



MONASH
University

MONASH
CHEMICAL
ENGINEERING

February 2018 Vol 11, Issue 1

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

HIGHLIGHTS IN THIS ISSUE

Welcome from Head of Department	3
Monash chemical engineering welcomes new HOD	4
Student work highlighted by the ACS	5
IChemE Macnab-Lacey Student Design Award 2017	8
Department alumni networking night	10
A chemical engineer's working life	12
CEPA 2018	17
IBMM-IEESEP 2018	18
SMUCE update and 2018 committee	21
Girls Make Games event at Monash	22
Department Alumnus pursuing his dreams in Switzerland	23

WELCOME FROM THE HEAD OF DEPARTMENT



As 2018 begins, we are in an exciting time for the Department of Chemical Engineering at Monash. We have just welcomed a new Dean of Engineering University, Professor Elizabeth Croft, and we are embarking on a new series of strategic hires in partnership with departments across the Faculty of Engineering and the University. We are looking forward to further developing key areas of departmental expertise as well as strengthening our joint research and teaching efforts with partner departments. We are also using this as an opportunity to engage further with our industrial and NGO stakeholders as we evaluate the impact of current and proposed scholarly programs on society.

We are also in the midst of our very successful roll-out of the Masters of Advance Engineering program. This one or two year program is designed to provide cutting edge knowledge in an area of specialisation whilst

simultaneously developing leadership and complex problem-solving skills that can function in the modern cross cultural environment. Please contact us about this exciting program if you are an interested student or an external partner who wishes to engage in this new opportunity.

I am delighted to be joining the Department of Chemical Engineering. The department has strong teaching and research addressing the energy-food-water nexus, which is a major challenge both locally and globally. Engineering, in collaboration with multiple partners on and off campus, is pursuing sustainable technical solutions informed by societal needs as well as addressing the environmental impacts of the activities. With our students and faculty, we are intellectually, geographically, and culturally positioned to provide leadership spanning the Pacific and Indian Ocean basins and hence to the vast majority of the world population. In addition, we are looking to take advantage of Monash University's great strengths in the medical field and to continue building our program in this rapidly growing sub discipline of chemical engineering.

In faculty news, please see the article on the election of Professor Aibing Yu as a foreign member (Academician) of the Chinese Academy of Engineering. This is a very high honour and we are delighted to see his teaching and research and impact on the field of engineering recognised in this fashion.

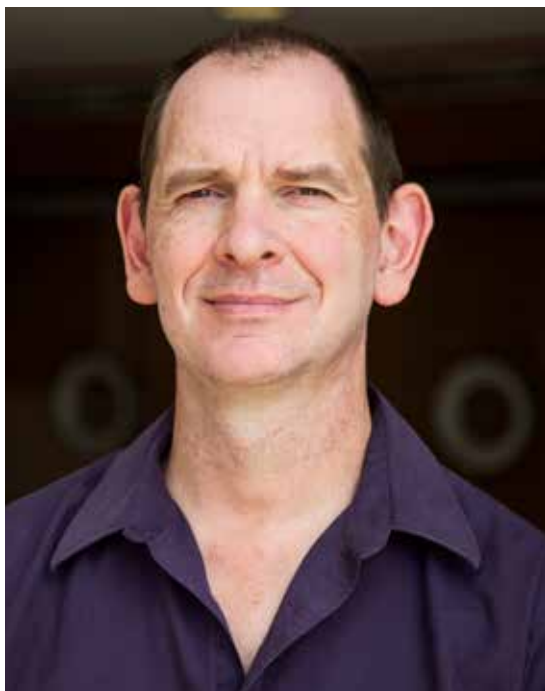
We are also proud of our students Kirsten Piner, Baher Maher, Marwa Al Busaidi, Michael Welsford, Ziqian Wang, and Jeremiah Lowe for a 2017 Macnab-Lacey Student Design award commendation from IChemE. New strategies for lower carbon footprints are of great importance and it is wonderful to see their work internationally recognised.

Finally, I would like to extend a hearty thank you to Professor Sankar Bhattacharya for his exemplary efforts as interim Head. Under his leadership, the department initiated three new ARC research hubs, hired talented senior and junior faculty, and placed the department in an excellent position to embrace new opportunities.

Professor Banaszak Holl



MONASH CHEMICAL ENGINEERING WELCOMES A NEW HEAD OF DEPARTMENT



We are pleased to welcome Professor Mark M. Banaszak Holl to the Department. Professor Banaszak Holl comes to us from the University of Michigan where he was Professor of Biomedical Engineering, Chemistry, and Macromolecular Science and Engineering. He served as Director of Macromolecular Science and Engineering from 2015 – 2017 and Associate Vice-President for Research from 2009 to 2012. He obtained his B.S. Chemistry from the University of Chicago and PhD from Cornell University. He was previously a post-doctoral fellow at the IBM T. J. Watson Research Laboratory and an assistant professor at Brown University.

At Monash his group will focus on a variety of problems related to nanomaterials including the structure of bone as a function of disease and drug treatment, anterior cruciate ligament failure, and the development of polymer composites and dielectric inks for polymer processing. His group is also active in the area of the full life cycle design, use, and reclamation of polymer as well as the environmental impacts of nanoplastics. His group is also engaged in employing polymer and other nanomaterials for targeted drug delivery applications.

"I am delighted to be joining the exceptionally strong Monash program in polymer materials and processing and look forward to working with the many strong groups across the Faculties of Engineering and Science as well as CSIRO," he says. "Monash's great strength in materials characterisation will also be of great value for our studies of human tissue and collaborations with the medics. We are in an exciting period to take advantage of the latest in cutting-edge science and engineering to better

understand and help repair the human body. I am also looking forward to applying our cutting-edge approaches to scanning probe microscopy to collaborations with the energy and membranes groups"

Outside of work, Professor Banaszak Holl loves to cycle, is a musician with three published collections of songs, and is an avid practitioner and teacher of the martial arts.

DEPARTMENT PROFESSOR HONoured BY THE CHINESE ACADEMY OF ENGINEERING



Professor Aibing Yu has been elected Foreign Member (Academician) of the Chinese Academy of Engineering (CAE), one of the highest academic honours bestowed on overseas experts biennially in China.

A world-leading scientist in particle and powder technology and process engineering, Professor Yu was elected this biennial round along with 17 other foreign experts including Bill Gates after two rounds of selection process.

This election by the Chinese Academy of Engineering is an honour that reflects the global impact that his research has across a range of industries, and we congratulate Professor Yu on this wonderful accomplishment.



STUDENT WORK HIGHLIGHTED BY THE AMERICAN CHEMICAL SOCIETY

Research published by Weirui Tan and Dr Liyuan Zhang, and supervised by Professor Wei Shen, reports on their investigation on building chemical responsive adhesives sensors. Now tape sensors can directly detect and quantify solid samples. It can also work with dipstick style of papers sensors, eliminating the problem of indicator being leached out while dipping paving the way for the availability of real chemical responsive tapes in the future. The group has applied for a provisional patent for this invention.

