

ChemEng *focus*

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Research institute celebrates 25 years of innovation

Key figures from government and industry joined celebrations on the 16th September 2014 to mark the twenty-fifth anniversary of a leading Monash research institute.

The Minister for Industry, the Honourable Ian Macfarlane MP, was among guests to mark the achievements of the University's Australian Pulp and Paper Institute (APPI), and hear about the next phase for the institute.

Over 300 engineers and scientists have graduated from APPI. Based within the Department of Chemical Engineering, the institute provides graduate training, research and development to the forest manufacturing industry.

As well as celebrating its success, APPI Director, Professor Gil Garnier, from the Faculty of Engineering, announced the institute would evolve to become the Bioresource Processing Research Institute of Australia (BioPRIA).

Professor Garnier said the move would see the institute lead Australia's green economy and advance the manufacturing industry.

"Over the last ten years, the industry has been fantastically effective at improving efficiency and cutting costs. But in a global economy, the market is changing rapidly – and the need for innovation is greater than ever," Professor Garnier said.

"Strengthening the institute and building on industry collaboration, will ensure Australia leads the way in many different areas including developing novel packaging, paper bio-diagnostics for blood typing and membranes for water treatments."

The event also marked the launch of the Australian Research Council (ARC) Hub for BioProcessing Advanced Manufacturing Initiative (BAMI). Officially opened by the Minister, the three-year \$1.6 million ARC funded project is bolstered by \$1.3 million from industry and \$600,000 from Monash to convert bio-materials into marketable materials, chemicals and energy products including new composites and smart packaging.

"Close collaboration between industry and research is needed so Australia can capitalise on higher value-added industries based on research, innovation, and a highly skilled workforce.

The investment in BAMI will see researchers convert bio-materials into marketable materials, chemicals and energy products to revolutionise industry," Professor Garnier said.

The institute will also provide advanced technical training required for new business in everything from catalytic reaction engineering, green chemistry, nanotechnology, material science and industrial biotechnology.

2014 Eureka Prize for Innovative Use of Technology [finalist]

Congratulations goes to the Monash University Team who were one of the finalists in the 2014 Eureka Prize for the category "Innovative Use of Technology". The Team consisted of Huanting Wang, George Simon, Dan (Linda) Li, Amir Razmjou, Yao Zeng, and Jing Wei.

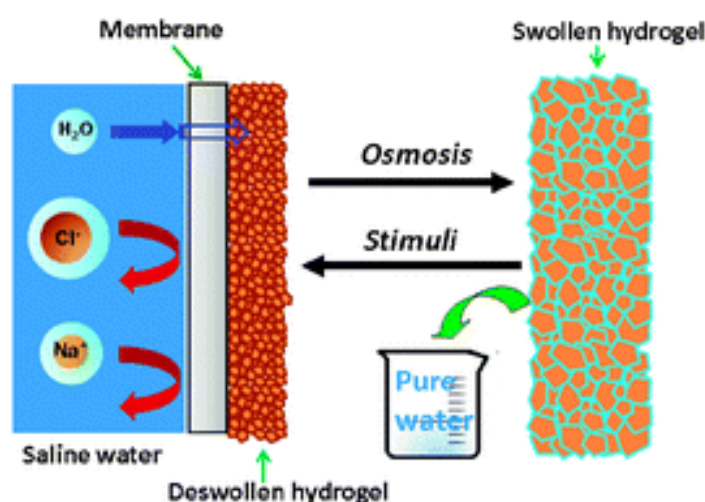
The Team's entry "Stimuli-responsive polymer hydrogels" is a new class of osmotic agent for extracting fresh water from saline water and wastewaters using sunlight or low-grade heat sources.

The research team is developing the technique in the hope of providing low-cost, environmentally friendly technology for producing clean water which will have an important economic, environmental and social benefit to developing countries.

