julie Courgibet

I am currently a first year PhD student in chemical engineering at Monash. I did my masters degree in France at ESPCI ParisTech in engineering with a specialisation in biotechnologies.

I chose to do a PhD as I would eventually like to work in an R&D department in a biotechnology company and I believed that a PhD would develop my experimental skills and my critical thinking ability. I also love the idea of managing my own project and to have time to develop it. Monash gave me the opportunity to do this by providing a multidisciplinary project that fits my background (physics, biology and chemistry). This project is also industry based, which made it a perfect fit for me.

Since I arrived 5 months ago I have started my experiments and began my literature review. I am beginning to grasp the scope of my project but I have a long way to go.

I really love the Monash environment, Clayton is a big and thriving campus close to the city and the beach. There is also a positive work environment with a close-knit team with many PhD students whom I can relate to, available supervisors, well-equipped labs and a friendly atmosphere. I also have everything I need to enjoy Australian life!

Craig Osbourne

I have a background in Chemical Engineering, Biochemistry and Chemistry. I am fascinated by the emerging field of biomolecular engineering that resides at the interface of these three disciplines. By using the exquisite catalysts designed by nature (enzymes) as a template, we now have the capacity to understand the nature of these capabilities and, more importantly, introduce intentional modifications to 'design' these enzymes. Such designed enzymes can have applications in areas ranging from bioremediation to industrial catalysis.

After graduating I spent several years working in industry before ultimately returning to do my PhD. Although I am very thankful for having spent that time there, I found that the majority of the roles, though exciting at first, became tedious very quickly. I also found that many of the roles were highly repetitious and only loosely related to Chemical Engineering.

My decision to undertake a PhD was largely because I wanted to do something that I was passionate about, and would also be an opportunity for me to make a significant contribution to society. I have always enjoyed research, and it is perhaps unsurprising that I ended up going down this path.

My strongest recommendation to students considering postgraduate studies is to find something that you are passionate about; if you don't like what you are doing then you won't last very long. This goes for all potential future areas, but especially if pursuing a PhD. There will at some point during all PhDs where nothing is working, the pressure is on, and you are hating life. It is hard to get past this point if you weren't that passionate about the project to begin with.

Remember that even if you aren't that interested in Chemical Engineering per se, you may be able to find a project through the department that suits your tastes. Of the multiple disciplines involved in my PhD, I probably use Chemical Engineering the least.

Monash Chemical Engineering leads Australian Universities in QS World University Rankings

Monash University has maintained its enviable position as Australia's leading chemical engineering faculty. Rankings from the QS World University Rankings, released in September 2016, saw the Department come in at 28th out of the 300 international Chemical Engineering faculties ranked.

Acting Head of Monash Chemical Engineering, Professor Sankar Bhattacharya, congratulated the staff on their commitment to teaching and research which saw Monash continuing in its leading position. "I would also like to show my appreciation to our former Head of Department, Professor Karen Hapgood, who over the five years of her tenure showed great leadership and commitment in shaping the Department".

28/300

**Chemical
Engineering
School
Worldwide**



PHD OPPORTUNITY

Expressions of interest are sought from outstanding candidates for PhD study in Chemical Engineering.

PhD Project – Low-cost analytical sensors for heavy metal ion detection and quantification.

A full scholarship is available for a PhD student to conduct research on development of a new class of chemical sensors to detect and quantify heavy metal ions in environment. The research will be conducted in Prof Wei Shen's group in the Department of Chemical Engineering. This project will take a new approach to build heavy metal ion sensors. Prof Shen's group has a few platform technologies, such as paper- and thread-based microfluidics, to enable the research on new heavy metal ion sensors. The new sensors will be designed to meet specific national standards for their accuracy and detection limits; they will be portable, user-friendly and, if required, can be adapted to modern communication methods, such as smartphones. A strong background in Analytical Chemistry and Physical Chemistry is essential. Additional skills, such as electronics and programming, are highly desirable.

Applicants must show excellent communication and inter-personal skills, and the ability to conduct self-motivated research. They should have Masters Degree in the relevant research areas and have a record of publishing their research in mainstream scientific journals.