Simple paper-strip testing has the potential to tell us quickly what's in water, and other liquid samples from food, the environment and bodies - but current tests don't handle solid samples well. Now researchers have developed a way to make these low-cost devices more versatile and reliable for analyzing both liquid and solid samples using adhesive tape. They report their approach in the journal *ACS Applied Materials & Interfaces*.

One of the best-known examples of a paper dipstick test is the home pregnancy test, which detects the presence of a particular hormone in urine. Pregnancy tests are known to be accurate, but many other paper-based sensors are not as reliable. Liquid samples can push the color indicator off the paper or outward toward the edges of the readout, making the results inaccurate or harder to read. When it comes to testing anything solid, such as food or soil, samples need to be processed into a liquid form. Wei Shen

and colleagues wanted to address these limitations and expand paper-based sensor applications to analyze solids.

To test either liquid or solid samples, the researchers turned to the same household staple many of us use to repair a torn book page or affix a photo to a piece of paper: adhesive tape. The team drew chemical symbols onto the tape using indicator "inks" that change color when they react with specific substances, such as copper and chromium. The low-cost sensor, which the researchers dubbed "chemical responsive adhesive tape," or CAT, changed color and revealed the chemical symbols in response to solid heavy metal salts in a powder and metal ions in solution. Additionally, when paired with paper-based sensors, CAT could detect heavy metal ions in water, without displacing the indicator ink. The researchers also showed that the sensor could be used to detect proteins in solution.

Journal Reference:

Weirui Tan, Liyuan Zhang, Wei Shen. Low-Cost Chemical-Responsive Adhesive Sensing Chips. ACS Applied Materials & Interfaces, 2017; DOI: 10.1021/acsami.7b14122

Adapted from Science Daily
<https://www.sciencedaily.com/releases/2017/11/171129120235.htm>.

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.

Head of Monash Chemical Engineering, Professor Mark Banaszak Holl, congratulated the staff on their commitment to teaching and research which saw Monash continuing in its leading position.

28/300

**Chemical
Engineering
School
Worldwide**

ALUMNUS RUSSELL M. SCOTT HONoured IN AUSTRALIA DAY LIST



Alumnus Russell M. Scott has been made a member (AM) in the General Division ‘for significant service to chemical engineering through leading roles in developing and improving professional education

Mr Scott was recognised for significant service to the profession, through leading roles in developing and improving education. After graduating from Monash University, he spent 16 years at Davy McKee Pacific in various roles – including Project Manager for the procurement of a \$500m residue catalytic cracking unit at the Shell Geelong Refinery. This was followed by seven years as the Director of Mining at Killhill, and 14 years at Udhe.

Scott’s career at Udhe also saw him undertake several positions, including CEO and Managing Director. During this period, he was responsible for overseeing the performance of all Udhe’s Asia Pacific operations, in Australia, Thailand, Mexico and China.

Scott’s passion for promoting and maintaining relations between Asia Pacific organisations, and the development and improvement of education in the region led to him becoming President of the Asian Pacific Confederation of Chemical Engineering (APCChE), from 2013 to 2015. He still has a proactive role of the APPCChE board, as the Australian and New Zealand representative. Scott also chairs the University of Melbourne Chemical and Biomolecular Engineering Industry Advisory Group, working to ensure that chemical engineering degree courses are aligned with the needs of industry.

A Fellow of the Institution of Chemical Engineers (IChemE), Scott was IChemE’s President in 2012-2013 and Chair of IChemE in Australia from 2007 to 2009.

Russell Scott has been a passionate advocate of chemical engineering throughout his career, particularly within the Asia Pacific region, and this is worthy recognition of his commitment.

The Order of Australia was established in 1975 by Queen Elizabeth II, to recognise Australians for their achievements and service. Prior to the Order of Australia, citizens would receive British honours.

SANKEY AWARD FOR ALUMNUS CHRISTOPHE LI

Christophe Li was granted the Sankey Award in 2016 and, as part of the award, had the opportunity to spend two weeks to work in the New York Office of Forethought in August 2017.

To be nominated for this award, colleagues must be a recent university graduate, whose role at Forethought is their first full-time role in a professional capacity. Nominations can only be made by the leaders of the firm.

The criteria included collegiality, distinguished work, commitment to career development at Forethought, good stakeholder relationships and curiosity.

The winner is then chosen among the nominees by Michael Sankey, a Principal Consultant at the firm, based on the strongest nominations.

Forethought is a brand growth firm that uses science to understand consumer behaviour and decisions. It is ranked Australia’s most innovative and commercially effective research firm, and specialises in rational and non-conscious emotions driving choice and brand growth.

YOU HAD ME AT KATAIFI PRAWNS - 2017 CHRISTMAS LUNCH AT ALATONERO

Chemical Engineering staff and students brought 2017 to a close with a splendid Christmas lunch with 106 staff and students from the Department attending.

In the lead up to the function, Jill tantalised us with emails about booking our spot early, with examples of the menu from Alatonero. There was talk about the after lunch activities on the beach which included cricket.

On the day, there was much excitement and lots of chatter on the bus ride down to McCrae (on the Mornington Peninsula). At the Alatonero restaurant we were greeted with the personalised menu. Our lunch lasted a full three hours of feasting on their wonderful food which was above and beyond what we expected. We simply rolled out of the restaurant full to the brim with food. Images of Mr. Creosote from the Monty Python's The Meaning of Life movie flashed through my mind at several times during the meal. Thankfully, Alatonero did not offer Wafer-thin Mints!

After lunch it was off to McCrae Beach with crystal clear water and white powdery sand. Our 'play time' at McCrae beach was just the icing on the cake of a perfect day out. We played beach cricket, flew kites and had a kick around with the soccer ball, which eventually ended up in the water. The soccer ball is most likely now floating off the coast of Victoria on it's way to New Zealand by now. We had a ball on this beach after our lunch.

A big thanks goes to Jill Crisfield for arranging another wonderful day out again for our end of year party.



DRIVE TO MAKE FOSSIL FUELS MORE SUSTAINABLE LEADS TO ICHEME MACNAB-LACEY STUDENT DESIGN AWARD 2017 COMMENDATION

Speaking with the Thai Methanol Company (TMC) project team lead Kirsten Piner (BEng(Chem)), it was their commitment to continually make processes more sustainable and less environmentally damaging that propelled the initiative and determination of herself and her team members Baher Maher, Marwa Al Busaidi, Michael Welsford, Ziqian Wang and Jeremiah Lowe. It is something that every engineer and manufacturer should be striving for, she states. The objective of the Macnab-Lacey competition is to encourage students to think of sustainable development as a key element of their design projects, something clearly demonstrated by Kirsten and the team.

The project considered the integration of a Mega-Methanol plant (1.4 Mtpa) and an Ethylene plant in Rayong, Thailand, for the production of Methanol with reduced carbon footprint. Why? Kirsten shares that as countries become increasingly decarbonised, global markets will start to transition away from fossil fuels towards more carbon-light fuels.