Fresh water shortage has become one of the most important issues due to climate change, economic development and population growth. The applications of membrane-based processes such as reverse osmosis (RO) for seawater desalination and water recycling have begun to provide some solutions to solving the scarcity of fresh water. Forward osmosis (FO) process is emerging for desalination because of its potential to produce fresh water at a much lower energy cost when compared to RO, with reduced membrane fouling problems. However, the lack of suitable draw solute is the key hurdle for commercial implementation of FO technology.

Hydrogels are three-dimensional networks of polymer chains that are cross-linked by either physical or chemical bonds, and that can entrap large volumes of water attracted by the high concentration of hydrophilic groups (the amount of water absorbed is related to the balance between this attraction and the network chains elastic properties which restrict water sorption). In particular, hydrogels with ionic groups on the co-monomer unit can attract even greater amounts of water. An important aspect of such polymer hydrogels is that they can undergo reversible volume change or solution-gel phase transitions in response to environmental stimuli (also called 'intelligent' or 'smart' hydrogels). Many physical and chemical stimuli have been applied to induce various responses of the smart hydrogel systems, in particular to change the materials from hydrophilic to hydrophobic, thereby releasing water. In 2011, the research

team for the first time demonstrated the feasibility of using stimuli-responsive polymer hydrogels as smart draw agents in the FO desalination. As illustrated below, this new process involves water permeation through a selective membrane driven by swelling pressure of polymer hydrogel and dewatering of swollen polymer hydrogel under various stimuli conditions.



Due to their high osmotic pressure, hydrogels can extract clean water from various saline waters, where the FO membrane acts as a barrier to reject the salts and other dissolved matters. During the FO dewatering process, the clean water can be collected by stimulating the hydrogel with heating at a relatively low temperature (e.g., about 32°C) or irradiating with sunlight. The thermal responsive polymer hydrogel-FO desalination process, with low water recovery temperatures, is expected to substantially reduce energy costs in desalination and water treatment, thereby reducing greenhouse gas emissions. The team have recently demonstrated the feasibility of bifunctional polymer hydrogel draw agents for continuous water desalination using solar energy. Therefore, these non-toxic and low-cost hydrogels show great potential for large-scale fabrication and safe use in the FO separation for desalination or (waste) water treatment.

The 2014 Eureka Prize YouTube clip is available here:
https://www.youtube.com/watch?v=BJ2pls_nidc

Driving the innovation edge for the chemicals and plastics industry

Monash is offering a unique PhD+ program with the Chemicals & Plastics (C&P) Industry

The best minds in academic research are joining with industry and government to ensure a dynamic future for the Australian chemistry industry, the second largest manufacturing sector in Australia, by jump starting opportunities for global investment, innovation, productivity, job creation and economic growth.

'The Chemicals and Plastics Innovation Network and Training Program' is led by Monash University and the Plastics and Chemicals Industries Association (PACIA) and underpinned by support from the Victorian Government Department of State Development, Business and Innovation (DSDBI). It will have an initial investment of \$5.9M in this innovative cofounding partnership between industry, the State Government and academia.

Parliamentary Secretary to the Premier Craig Ondarchie announced the new initiative at the PACIA national conference which was held in Melbourne, 16-18 September 2014.

The initiative brings together multinationals, SMEs, the industry peak body and research organisations to create global market opportunities, increase collaboration between SMEs and multinationals, enhance manufacturing innovation, and deliver a new generation of industry professionals.

The partnership has more than 20 industry participants including: BASF, Procter & Gamble, 3M, Nufarm, Dulux Group, PPG Industries, Nuplex Industries, Agilent Technologies, AquaHydrex, Digital Ink Technologies, PerkinElmer, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Australasian Industrial Research Group (AIRG), EPA Victoria, the national industry association for the Australasian hygiene, cosmetic and specialty products industry (ACCORD), SEMMA (South East Melbourne Manufacturing Alliance), SEMIP (South East Melbourne Innovation Precinct), the Australian Nuclear Science and Technology Organisation (ANSTO), STC (Small Technologies Cluster) and KPMG.

The initiative is expected to deliver outcomes to hundreds of other businesses associated with the collaboration.