Note: applicants who already hold a PhD will not be considered.

Location: Clayton campus, Monash University

Main Supervisor: Prof Wei Shen

Remuneration: \$26,682 p.a. full-time rate (pro-rata).

Shortlisted candidates will be interviewed, over Skype if necessary. The interviews will be conducted in English.

Candidate Requirements

Applicants will be considered provided that they fulfil the criteria for PhD admission at Monash University and demonstrate excellent research capability. Details of the relevant requirements are available at <http://www.monash.edu/graduate-research/future-students/apply>

Submit an Expression of Interest

EOIs shall comprise:

A cover letter that includes a brief statement of the applicant's suitability

- A curriculum vitae, including a list of published works
- A full statement of academic record, supported by scanned copies of relevant certified documentation
- Contact details of two academic referees
- Evidence of English-language proficiency (international applicants only)

Enquiries and EOIs shall be sent, preferably in the form of a single PDF attachment to an e-mail, to:

Prof Wei Shen

Email: wei.shen@monash.edu

SMUCE - SOCIETY OF MONASH UNIVERSITY CHEMICAL ENGINEERS



2017 started off with a BANG once again for SMUCE. With approximately 100 students signing up in O'Week to be a part of the society. The events and initiatives run by SMUCE have shown why SMUCE plays such a significant role in the life of a Monash University Chemical Engineering student.

Once again GroupUp was run for the more difficult units which students take. Being an initiative solely run by students to help peers to prepare for assessments and tests together, congratulations must be extended to Alastair Katrivessis, Anthea Martin, Bhism Sethi and Shiv Vijayakumar for being the leaders and coordinators for GroupUp this semester.

Taking a step away from the academic side of life, SMUCE had its Trivia Night in Semester 1. As always, a fun night was had by all. With questionable tactics of bribing judges with drinks, it brought together students from all different stages to have an enjoyable and an (un)forgettable night. Pictured below is the winning team of the night.

Events to look forward to for next semester include the SMUCE BALL on the 17th August at the Lincoln of Toorak. Tickets are \$85 for SMUCE members and \$95 for non-members. The night will certainly not disappoint, so bring along friends and get a table together! Tickets can be bought from the SMUCE Facebook page, at the SMUCE office anytime, or online at <https://www.trybooking.com/book/event?eid=283648>



**SMUCE
BALL**

"All Class"

Dress to impress

7:30 pm Thursday August 17
Lincoln of Toorak

Earlybird \$80/\$90 members/nonmembers
Normal \$85/\$95 members/nonmembers

Tickets available at SMUCE office or online
via SMUCE Facebook Page

SMUCE SITE TOUR OF THE EXXONMOBIL ALTONA REFINERY

Recently SMUCE ran a number of 2hr trips to the ExxonMobil refinery in Altona. I was lucky enough to attend one, and it was great fun and really interesting. I've been tasked with writing a short piece about the coolest thing about it, but I'm just going to give a general overview because I loved all of it! The trip was split into two parts: an outside tour of the plant and an inside overview of Exxon and what it's like to work there.

So, for the tour, we got kitted out in overalls (which were ridiculously comfy!), steel-capped boots, gloves, glasses, hard hats, hearing protection and H₂S monitors. Before going outside, we walked into a sort of operations room, where they had boards describing various temporary or permanent hazards around the facility, such as asbestos,

high H₂S and, importantly, snakes! Outside, we walked to the FCC tower (which is pretty crucial for the plant operation, as we learnt) and climbed to the top. From there, we had a pretty good aerial view of the plant, as well as a decent view over the bay to the CBD. We had a good talk about what the various parts of the plants were for, and how the crude and refined products are distributed. It was pretty cool to see all the things you learn about in theory actually in place and working together.

For the second part, we got an overview of ExxonMobil's operations within Victoria, which includes some oil rigs in Bass Strait, and a day-to-day look at what an engineer may do when working at the Altona plant. The whole tour was really fun and interesting, and it was good to see what you learn about in theory actually in practice.