Team TMC investigated the feasibility of pairing a world scale methanol production plant with an existing process to utilise its Carbon Dioxide (CO_2) and Cracked Lights (H_2 , CH_4) waste streams as feedstock. The resulting 'bio-methanol' product would have a lower carbon footprint compared to methanol produced via conventional methods, which utilise Natural Gas (NG) as the primary feedstock, and thereby presents a more sustainable option for future methanol production.

The Macnab-Lacey Prize, and those like team TMC who are given a highly commended status, is awarded to undergraduate student design project teams whose submission best shows how chemical engineering practice can contribute to a more sustainable world. I am immeasurably proud because it reflects the extraordinary dedication and effort made by my team over what was, truly, an intense 14 weeks. It is also validation of the approach we took when designing our solution: we made it a priority to consider at all stages factors such as the safety of plant personnel and the local community, improving efficiency and reliability of operation, reducing waste and minimising environmental impact, Kirsten says.

Working in a multicultural team, Kirsten noted that everyone brings their own experiences and unique world view to the table. This ultimately allowed us to ask questions and consider different aspects of the problem compared to if we were acting on our own. I have learnt that when people are able to actively and meaningfully contribute to discussion, and feel that their concerns are being taken seriously, they have a sense of ownership over the task and, as a result, you end up with a better outcome.

A lesson for all of us!



THE HON ZED SESELJA VISITS THE ACJRC FOR DAIRY MANUFACTURING

The Australia-China Joint Research Centre in Future Dairy Manufacturing had the pleasure of welcoming Senator Zed Seselja, the Assistant Minister for Science, Jobs and Innovation, and his team in January 2018.

Professor Cordelia Selomulya and Dr Lin Lin from the ACJRC, and Mr Kris Browne, Manager of International Collaboration from Department of Industry, Innovation and Science welcomed Seselja's team at Monash University.

Professor Selomulya introduced the ACJRC by showcasing the people, the research and the recent and upcoming events. As part of the visit, the Assistant Minister had the opportunity to visit the recently established pilot-scale laboratory of spray drying and membrane filtration.

The senator's visit provided the opportunity for ACJRC to showcase the innovative research being undertaken at Monash University, and the productive collaborations that are ongoing with the industry partners.



Seselja's visit to ACJRC in January 2018 L-R: Dr Lin Lin, Mr Kris Browne, Senator the Hon Zed Seselja and Professor Cordelia Selomulya (Photographer – Steven Morton)

The 2nd Australia-China Joint Research Symposium in Future Dairy Manufacturing 17 – 19 October 2018 | Beijing, China

The Australia-China Joint Research Centre (ACJRC) in Future Dairy Manufacturing is a virtual centre that links Australian and Chinese research institutions in conducting a portfolio of research-related activities in the field of dairy manufacturing. The centre focuses on seeking engineering solutions to practical problems in the dairy manufacturing sector.

Event overview

The 2nd Joint Symposium with the theme of cheese will be hosted by our industry partner, China National Cereals, Oils and Foodstuffs Corporation (COFCO), and co-hosted by Soochow University in China and INRA France, Europe's top agricultural research institute.

The three-day event will be based at COFCO NHRI (Nutrition and Health Research Institute), the research centre of COFCO. The event includes a technical symposium, showcasing advanced capabilities and innovative dairy technologies for industry to utilise and co-develop into high-value, high-tech applications that could generate new revenue streams. Talks will be delivered by the cheese experts from INRA and other countries. Symposium also includes special 'Cheese and Wine' tasting session and an exclusive tour of COFCO NHRI. The attendees are encouraged to visit the Mengniu site either in Hohhot (the headquarters) or in Beijing.

We welcome your participation

A great opportunity for dairy companies to showcase their dairy product for the emerging Chinese market.

Express of your interest

Australia-China Joint Research Centre (ACJRC) has the pleasure of inviting you to attend the symposium as dairy companies or sponsors. Expression of Interest (EOI) can be found [via this link](#) and closes on 30 April 2018.

Date	Wednesday, 17 October	Thursday, 18 October	Friday, 19 October
Agenda	COFCO NHRI tour : The tour will start approximately at mid afternoon.	All day symposium Morning tea Lunch	Site visit of Mengniu Dairy Option 1: Beijing Tongzhou (half-day, including lunch and local transportation) Option 2: Mengniu Headquarters in Huhhot (day-trip, including lunch and local transportation. Pick up from airport between 10:30am - 11:00 am. Flights not included - Beijing to Hohhot flight will take approx. 1 hour)
	Registration: 4 – 6 pm Welcome reception: 6 – 8 pm	Afternoon tea (Cheese and wine tasting session) Conference dinner 6 – 9 pm	

Key dates

Mid March - EOI release

Late April - EOI close

Late May - Registration open

Late July - Registration close

DEPARTMENT ALUMNI NETWORKING NIGHT

At the end of last year the Department had the pleasure of welcoming its alumni back to University for a networking event.

The evening commenced with a tour of Department facilities, including the Green Chemical Future Building, the Monash Food Incubator, The Society of Monash University Chemical Engineers (SMUCE) Office, the New Horizons Building, and the Chemical Engineering laboratories.

Drinks and canapés were served with plenty of opportunity for alumni to network and catch up with their fellow class mates.







A SUMMARY OF A MONASH CHEMICAL ENGINEER'S WORKING LIFE

It is suffice to say that my time studying Chemical Engineering at Monash meant doing the minimum work possible. Surfing was the most important feature of my life then – uni was just something done between times spent at the beach. The Notting Hill Hotel with its student's bar was also a feature, along with sleeping in and missing the first one or two lectures of the day in final year. This is not really a good look to present to young would-be engineers studying today, but that is the way I behaved in those days. Somehow, however, it all came together and I managed to get through.

After finishing Chemical Engineering at Monash University at the end of 1967, I had great difficulties obtaining a job, since I was called up for the dreaded National Service. I eventually started as a Shift Engineer at Albion Explosives Factory before I was due to be called up for the next army intake. The factory was a Federal Government run business near Sunshine on the outskirts of Melbourne and made explosives to put in bombs. The drive to the RDX-TNT manufacturing plant from the front gate was about a mile past mobs of sheep grazing to keep the grass down in the vast area where potentially explosive plants and storage facilities were kept at large distances from each other. I worked five day rotating shifts with weekends off. The work was boring and virtually no chemical engineering skills were utilised. Highlights, if you could call them that, included relieving the shift operators for their meal breaks to operate the plant and ensuring any explosive was removed by directing an oxy-acetylene flame on pieces of equipment before handing them over to the maintenance department for repair.

I had a stroke of luck after 3 months of this tedious job – Gerard Vaughan, a mate and fellow Monash graduate, had been offered a scholarship to do a masters degree in the Brown Coal Research Laboratory at the University of Melbourne's Chemical Engineering Department. Gerard had already accepted a scholarship to do research at Monash, and he suggested I might be interested – particularly as it would mean a couple of year's deferment of the requirement to join the army. I had never considered research as a possibility and grasped the opportunity of the scholarship when offered. The ensuing life of a post graduate student was a delight along with a bit of tutoring and demonstrating to help survive financially. Being able, between tutes and lab classes, to disappear off to Torquay and Bells whenever the surf was up, was a bonus. I also ended up as a resident tutor at Whitley College, which was another bonus with free accommodation and food.