Monash University's Vice-Chancellor and President, Professor Margaret Gardner AO said "As part of the initiative, the University would co-sponsor over 16 innovation projects with industry, through Monash's new Graduate Research Interdisciplinary Program. It will also jointly deliver more than 60 innovation training development activities in partnership with industry, such as the exclusive Procter & Gamble's Serial Innovator Program, which teaches entrepreneurship and taking ideas from mind to market, for the first time in Australia.

These projects will enable exceptionally talented students in science and engineering the opportunity to work with around

40 top academics and industrial researchers on leading edge innovations for the chemicals and plastics manufacturing industry," Professor Gardner said.

"Monash has world class capability internationally in the chemical sciences with recent Australian investments exceeding \$100M for the Green Chemical Futures facility and the Victorian Centre for Sustainable Chemical Manufacturing. Monash is extremely excited by this partnership to act as a catalyst for innovation with industry to produce a new generation of scientists and engineers, with business acumen and best practice knowledge to champion globally relevant innovation and add value to this industry, where it counts."

PACIA CEO Samantha Read PACIA said: "We have seen a tremendous response from industry to this initiative. This is recognition of the vital importance of strong collaboration between academia, the research community and industry in helping to drive innovation. The role of innovation in helping to create competitive advantage for the Australian chemistry industry, cannot be overstated."

"The highly talented and skilled PhD researchers coming out of this program will have a firm understanding of industry needs. This is an extremely valuable contribution towards the on-going development of Australia's technology base and a highly skilled and productive workforce.

"Innovation and productivity in this sector will also have a significant flow-on effect

through the economy, given that the Australian chemistry industry supplies critical products and services into 109 of Australia's 111 industries," said Ms Read.

A consortium of over 20 industry participants will set up 16+ new PhD projects, as part of the new PhD+ training program. This is supported also by a Monash GRIP Training centre linking Chemistry, **Chemical Engineering** and Materials Engineering at Monash. This represents \$400k of external funding per year, plus additional internal support from the Faculties of Engineering, Science and Central.

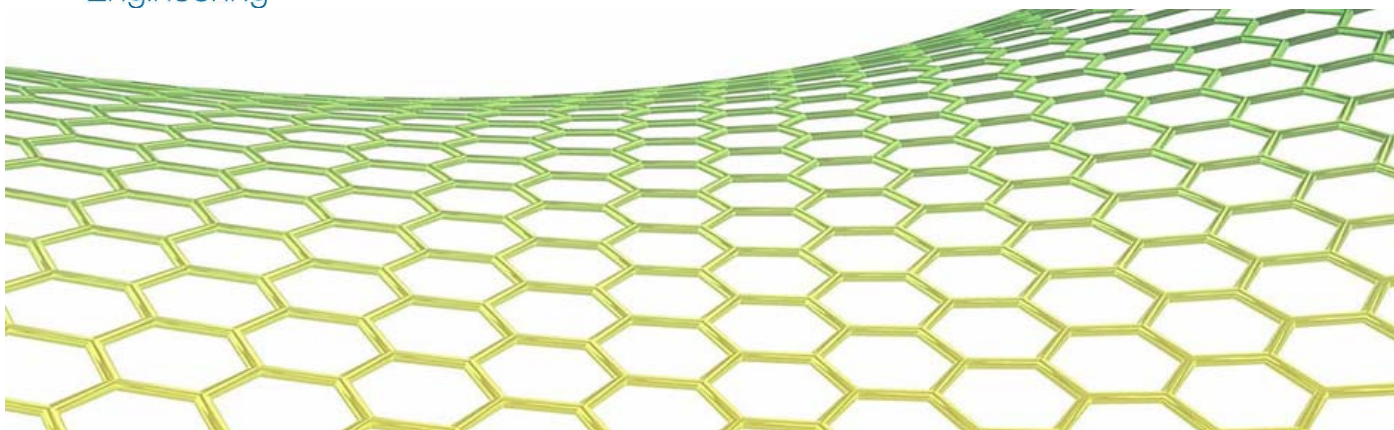
From this collaboration project, the **Department of Chemical Engineering** will welcome ~8 new PhD students during 2015 plus there will be another ~8 located in the Department of Chemistry. Each hand picked student will be recruited to work on a specific project with a specific company.