SOCIETY OF MONASH UNIVERSITY CHEMICAL ENGINEERS

Linking students with industry

CONTACT smuce@monashclubs.org

to organise your opportunity to connect with the
Chemical Engineering students at
Monash University

GIRLS MAKE GAMES

Pre-registration is now live! Link: <http://girlsmakegames.com/registration.html>

At this time we're offering an early registration discount of AUD 50 (automatically applied when registering).

We also offer need-based financial aid scholarships. Families may apply for scholarships by completing the financial aid application found here: <http://girlsmakegames.com/ausreg.html>



Want to *design*, *program*, and *publish* your own video game?



What will you learn in a week?

- +Game Programming
- +Game Art
- +Game Design
- +Intro to VR
- +Practice Pitching to Industry Experts
- +Audio Engineering

Class Details:

Dates: January 15-20, 2018

Age Groups: 8-11 & 12-15

Hosted by the:

Faculty of Engineering, Monash University

Venue: Monash University

Clayton Campus

Wellington Road, Clayton VIC 3800

Excursion to local game studio/tech company

Tuition: AUD 500*

*Up to 100% tuition assistance available

WHAT IS GIRLS MAKE GAMES?

Girls Make Games is an international game development program designed to inspire middle and high school girls to learn game design, programming, and entrepreneurship.

To date, GMG camp alumni have published games on Xbox, Steam, and raised over \$70,000 on Kickstarter.



Register Now at
www.girlsmakegames.com

MONASH ALUMNUS DR MOHIDUS ADDRESSES SOCIO-ECONOMIC ISSUES THROUGH HIS RESEARCH



Dr Mohidus Samad Khan, a chemical and biotechnology engineer and researcher at the Bangladesh University of Engineering and Technology (BUET), is a Monash University Alumnus dedicated to improving food standards in Bangladesh.

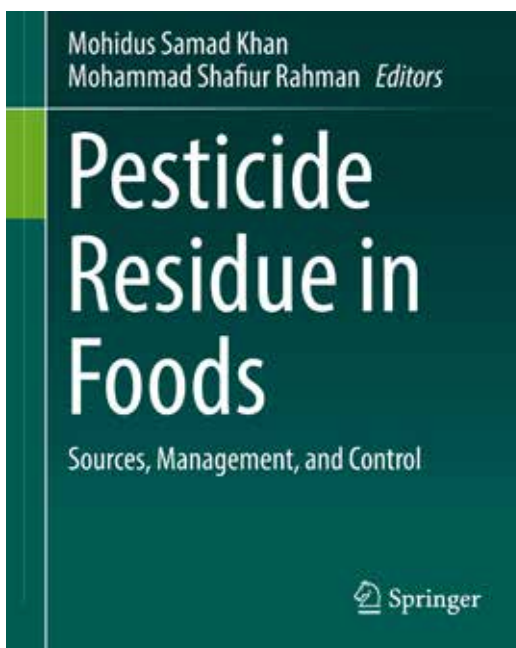
Following his undergraduate study in Bangladesh, Dr Khan worked as a Research Engineer in an International Pollution Abatement Project, which was funded by DFID (UK), USAID (US), Dept of Env (DoE) of Bangladesh Govt. In 2006, Dr Khan joined Monash University's Department of Chemical Engineering to complete a PhD in Bio-surfaces and Biotechnology. He received best PhD thesis awards for his PhD work at Monash.

Returning to Bangladesh in 2013 after postgraduate studies at McGill University in Canada, he discovered that formalin in food was a burning issue, prompting him to take action. "Developing a paper to detect formalin was my professional commitment. I wanted to apply my experience and expertise in developing a low-cost and user-friendly technique. The focus was also on designing something with higher accuracy that can be manufactured in Bangladesh."

His team has developed low-cost paper diagnostic kits to detect the presence of formalin in food, water and other biofluids. The project allowed Dr Khan to apply his knowledge and experience to a project that would have a great positive impact on the people of Bangladesh. Formalin, though naturally found in certain food items at a very low level, is illegally added at times to preserve food for longer, putting public health at risk. The invention of Dr Khan and his colleagues has the potential to curb the unbridled use of the toxic substance in food items. Consumers can now be assured of food safety themselves just by using a litmus-like paper to determine the presence of formalin in food items. A drop of a drink on the paper can help learn whether it is safe. To know if any fruit, vegetable or other solid food item is adulterated with formalin, a small amount of water from washing them can be used.