I must admit that while doing my masters, I had a lightbulb moment as a chemical engineer. During a seminar I was giving on my progress of my project to the staff and other postgrads, I was asked a question by one of the lecturers about one particular step in my mathematical model. The model was only working for half the predictions I needed at that stage. I gave him what may have been a plausible answer – at least it satisfied him. Afterwards, I thought about my response, and carefully examined my model. It was then that I looked at it from a more fundamental aspect, and virtually started again. It then hit me that there was something really neat about chemical engineering and how to tackle problems. From then on, my enthusiasm for chemical engineering was enhanced significantly.



Martin Grover, John Rowney, Gerald Vaughan, Peter Strickland, Julian Hart, David Langford.

Marriage eventually brought a final end to my mostly wayward existence and to top things off, I failed my army medical tests due to severe hearing loss incurred while I was an army cadet at school. Poetic justice, I thought.

Armed with my MEngSc and BE(Chem) degrees, I commenced work at the ICI Australia Research Laboratories in Ascot Vale. ICI Australia had great research facilities and included a wide variety of projects with a small group of chemical engineers in a 170 strong workforce of mainly chemists, technicians and maintenance personnel. Among the projects I enjoyed working on included simulation of ion exchange desalination plants, design of a radiation initiated chemical reactor, production of ion exchange resins using irradiation initiation, nickel ore process development and development of a process for making catalysts for an ICI plant.

I thought that this research stuff was ideal and I could make a long term career of it. One of the things that stood out in my mind was that I should include a PhD in my resume if I wanted to make the most of my opportunities at ICI, and research in particular. So I got another scholarship and went back to the University of Melbourne in its new Chemical Engineering building in 1972 and started on a project studying melting due to convective heat transfer.

By 1974 inflation was rampant and the fixed scholarship wasn't enough to live on especially as children had started to appear. To keep the wolf from the door, I ended up working full time with the CSIRO Division of Chemical Technology at South Melbourne, on a water treatment project called Sirotherm (a thermally regenerated ion exchange resin and system). I was continuing to finish my PhD in my spare time - before and after work I was calling into the University to add to my mathematical model (punching up computer cards for only two runs per day) and continue the experimental work.

As part of my CSIRO position, I was regularly visiting the ICI Research Laboratories, since project was a joint effort between ICI and CSIRO. My particular aspect was to make a magnetic Sirotherm resin, build a laboratory pilot plant at ICI and design a single stage contactor for the plant operation. Everything went well until I mathematically simulated the process that the Chief of the Division desired. The trouble was that, theoretically, his concept was not feasible, and I blew it by telling him the facts. I was later told by one of the old research hands that one keeps one's job in the research game by suggesting new developments are just round the corner, and never let it be known that the boss's concept is a dud. A lesson learned the hard way.

Anyway, I was off to pulp and paper research in the same CSIRO division to work on a new concept of paper production called the Siropulper (a fitting punishment for my behaviour?). I had some success doing this, and was credited with 17 joint patents since I had designed a device which worked using a different concept to my supervisor's ideas. However, the

work was dead boring. By 1977 government funding was drying up, and I was shifted on to a month by month contract. Permanent positions were no longer offered in CSIRO, so it was time to move on.

I took a temporary job with the Victorian EPA, evaluating air quality licences. This was rather interesting at times, since I picked the most interesting chemical or industrial plants to evaluate. I only managed to last in this rather laid-back job working for the Government for a year but I completed the writing of my thesis and gained my PhD after a few months after starting. Funny as it seems, by then I had decided that research work was not for me – things took too long to achieve a practical result, and I wanted to try my hand at working in the oil industry, which had always fascinated me.

1978 saw me drag my wife and three boys to Brisbane and I started in a completely new role as a process engineer in the Amoco Oil Refinery in Brisbane. My thoughts were that with a couple of years' relevant experience, I would get a job easily in a refinery back in Victoria. In those days, living in the "Deep North" was looked upon as only for the demented, since Joh Bjelke-Petersen and his mob were held in disdain by all southerners and no-one in their right mind would ever go there to live. I am still living in Queensland forty years later, so it didn't turn out to be such a bad place after all.

The oil refinery, the smallest in Australia, was a fabulous place to work, manned by a great bunch of people in all facets of the business and small enough to get to know everyone very quickly. This was an exciting time as the refinery was a period of undergoing a major expansion phase. Upgrading and expansion continued relentlessly at the refinery for the rest of my working life. I had the benefit of being trained by an excellent experienced process engineer in the specific oil industry design methods, and after a couple of small design tasks, I started doing design work on a major Fluid Catalytic Cracking Unit (FCCU) expansion. Computer simulation of oil refinery processes was in its infancy and I managed to find that some of the old rules of thumb in design were horribly inaccurate, and this explained why some of our plant, even in the recently built units, could not possibly work as designed. Rigorous simulation was the start of a new era in design, and the end of manual calculations for everything from pressure drops to distillation tower design.

I had to follow our design work into the construction side and join the Operations Department to eventually get things I had designed to work. My first day in Operations was to start up a diesel hydrotreating unit – I had never had anything to do with what I thought was a very complex plant. A start up procedure was thrust into my hand, and I was told to get on with it (so much for any training!). Luckily, an experienced Head Operator came to my rescue and did the job while I looked on in amazement. Little did I know that within a few months I would be writing startup and shutdown procedures and be genuinely in charge of running start-ups, shutdowns and the day-to-day operation of much more complex units. I was also introduced to Industrial Relations and negotiated with operators on local claims. At this stage, the main awards were done centrally by the Oil Industry Committee and the union representatives in Melbourne.

I was again lucky, since I was teamed up with the FCCU superintendent, a fabulous mentor who taught me everything about operations of a refinery. My mentor, Keith Rhodes, was not an engineer, but had been a printer and a sailor before he became a refinery operator and eventually a process superintendent. He was refining personified, and his understanding of the refinery processes was uncanny. You can never underestimate how much you can learn from guys like this, including how to deal with people. For two years I soaked up his expertise until I reckoned I was ready to take over his job – I couldn't wait for him to retire! From 1982 I spent over a year in the Planning Department as part of my development path, learning how to plan the operation of the refinery (awfully boring -going through the same process every month, running the Linear Program and using other planning tools). Not before time, I managed to escape Planning and back to the variety and enjoyment of Operations.

BP bought out Amoco Australia in 1984, and a number of managers got the golden handshake. I took the FCCU superintendent's position in 1985 and had what I considered to be the best job I had ever had. The FCCU is a very flexible unit and I delighted in being able to walk into the control room every morning and let the operators know what my latest stunt for making the unit perform better would be for the day, and then work through all the changes and the resultant impact.

My delight in running this area was not to last as long as I thought, and my parting gift was to burn down a crude furnace attached to the FCCU just prior to taking over as Technical Manager. I hadn't ensured that the training for all the operators on a new control system was at the highest level for all operators concerned. An inexperienced panel operator made a mistake, his usual immediate supervisor was absent and his immediate supervisors on the day weren't quite up to speed to correct his error. I diagnosed the problem from home on a Saturday night by phone, but by then, the response was too late. It is often hard to imagine you can burn down a furnace – believe me, it can be done. What a mess! At least I wasn't sacked.