Each student will receive special technical and industry training, plus the opportunity for an industrial placements during their PhD. The Centre will be run by Antonio Patti (Chemistry), Karen Hapgood (Chemical Engineering) and Joseph Lawrence (Science). Further information can be found

[here.](#)



Industry, Monash University and government collaborating to boost innovation for future growth



Graphene Production: From Research Curiosity to Commercial Reality

Graphene is a truly exceptional material and it promises to revolutionise future developments in energy storage, aviation, electric vehicles, water purification, medicine, military, anti-corrosion coatings and the list goes on. Graphene can be manufactured from graphite which is a natural resource. Australia is fortunate to possess an abundance of graphite which can be used to produce graphene in large quantities. However, there are significant challenges that must be overcome to translate the potential of graphene at commercial scale. Current lab-scale methods of graphene production are costly and environmentally hazardous. Dr [Mainak Majumder](#), Department of Mechanical and Aerospace Engineering and [Dr Akshat Tanksale](#), Department of Chemical Engineering have teamed up to develop Modular Reactor Technology to produce graphene from indigenous natural graphite produced at the Uley mines of South Australia.

Their team has received research funding to the tune of \$388k, jointly granted by their industry partner Strategic Energy Resources Limited (ASX: SER) and the Faculty of Engineering. SER is the majority shareholder of the only graphite producing mine in Australia, now managed by Valence Industries (ASX: VXL).

The Modular Reactor Technology will be developed from a bench scale facility to be setup in the Department of Chemical Engineering. This bench scale facility will be capable of producing 500 – 1000 g of graphene per batch.

Dr. Majumder, chief investigator of the project said, “Our multidisciplinary engineering research team will develop a bench-scale process which can produce 500 g to 1 kg per batch. But we will ensure that this is scalable to multi kilogram per day, while at same time make graphene production significantly cheaper and greener”.

Dr Akshat Tanksale, co-investigator added, “Large scale graphene production from natural graphite is a significant challenge which we will overcome by using robust reaction engineering approaches. The scale of our bench reactor is several times what has been demonstrated to date and the reactor technology, we are developing, is highly modular.”



Mainak (back row, middle) and Akshat (second back row, left side) with SER CEO and board members, and the business development team at Monash

Dr Steven Wang awarded the Veski Innovation Fellowship - physical sciences



Dr Steven Wang

In recognition of the important role of innovation to Victoria's economic future and the need for Victorians to be skilled in science, technology, engineering and mathematics the Victorian Government has provided 12 Victoria Fellowships. Each Fellow

receives a travel grant of up to \$18,000 to undertake a short-term overseas study mission to assist in developing a commercial idea; undertaking specialist training; or career development not available in Australia.

Dr Steven Wang has been working on a new approach to separating solids and liquids that presents exciting opportunities for a number of Victorian industries including those in the processing of chemicals, minerals,

pharmaceuticals, food, water and waste products.

In particular, Dr Wang's work on particle clustering has potential commercial application in the Australian minerals industry as it has shown to increase product purity, reduce waste, better integrate biotech processes and accommodate lower quality raw materials. Dr Wang's travel to the Massachusetts Institute of Technology in the USA will further develop his research work on particle clustering.

Dr Wang was awarded the Fellowship in the Physical Sciences category. The Physical Sciences category encompasses the branches of science that study non-living systems, including but not limited to fields such as physics, chemistry, earth sciences, engineering, ICT, mathematics and statistics, or astronomy.