Dr Khan has also recently co-edited (along with M. Rahman) a book *Pesticide Residue in Foods: Sources, Management, and Control*. The book presents an in-depth study of different aspects of pesticide use in food production. Topics include sources of pesticide residues in foods, relevant health and environmental concerns, degradation of pesticides after their use, and available laws and regulations to regulate pesticide use. In addition, different pesticide management techniques, such as: reduction of pesticide residues in grains and foods, alternatives to conventional pesticides, and prospects of organic farming are also covered.

Through this book Dr Khan hopes to raise awareness of the proper use of these chemicals in order to lower residue in foods and reduce risk for consumers.



Dr Khan's new book to raise awareness of chemical residues in foods.

Front page news - a simple test anyone can conduct to detect formalin

WELCOMING NEW STAFF TO THE DEPARTMENT

PROFESSOR UDO BACH



We are pleased to welcome Professor Udo Bach to the department. Professor Bach currently holds a joint appointment with Monash University and CSIRO. He has been an Australian Research Fellow since 2006 and a CSIRO OCE Science Leader since 2011. Professor Bach has a strong background in the area of photovoltaics and nanofabrication. He received his PhD from the Swiss Federal Institute of Technology (EPFL) and worked for three years in a technology start-up company in Dublin (Ireland). Subsequently he spent 15 months as a postdoc in the group of Prof. Paul Alivisatos at UC Berkeley (USA), before moving to Monash University in November 2005 to establishing his own research group.

At Monash his research group is focused in the areas of photovoltaics, nanoenergy and nanofabrication. His interdisciplinary team includes chemists, physicists, materials engineers and architects from all over the world who explore novel concepts of capturing solar energy and develop novel nanofabrication strategies based on self-assembly.

Professor Bach is tackling the practical challenges of enhancing dye-sensitised cells through several different technologies. He has pioneered the theoretical foundations of boosting the output of organic cells by stacking them in tandem in a process similar to conventional solar cell

arrangements. This process could boost energy conversion beyond current limits.

He is also developing back-contact solar cells. This technique removes the collecting electrode from the top of cells and links the previously separated positive and negative charge collectors at the back of the cell, ending a problem of shading.

Along with Monash colleagues, he is working to find non-corrosive alternatives to the liquids presently used to transport charge internally. Such a development would allow the use of new materials in cell construction, potentially leading to conversion increases.

Professor Bach's energy work is complemented by his nanotechnology research as a Technology Research Fellow with The Melbourne Centre for Nanofabrication. He is engaged on a project where he is developing novel nanofabrication technology, combining conventional 'top-down' fabrication techniques with new 'bottom-up' assembly techniques.

With the use of blue prints from conventional nanopatterns, he has created nanostructures from nanometre-sized building blocks. He will then be able to perfect a universal assembly technique for use in future generations of solar cells, computing devices and sensors.

"Our contribution could be that we provide a disruptive photovoltaic technology, one which is a clear step from where we are now," he says.

"Currently photovoltaic technology is getting cheaper only in scale with the volume we produce. We are hoping that we can come up with something that is an important step, and will dramatically change the situation.

"I'm almost certain that within the decade photovoltaics will become extremely important and play a major role in global energy. Soon we will see photovoltaics in a position where it is economically viable and people might opt for photovoltaics as an energy solution simply because it's cheaper, not just because it's cleaner."

Professor Bach is currently a Chief Investigator with the ARC Centre of Excellence in Exciton Science and Chief Investigator on a number of ARC Discovery projects.

DR JOANNE TANNER



Dr Tanner is a Chemist and Chemical Engineer. She is interested in sustainability and biorefinery; replacing traditional fossil fuel-based fuel and chemical production processes with analogous plants using sustainable biomass as the primary feedstock. She typically designs projects that utilise an existing waste stream in order to add value to an existing process, develop new products, create new revenue streams, and increase the sustainability of our fuels and chemicals industry.