As Technical Manager from 1987 I had responsibility for all the process engineering design and investigation in the refinery as well as the Refinery Laboratory and the Australian Marketing Laboratory. This was a very productive and interesting time, but I could not get away from Industrial Relations, as the Laboratories had many union members. At this stage, things changed from the locals being responsible for only local award matters, to be part of the introduction of Enterprise Bargaining. This was a lot more work, but overall we were in charge of our own progress with how the workforce was managed and controlled, and we had great success in our agreements to progress the efficiency of all concerned.

Among the interesting projects I initiated was the introduction of the first FCCU catalyst cooler in Australia and BP worldwide refining, and our group laid the foundations for a major expansion of the refinery which eventually was commissioned in 2000, including Australia's first hydrocracker. Among the rewarding tasks I had was to interview and hire new graduates including many chemical engineers. We had criteria which set a high level of academic and personal behaviour and used exhaustive interview techniques. This delivered a chemical engineering workforce second to none, and we paid them well and gave them responsibilities right from the start. Having to manage a team of high quality engineers made my life relatively easy.

In 1994 after almost 7 years as Technical Manager, and despairing of ever getting the position I wanted, namely the Operations Manager's position which was by then earmarked for expats, I took a position in Java in Indonesia. This position was as part of a team of BP expats to help train Indonesians in how to effectively manage a new Pertamina oil refinery called Exor-1. I led the Operations team to advise our opposite numbers on how to effectively run a modern refinery. This proved to be an exacting task, since the local management of the new refinery did not want us there, but we were all satisfied that our good practices in the various aspects of operation, planning and maintenance were firmly entrenched in local personnel by the time we had finished. Obviously they made a lot more money using our advice and paid off the loan for building the refinery in a much shorter time frame than would have been possible if they had been left to their own devices.

My time in Indonesia was cut short in 1996, since the Brisbane Refinery Manager wanted me back urgently since the previous expat Operations Manager had driven the industrial relations into a complete disaster and the refinery was in deep trouble with operating personnel. I took on the role as Operations Manager, and it took me about 12 months to get things back on an even keel. I rearranged the department, and put all the steps in place to cope with the impending major expansion in 2000. By the time the expansion project was running, I was not looking forward to doing another Enterprise Agreement with the operators (I did three of them in a row after returning from Indonesia – all successful, but I was running out of ideas for new stunts to get things easily passed by vote of the union members).

I took the easy way out and became an expat again with an 18 month period working in two of BP's petrochemical plants in Cilegon in Java, Indonesia. Transferring into the petrochemical plants was relatively easy – the same unit operations exist in petrochemicals as in oil refining, but the chemical composition is simpler. My last expat job was like being a consultant, finding things wrong with the plant and/or personnel and fixing them. With no real line responsibilities for this last position, I started thinking that the idea of coming back to Australia and having to deal with the unions again wasn't high on my priority list, so I decided to take early retirement in 2002 at the ripe old age of 56.

My life as a chemical engineer was now over, and I think back at all the rewarding work I was involved in, the fun I had at the various places I worked, particularly at the refinery, the friendships I had made at University and at work, the antics I got up to everywhere and I just enjoyed the very best of life and work.

I am now happily retired on the Gold Coast where I surf, maintain and drive some classic cars, ski in Victoria and Japan, and travel in Australia and the rest of the world. All of our three sons live close by on the Gold Coast and we enjoy our times with them and their families including 3 granddaughters.

Without doubt, my degree in Chemical Engineering at Monash, gained over 50 years ago, opened up a wide variety of jobs which made my career a thoroughly enjoyable and rewarding time – jobs which ranged from research work to boiling oil to making plastic. I sometimes reflect back at some of the things we made do with at Monash – slide rules (no calculators then), punching cards to run computer programs, mechanical adding machines, using an analogue computer to solve a differential equation (a short lived concept), and no internet or email. How things have changed for the better, but I like to think we had the best of most things in the "good old days". Life was a bit simpler then.

John Rowney

Mermaid Beach



Attendees were as follows from left to right: David Langford, Julian Hart, Gerard Vaughan, John Rowney, Martin Grover, Peter Strickland Anthony Stevenson, Helen Stevenson

JACKY SONG DISCOVERED HIS CAREER PATH BY KEEPING HIS OPTIONS OPEN



When the time came for uni, Jacky Song hadn't a clue what he wanted to do. That's why he opted for Commerce/Engineering at Monash. He figured this double degree would offer him all sorts of career opportunities, and he'd have the luxury of choosing one later! As it turns out, he chose to become a consultant at Ernst & Young (EY), where he now works on IT projects for clients in the insurance market across the Oceania region.

Throughout his years at Monash, Jacky made a point of reaching beyond his studies. He worked part-time as a lifeguard, competed with the Monash Squash Club, and made the rounds of university-sponsored industry seminars and career events. One semester Jacky attended Tsinghua University in Beijing, China, just to get a different perspective on his studies. The more he branched out, the more options he discovered. "I'm always astounded to hear where an Engineering degree can take you!", he says.

Although Jacky enjoyed studying chemical engineering, his attraction to commercial markets ultimately prevailed. And he's happy having landed at EY. "I am constantly surrounded by exceptionally talented individuals", he says., "and I enjoy meeting new people around the world."

What's on the horizon? Jacky's keen to see how the 'connected car' (a vehicle fitted with devices connecting to other internal and external devices) might be integrated into our city's networks. Traditional car manufacturers like Ford and Toyota are slowly transforming into software giants explains Jacky. As our vehicles get smarter, we step that much closer to the reality of self-driving cars.

By staying open to possibilities, Jacky has stumbled upon a terrific career path. And he recommends that everyone else do the same: Be as well rounded as possible. Your degree does not define who you are professionally. In other words, explore. You might start in one place and end up in another. And it will all turn out for the best.

Originally published on the Monash Engineering News

CRAZY, NERDY LOVE AT THE HEART OF CHARITY FOR DISADVANTAGED STUDENTS - ALUMNA KARINNA SAXBY



When it comes to biggest bugbears, Monash Engineering graduate Karinna Saxby (BE(Chem)(Hons) / BSci) points to inequality in education. It rankles her that only 60% of students from low socioeconomic status (SES) schools finish year 12, and that less than 20% of them go on to university. A single extra year of education increases life expectancy by 0.18 years! she decries. And so Karinna has created Horizon Mentors, a charity to inspire disadvantaged students to reach their potential.

Through peer support, Horizon Mentors strives to increase high school completion rates, university admissions and enterprising skills in students from low SES backgrounds. Online meetups provide outreach to remote areas. We're only in the early days, but we're trying to help out students in any way we can. Whether it's providing advice on how to find a part-time job or what subjects to choose for certain career paths she explains.

So how did Karinna get here? A passion for science and a "crazy, nerdy love" of maths attracted her to the biotechnology stream of Chemical Engineering – a choice that ultimately led to a Masters in Infectious Disease and a job at KPMG in life sciences and health advisory. I became more interested in how resources in health were distributed, what therapeutics were funded, and what interventions worked better than others she says. Low and behold, I had developed a passion for health economics!

If running a charity isn't enough, Karinna has recently become a research fellow at the Centre for Health Economics, with a PhD in health inequality in the offing. She's also working with the Triple R radio station to podcast interviews of people who've made the leap from a low SES background to an impressive career. None of this surprising given her credo: Keep all your options open. You never know where an opportunity will take you.

Originally published on the Monash Engineering News



CEPA 2018

chemical engineering postgraduate association conference

OVERVIEW

The annual CEPA conference is back, and this year it will be bigger and better than ever. Since its conception in 2011, the conference has grown in both the number of speakers and attendance. This year, we hope to have the largest number of post graduate students from the Chemical Engineering Department taking part ever! The conference is planned for the 25th of October 2018, so save the date and make sure you don't miss out on such a highly anticipated event in the department!

PARTICIPATION

Attendance this year is set to be at a record high, with 28 students already set to give milestone presentations! However this event is not only for milestones; anybody is able to give either an oral or a poster presentation! Not only does the event aid with your presentation skills, but participation in the conference also counts as 5 Platinum Seminars! Don't want to present? - That's okay; attendance to each session on the day will also count as a Platinum Seminar attendance!

Both poster and oral presentations will be offered throughout the day, with prizes on offer for the top 3 presenters!

A call for abstracts will be sent out later in the year, and abstracts will be accepted until 2 weeks before the event (the 11th of October).

IBMM-IEESEP2018

In January 2018, the Department was delighted to be a platinum sponsor of the 1st International Conference on Bioinspired Materials and Membranes (IBMM2018) and the 1st International Conference on Energy-efficient Separation (IEESEP2018).

The two conferences, organised by the ARC Research Hub for Energy-efficient Separation, hosted 157 participants and aimed to review and discuss the recent research progress and future direction of two vital research topics - bio-inspired materials and membranes.

Bio-inspired materials are the focus of an emerging research topic, which aims to develop high-performance functional materials by learning from nature. In the last few years the applications of bio-inspired materials in membranes has markedly increased.

Within this context, the two conferences together provided the perfect opportunity to gather experts from both research fields - including academic and industry partners - to exchange innovative ideas and experience in developing advanced materials and membranes for energy-efficient separation.

Co-chairs Professor Huanting Wang and Professor Xiwang Zhang, along with their organising committee, created a scientific program designed to provide researchers tangible benefits and collaboration opportunities, thereby stimulating research in the development of new bio-inspired materials and membranes.

The conference committee welcomed five plenary speakers, 25 keynote speakers and 15 invited speakers. Plenary speakers included Professor Tony Fane (UNESCO Centre for Membrane Science and Technology at UNSW, Australia), Prof Lei Jiang (ICCAS, and Dean of School of Chemistry and Environment, Beijing University of Aeronautics and Astronautics, China and Department of Chemical Engineering Monash University), Prof Liang-Yin Chu (School of Chemical Engineering, Sichuan University, China), Dr Anita Hill (Future Industries, CSIRO, Australia), and Prof Dongyuan Zhao, (Department of Chemistry, Laboratory of Advanced Materials and Collaborative Innovation Center of Chemistry for Energy Materials, Fudan University, China and Department of Chemical Engineering, Monash University, Australia).

The event also included a tour of Monash Campus and the Australian Synchrotron, as well as an Early Career Researcher Workshop.

The next IBMM will be held in Sichuan, China in 2020 .

Student awards:

An important element of the conferences was the opportunity for students to present their research in a supportive environment, which included mentors, future collaborators and leaders of their fields. Students were encouraged to present a poster or enter the 3MT competition, with awards given to the top three in each category. Recipients included:

3MT award: 1st - Van Huy Tran (University of Technology Sydney), 2nd - Wang Zhao (Monash University), 3rd - Yun Xia (Monash University)

Best poster award: 1st - James Maina (Deakin University), 2nd - Yuqi Wang (Monash University), 3rd - Yun Lu (Monash University)



STUDENT COMPETITION WINNERS



3MT Winner Van Huy Tran



3MT 2nd place Wang Zhao



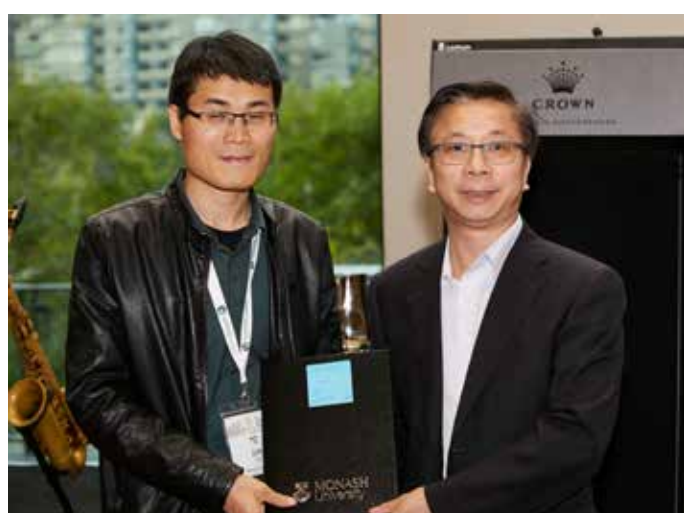
3MT 3rd place winner Yun Xia



Dr Ludovic Dumeé receiving the best poster award on behalf of his student James Maina



Poster 2nd place winner Yuqi Wang



Poster 3rd place winner Jun Lu



POSTGRADUATE OPPORTUNITIES

PhD

Monash Engineering operates at the forefront of engineering research. All specialised fields of research are at world standard or above and the most recent Excellence in Research for Australia assessment has rated our research results well above world standard. With access to world-class laboratories, workshops and facilities and with highly specialised equipment and software, a PhD in Engineering offers you a stimulating, supportive and professional environment in which to explore engineering challenges and develop solutions for the future.

A PhD in Engineering takes the form of the Monash Doctoral Program – a PhD for the 21st century. The program consists of extensive, independent research of a topic formulated in consultation with academic staff. A minimum of two academic supervisors will support you throughout your study. As part of the program you will also complete a series of professional development activities or coursework units that provide you with the skills required to make an impact in academia, industry, government or the wider community. Your study will result in a research thesis or alternative approved output, which makes a valuable contribution to the current body of knowledge on your chosen topic.

Our research explores a wide range of chemical engineering disciplines, including chemical reactor engineering, coal conversion processes and particle technology. And our researchers are leading the way. Not only are we the number one chemical engineering faculty in Australia – we're among the very best in the world.

Our expertise

Our research here at the Department of Chemical Engineering at Monash is organised into six key areas.
<http://www.monash.edu/engineering/departments/chemical/research/departments-research-expertise>

Why join Monash?

Monash University is ranked as the best university in Australia for engineering and technology by the Times Higher Education, 2016-2017.

What's more, Monash itself is in the top 1 per cent of world universities according to the Times Higher Education World University Rankings 2016-2017, and a member of the prestigious Group of Eight Universities here in Australia.