Dr Tanner joined the Monash Department of Chemical Engineering as a Lecturer in 2016 and she currently teaches reaction engineering and process control. Dr Tanner has industrial experience in the Process Control and Industrial R&D sectors, including extensive process and reactor design and on-site commissioning. Her research background is in thermochemistry and reaction engineering. She is familiar with batch, fluidised bed and entrained flow reactor design for traditional and catalytic reactions and has expertise in reaction engineering and laboratory and pilot scale reactor design and commissioning.

Dr Tanner maintains a close collaboration with the Institute of Energy and Climate Research, IEK-2, at Forschungszentrum Jülich, Germany, where she undertook postdoctoral research in 2015. Most of her projects are very hands on, and she tries to involve industry partners as much as possible to ensure that her research is addressing real world problems.

DR THANH NGUYEN



Dr Nguyen is a lecturer and Master of Advanced Engineering coursework administrator in the Department of Chemical Engineering at Monash University. Thanh considers herself to be a 'departmental dinosaur' because she completed her BE, MEngSci(Research) and PhD in the same department (the department was such a warm environment for pursuing her passion for research in pharmaceutical engineering!). Thanh enjoys learning about student learning experiences and her close interactions with students became the driving force to combine her interest areas of research, student learning and teaching. Consequently she is striving towards an education-focussed teaching role.

To help her understand the different facets of tertiary education, Thanh participates in a variety of activities such as student services administration work, working in the Continuous Professional Development (CPD) committee, helping to promote engineering through faculty events such as ENGINuTy and Monash Open Day, and learning about pedagogy and Scholarship of Teaching and Learning (SOTL or SoTL) with the community of engineering student and early-career academic teaching group Educats (an awesome group to socialise and learn from!). Thanh's passion for

research and teaching has allowed her to be selected as one of 20 participants for the Higher Education Research (HER) program, facilitated by the Monash Education Academy, a 1.5 year professional development program for academics interested in developing their SOTL or SoTL. Thanh is relishing this opportunity and is developing a project aimed at helping engineering students to develop their reflective learning through the use of Lego (a perfect project of combining research, teaching and my love of Lego!).

TWO NEW INDUSTRIAL TRANSFORMATION RESEARCH HUBS FOR THE DEPARTMENT

Following the recent ARC announcement, we are please to welcome two new Industrial Transformation Research Hubs to the Department.

"The two new research hubs, led by outstanding researchers in our Engineering Faculty, will create tremendous opportunities for Australia across multiple sectors in our economy. These hubs focus world-leading researchers and research infrastructure at Monash to address significant challenges facing industrial economies today and into the future," said Monash Vice-Provost (Research) Professor Nestor.

"Monash University is increasingly a magnet for industry and governments seeking competitive advantage through innovation. The two new research hubs add to our existing hubs for Transforming Australia's Manufacturing Industry through High Value Additive Manufacturing, BioProcessing Advanced Manufacturing, Computational Particle Technology and Nanoscience-based Construction Material Manufacturing."

The Industrial Transformation Research Hubs scheme engages Australia's best researchers in issues facing the new industrial economies and training the future workforce. The scheme supports collaborative research activity, between the Australian higher education sector and industry, designed to focus on strategic outcomes that are not independently realisable. The scheme provides funding to eligible organisations to engage in cutting-edge research on new technologies and economic, commercial and social transformation which support the development of research outcomes that benefit industry partners in the Industrial Transformation Priorities.

About the hubs

High value processing of lignocellulosics, led by Professor Gil Garnier

This hub will convert biomass waste streams from Australian pulp, paper and forest industries into new globally high-value and high-demand products with benefits flowing across Australian pharmaceutical, chemical, plastic and food packaging sectors.

Energy Efficient Separation, led by Professor Xiwang Zhang

This hub will create an Australian multidisciplinary platform to develop advanced separation materials including membranes, absorbents, catalysts and storage media for advanced manufacturing which will enhance Australia's capability as a world-leading technology provider.