A full-time funded scholarship is available from outstanding candidates for PhD study in Chemical Engineering.

Chemical Engineering Higher Degree by Research enquiries.
Email us at: chemeng-hdr.enquiries@monash.edu

Masters

Master of Advanced Engineering Coursework (Chemical Engineering) enquiries
<https://www.monash.edu/engineering/masters>
Email us at: chemeng-pgcoursework.enquiries@monash.edu

SMUCE - SOCIETY OF MONASH UNIVERSITY CHEMICAL ENGINEERS

The Society of Monash University Chemical Engineers (SMUCE) is a student-run society that aims to bridge the gap between the classroom and the world outside university. It serves as a link between students, academics and industry. The Society runs a number of events throughout the year and has an elected committee and representatives from each year level. Students/visitors are welcome to drop by our SMUCE office anytime (opposite E1-E3).

Upcoming events

- » SMUCE Booth at Monash ORIENTATION WEEK, 19 - 23 February 2018
- » SMUCE membership BBQ, 1st March 2018
- » AGM, 12-1 in the Lawson room - 15th March 2018
- » SMUCE Lunchtime seminars, Semester 1 2018 - each Thursdays, 12 pm to 1 pm in the Lawson room

We have following positions open on the committee

- » 3 x 2nd-year representative
- » 1 x 3rd-year representative
- » 1 x 4th-year representative

SMUCE Committee 2018

President - Bhishm Sethi
Vice President (Academic) - Alistair Hogan
Vice President (Industry) - Shivank Vk
Vice President (Social) - Danni Suhaidi
Secretary - Niki Malysiak
Diversity Representative - Carson Yuan
Treasurer - Dilini Eriyagama
4th Year Reps - Anthea Martin, Kaushal Kulkarni
3rd Year Reps - Pujita Mukesh, Thisal Jayakody



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

Like us in Facebook www.facebook.com/SocietyOfMonashUniversityChemicalEngineers/

GIRLS MAKE GAMES COMES TO MONASH



In January Monash Engineering again hosted another successful Girls Make Games camp.

Girls Make Games is a series of international summer camps, workshops and game jams designed to inspire the next generation of designers, creators, and engineers. During the summer camps, participants learn how to design and program your own video game! Students learn the fundamentals of game development while working in teams to create fully functional game prototypes.

How did Monash's involvement with GMG come about?

In early 2017, Lilyanne Price, the Academic Programs Manager at Monash and parent of a GMG camper, reached out to GMG in the USA suggesting we bring GMG to the Clayton campus. After coordinating over e-mail while navigating time zones (GMG HQ is based in California), we were able to bring a full 1-week camp to Monash. Thanks to the tremendous support of Lilyanne and the Faculty of Engineering, the summer camp was hugely successful and our largest Australian camp to date!

Why is the GMG initiative important?

47% of gamers are women, but women make up less than 12% of the game industry. The fast growing games industry aside, it is a well known fact that the majority of future jobs are going to be in STEM fields, which presents a huge opportunity. We want to address the gender and the confidence gaps by reaching out to girls at a younger age. GMG gives elementary through high school girls a unique opportunity to work alongside mentors and established industry professionals to create fully playable games in a short span of time.

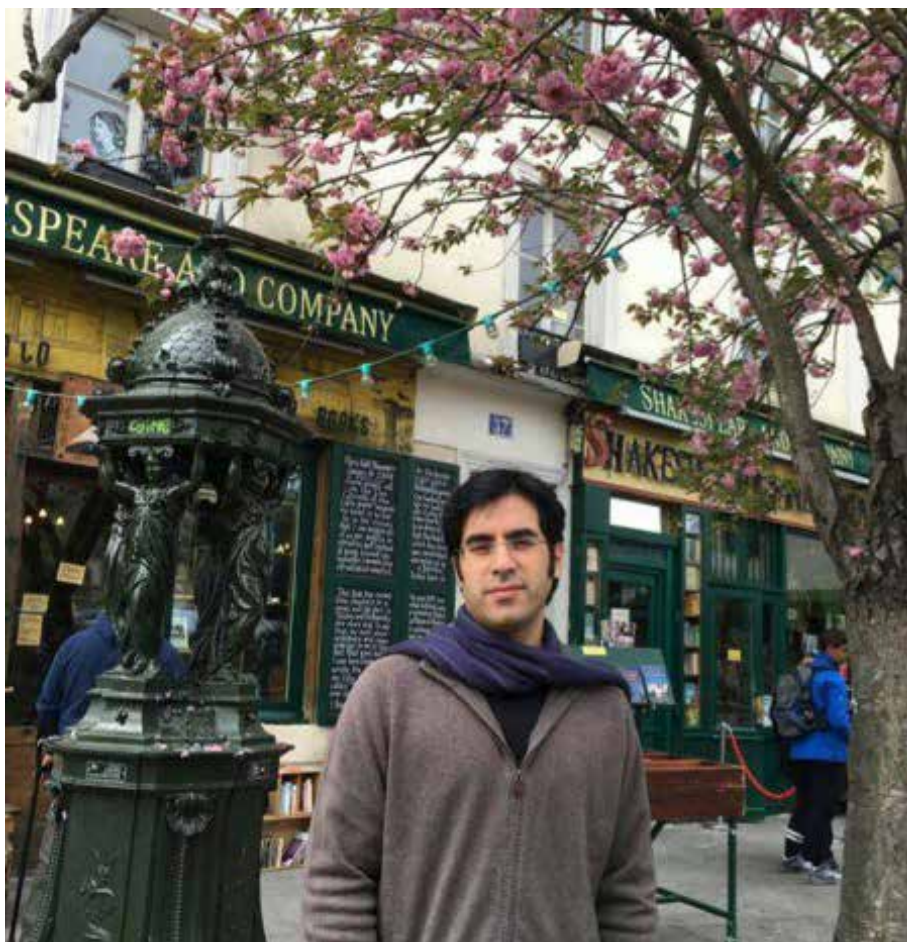
Why is it important for Monash and the faculty of Engineering to support the GMG initiative?

Monash and the faculty of Engineering are in a position to influence the perception and numbers not just locally within Melbourne, but also at a national level. By supporting programs like GMG, they bolster women's representation in STEM which ultimately will lead to a stronger position for Australia in the global IT industry.

What are you hoping the participants will take away from their experience?

In addition to learning technical skills, we hope participants will take away a love and excitement for game-making as well as creative expression. Our program is designed to instill confidence in working with technology at a young age. We hope our program graduates will carry these lessons and confidence through life and continue to do amazing things!

DEPARTMENT ALUMNUS PURSUING HIS DREAMS IN SWITZERLAND



Department alumnus Dr Ali Bahmanpour is pursuing his academic dreams in Switzerland at the Group of Catalysis for Biofuels, part of the Ecole polytechnique fédérale de Lausanne (EPFL).

After completing a BSc and MSc in Shiraz, Iran, Ali worked as a process engineer at the petrochemical company ANEDCO, working in the olefin production plant. In 2012, leaving his home in Iran for the first time, Ali moved to Australia to join the Department of Chemical Engineering to begin a PhD, supervised by Dr Akshat Tanksale and A/ Prof Andrew Hoadley. His PhD research investigated single-step conversion of synthesis gas into formaldehyde.