JORDAN CARTER: AN INDIGENOUS STUDENT SUCCESSFULLY ENGAGED WITH HIS COMMUNITY AND CAREER

While Monash University graduate Jordan Carter studied his Bachelor of Engineering, majoring in Chemical Engineering, he also mentored his fellow Indigenous students through the Yulendj Indigenous Engagement Unit at Monash Clayton.

From a young age Jordan was a quick learner in maths, and in high school he loved chemistry, biology and physics, eventually deciding to enter the field of engineering. "One of the main reasons why I choose to do engineering is because I talked with past students about their careers and they provided me with some great insight that helped to influence my decision."

When Jordan graduated he was one of a few Indigenous graduates from Monash in 2017. He acknowledged that the pathways and support for Indigenous students may not always be there within their communities, but he recommended that students considering studying at Monash get in touch with the Yulendj Indigenous Engagement Unit for guidance, advice, and encouragement. Jordan said of his motivation to work with Yulendj, "I volunteered my time because I liked to make sure every student enjoyed their university experience as much as I did". He was also successful in combining this role with the Monash Student Association. "I felt as though I was able to help build up the current Indigenous student community at Monash, especially when me and my brother were running the MSA and using the role to run social events for the student body," he said.

Having found a career discipline he is passionate about, Jordan was inspired to help others do the same. "I also wanted to influence high school students into enrolling in science and/or engineering courses, so they would open up their mind to the opportunity of pursuing a career in those areas." Jordan has already achieved one of his graduation goals: "My first goal was to obtain a process engineering role with a respected company which I was able to do with Viva Energy." He also hopes to travel and work overseas once he has gained further experience in this role.

With his long-term career goals, Jordan intends to return to a supportive role in the lives of Indigenous students. "I plan to work my way up to a senior engineer management role and become the plant controller. At this senior level, I could encourage other Indigenous youth to think that it is possible to rise through the corporate world and become successful." he said.

MONASH PROFESSOR RECEIVES RARE HONORARY DOCTORATE FROM PRESTIGIOUS FRENCH INSTITUTE



Professor Xiao Dong Chen, an adjunct with the Department of Chemical Engineering, has become the first ever recipient of an honorary doctorate from the École nationale supérieure agronomique de Rennes (Agrocampus Ouest, Rennes, France).

As the first to receive such recognition from the university in its 168 year history is testament to the international reputation of Professor Chen and his important contributions to the field of research.

The Agrocampus Rennes is the premier agricultural university in France, including dairy research and is home to INRA (France's leading dairy research institute).

Professor Chen receiving his award from the president of Agrocampus Rennes

LECTURES VIA VIDEO LINK TO BASF SHANGHAI RESEARCH HUB WELL-RECEIVED

Head of Department Professor Sankar Bhattacharya organised a very successful workshop with guest presenter Jan Haesner from BASF Australia, which included a live video link from the BASF Shanghai Research hub. The workshop allowed postgraduate students, senior undergraduate students and researchers interested in heterogeneous catalysis to hear about the latest research from BASF colleagues. The session concluded with a Q&A, which allowed students to expand on specific areas of interest.



Jan Haesner from BASF Australia

As a global manufacturer of industrial catalysts and leader in R&D on catalysis solutions for the future, BASF staff addressed students of the Monash University Chemical Engineering and Chemistry Departments on the topic of "Practical application of heterogeneous catalysis in industry". The lecture provided insight into how a global chemical company positions itself in the market to be valued as partner and supplier of high quality catalysis solutions.

Speakers also discussed applications of current products in the process industry, highlighting challenges and how to overcome them.

The 66 attendees at Monash were joined by 214 viewers watching from Malaysia, Bangladesh, Brazil, and the USA.

MAXIMISING THE BENEFITS OF THE BILATERAL AUSTRALIA-CHINA SCIENCE AND RESEARCH FUND

Professor Cordelia Selomulya's Dairy Joint Research Center has been highlighted by the Australian Department of Industry, Innovation and Science as an outstanding example of the bilateral scheme.