“Studying at Monash was a great experience and I personally cherished the opportunity I was given.” Ali says

He adds, “There were hard times too. There were failures and difficulties, but these difficulties were overcome with hard work and very importantly, with the help of other Monash people, many of whom were not directly part of my project but were willing to provide support and assistance.”

“I very much appreciate the assistance of my group members at Monash. Akshat and Andrew were always willing to help and it was a great opportunity to work with them. I want to thank Frank who was not only a helpful colleague but also a great friend. He helped me a lot during my PhD.”

After completing his PhD in 2016, Ali and his wife Raha (to whom he credits much of his success) moved to Switzerland to commence a postdoctoral research fellowship with the Group of Catalysis for Biofuels (GCB) at EPFL, Lausanne. Under the leadership of Professor Oliver Kröcher, the group collaborates with the Bioenergy and Catalysis Laboratory at the Paul Scherrer Institut on the development of highly efficient processes for the thermochemical conversion of biomass to biofuels.

Ali's current research continues from his work at Monash in heterogeneous catalysis, with projects examining dimethyl ether (DME) synthesis from methanol, CO₂ hydrogenation, and oxymethylene dimethyl ether (OME) synthesis. In the short space of less than two years, his work has already resulted in a review paper with several more manuscripts ready for submission.

Ali hopes to continue in academia and become a lecturer when his postdoctoral fellowship comes to an end.

“My dream was always to pursue a career in academia. When I finish my role here at EPFL, I would love to have the opportunity to start my own group and continue my research on designing and synthesizing heterogeneous catalysts for green chemistry.”

HIGH SCHOOL GIRLS SPEND A DAY IN THE DEPARTMENT

As part of our commitment to encourage and inspire girls to study chemical engineering and STEM in general, the Department hosted a group of year 10 students from Sacred Heart Girls' College and Canterbury Girls' Secondary College in November 2017.

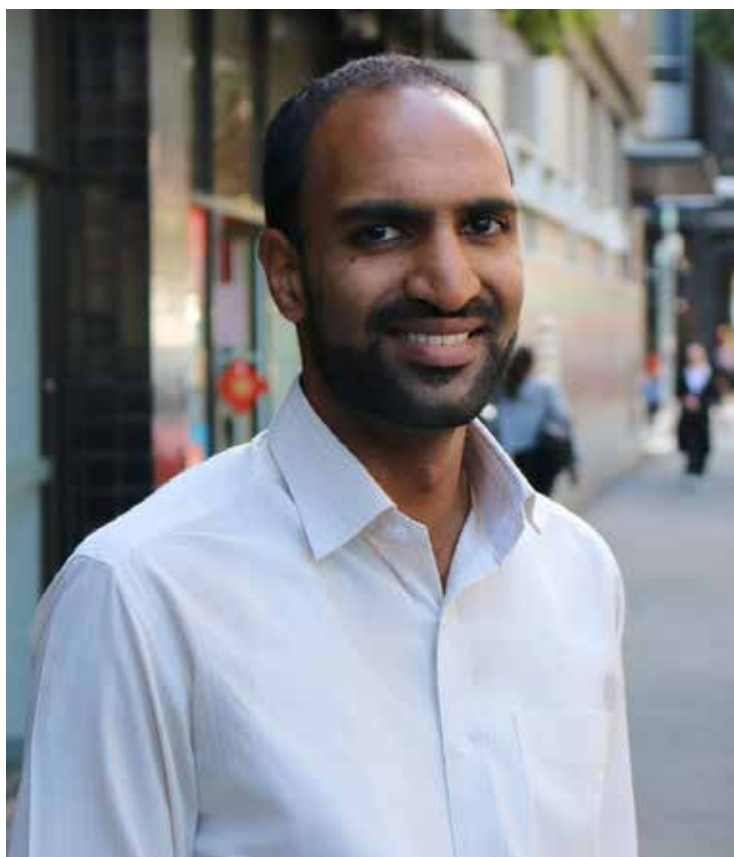
The program was tailored by several academics (Parama, Joanne, Meng Wai, Sankar, and Shahnaz) within the Department to showcase the exciting and diverse research carried out in the Department. With an all-girl group of proactive PhD students and research fellows (Dorota, Miriam, Negin, Sally, Ranwen, and Sonia) explaining complex concepts in a simple and engaging way to the school students.

As part of the day, the students had the opportunity to visit the research laboratories of Professor Udo Bach, Professor Huanting Wang and Dr. Meng Wai Woo.

The response from the school students was overwhelming. One student mentioned that she wanted to do Law and had never considered Engineering before, but after the tour, she is now thinking of a Law/Engineering double degree.



HOW MANY CAREERS IN A LIFETIME?



It's early days for Sandeep Sarathy (BChemEng(Hons), PhD), but he has already had a few. I remember being told at school that people my age will no longer have the same career for life, he shares. I've had four different roles in 12 years!

Sandeep started out specialising in plastic recycling – his PhD thesis explored the conversion of waste plastics into liquid fuels. Once he'd recognised that innovation depends on strong connections between science, business and government, Sandeep gravitated to commercialisation, where he could help translate knowledge gained through research into policies and practice. And that then led him to the Environment Protection Authority (EPA) Victoria.

Sandeep's first role at the EPA was in research management. We commissioned specific research projects from universities (including Monash) and consultants to inform EPA policies, he explains. This job was a natural progression from research translation.

From there Sandeep moved into his current role managing the quality of EPA regulatory functions. This is quite a deviation from my job history, but I still use a lot of the skills acquired previously, such as synthesising and analysing data, drawing conclusions, and making adjustments to reach our goals, he says.

Passionate about the environment, Sandeep keeps a keen eye on renewable energy. Growing up in India my parents could not afford to have a phone in their house, but just a generation later almost every middle-class Indian has their own mobile phone. I wish this would happen with renewables, he shares. Here we now still rely on centralised fossil fuel-based systems, but I believe countries like India, China and those in Africa can leapfrog this and go straight to distributed renewable energy.

That, of course, requires flexibility. As does moving from job to job. The world is rapidly changing, and Sandeep understands that we must be prepared to adapt and play new roles. Here's his secret: The most important skill is not WHAT you learn, but learning HOW to learn. Master that and your career choices could be endless.

Originally published on the Monash Engineering News (<https://www.monash.edu/engineering/about-us/news-events/latest-news>)

CONTACT MONASH CHEMICAL ENGINEERING

Department of Chemical Engineering
Monash University
Clayton Victoria 3800
Telephone: +61 3 9905 3555
Facsimile: +61 3 9905 5686
eng.monash.edu.au/chemical

WOULD YOUR COMPANY LIKE TO OFFER ANY OF THE FOLLOWING?

- Vacation Work Experience to our undergraduate students
- Graduate Positions (Undergraduate and Postgraduate)
- Speak to undergraduate students at a lunch time seminar about your company
- Become a corporate sponsor or donate a student prize

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.