Australian Government
Department of Industry,
Innovation and Science

Science



CASE STUDY

Maximising the benefits of the bilateral Australia-China Science and Research Fund

Topic: Recognising individual success, Professor Cordelia Selomulya

Location: Monash University, Melbourne VIC



Professor Selomulya (front row, 4th left) with visiting guest, Dairy JRC PhD students, Australian industry partner representatives from Murray Goulburn, Gardiner and Food Innovation Centre at Monash University on 10 March 2017.

The Australia-China Science and Research Fund (ACSRF) has provided Professor Selomulya with opportunities to build new collaborations and strengthen existing ones with Chinese researchers and industry.

Who is it and what do they do?

Professor Cordelia Selomulya is an academic in the Department of Chemical Engineering at Monash University. She is an ARC Future Fellow and the Director of the Australia-China Joint Research Centre in Future Dairy Manufacturing (the Dairy JRC).

What's changed: The bilaterally funded Australia-China Science and Research Fund (ACSRF) supported by the Australian and Chinese governments has provided Professor Selomulya with opportunities to build new collaborations and strengthen existing ones under two of its components, the Young Scientists Exchange Programme (YSEP) and Joint Research Centres (JRCs).

In 2013 Professor Selomulya travelled to China on a two-week exchange programme with 15 other Australian early-to-mid-career-researchers as part of the annual ACSRf YSEP. During the exchange in China, she presented a seminar at the Chinese Academy of Sciences in Beijing, Soochow University and Nanchang University,



Professor Cordelia Selomulya, 2013 ACSRf YSEP participant and 2015 ACSRf JRC Project Manager.

and was appointed as an Adjunct Professor of Chemical Engineering at Soochow.

CHEMECA 2017, MELBOURNE

The theme for Chemeca 2017 is “INNOVATION THROUGH SCIENCE AND ENGINEERING” and celebrates the pivotal role of chemical engineers and industrial chemists in creating new knowledge and translating it into trailblazing technologies that enhance our quality of life.

Chemeca 2017 is going to be held in the year that marks the centenary of the Royal Australian Chemical Institute (RACI).

To honour this momentous occasion, Chemeca 2017 will be held as a partner conference to RACI Centenary Conference 2017 at Melbourne Convention Centre from 23-26 July 2017. As one of the largest ever gatherings of scientists and engineers to be held in Australia, the RACI Centenary Congress aims to showcase innovative research and technology and to provide inspiration for creating new opportunities to address future challenges. As a platform to promote interdisciplinary thinking that is the core of creativity and innovation, it will facilitate professionals from diverse areas of chemical sciences and engineering to interact, collaborate and deliver innovative solutions for a sustainable world and way of life.

A world-class line up of invited speakers has been assembled, including Monash Chemical Engineering's acting Head of Department Professor Sankar Bhattacharya. Young researchers and students – our future leaders – are provided opportunities to showcase their research and be inspired to innovate. The Chemical Engineering Awards of Excellence dinner will be a highlight of Chemeca 2017 to honour and celebrate the exceptional people who contribute to chemical engineering and industrial chemistry.

Chemeca 2017 and the RACI Congress will be held at the Melbourne Convention and Exhibition Centre.

THE DEPARTMENT OF CHEMICAL ENGINEERING ALUMNI NETWORKING EVENING

Held during the 2017 Chemeca Conference:

Date: Wednesday 26 July 2017

Time: 6.00pm – 7.00pm

Venue: Melbourne Convention Centre, Level 1

Hosted by: The Department of Chemical Engineering, Monash University

Registration: <https://2017chemengalumnievent.eventbrite.com.au>

General Enquiries

LILYANNE PRICE

Academic Programs Manager

Department of Chemical Engineering

Engineering

Monash University

Level 2, Building 35, Room 226D, Clayton Campus

Wellington Road

Clayton Vic 3800

Australia

T: +61 3 9905 1872

E: lilyanne.price@monash.edu

CONTACT MONASH CHEMICAL ENGINEERING

**Department of Chemical Engineering
Monash University**

Clayton Victoria 3800

Telephone: +61 3 9905 3555

Facsimile: +61 3 9905 5686

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