<http://www.veski.org.au/Previous-Victoria-Fellows>

Recognition for Monash rheologist



Professor Tam Sridhar.
Credit: Monash University

A renowned rheologist from Monash University has been awarded the prestigious ASR Medallion by the Australian Society of Rheology. Vice-President of Monash University's Indian

and Chinese initiative, Professor Tam Sridhar, received the honour for his exceptional and distinguished service to rheology science and technology.

The Medallion is awarded by the society to Australian rheologists who are internationally recognised for their contribution to rheology science and technology, and their contribution and service to the society. Rheology is the science that studies the deformation and flow of matter.

Professor Sridhar has gained international recognition through the development of the filament-stretching rhe-

ometer and the test fluid M1 - named after Monash University. He has played a significant role in nurturing the rheology community in Australia, and forging of international strategic educational relationships.

Professor Sridhar said he was surprised to receive the ASR Medallion.

"I have been blessed with many fine students and generous colleagues. Monash has been a major centre of rheology in Australia since its very beginning. Our work would not have been possible without the first rate technical assistance that was characteristic of universities in early days," Professor Sridhar said.

Professor Sridhar becomes the fifth recipient in the past 20 years and the only Monash scientist to receive the award.

Professor Sridhar has been involved with the Australian Society of Rheology from its earliest days, and was the society's president from 1997 to 1999. He was also the founding co-editor of the Korea-Australia Rheology Journal, and remained its editor from 1999 to 2004.

Kawnish Kirtania

Working in Sweden after completing my PhD in the Department of Chemical Engineering, Monash University

You are just about to complete your HDR degree. You must be thinking to yourself at this point in time “Where will I work after graduating from Monash with my new HDR degree?” Where can you apply your newly acquired expertise? Well, here you go! If you are thinking you would like to move around the world, that you would enjoy meeting new people and learning about different cultures, then you can literally go anywhere in the world with your newly acquired PhD degree from Monash. I am not kidding!

If you are thinking about travelling to Europe for work, then I can confirm that Sweden is a great place to work. I moved here to take up the position of Senior Research Engineer at the Luleå University of Technology (LTU) after completing my PhD in the Department of Chemical Engineering at Monash University in August 2014.

What is Sweden like?

Sweden will blow your mind when you arrive here. What is special about Sweden? The first is the absolute natural beauty and serenity here. It is breath taking! The other is the daunting winter. You know this would be ahead of you when the leaves are changing color in autumn (or, maybe you really like snow). The winter is something that I am yet to experience!

Sweden is a place of light and a place of darkness

You can guess what I am talking about. For a significant part of the year, you would see the sun for 20-23 hours and vice-versa. I am working in Luleå, which is one of the most northern places of Sweden. Sweden is only 4,117 short kms from Siberia. To give you some idea of how close that is, it is roughly the same distance between Melbourne and Byron Bay NSW.

If you want to see nature in all of its extremes, Sweden is the place for you. Luleå is an old, small city (approximately 60000 people) with several old churches.



Luleå's autumn blooms

Some of the older parts of Luleå are listed as world heritage sites by UNESCO. The Baltic Sea is conveniently located at the lower corner of Sweden. I can walk to any of the harbors in Luleå if I want to. There are several lakes dispersed all over Luleå. In winter, the sea and the lakes freeze over. When this happens, ice roads are constructed so you can drive through the Luleå archipelago.

You must be wondering by now – what about the Aurora Borealis? Yes! I can see that from my apartment. But it is most prominent during winter time when there is barely any light. The photos on this page have been taken with my camera!



The south harbor of Luleå

Professional and personal life balance

In Sweden, people value their professional and their personal life. I would have to say that this aspect is very well balanced for the Swedes because the Swedish people value their family as much as their work. In Sweden, you have the right to spend time with your family. You get 35 days of paid leave every year. Even though, the tax rate is higher than most of the other European countries, health insurance is covered by the tax you pay here.

People with jackets

If you are fond of collecting jackets, this is the place for you. You can find all kinds of them and you can use all of them for the many different seasons that Sweden has to offer. And the people here love to wear really nice jackets!

The people of Sweden are very nice and so helpful. Most of them can speak English fluently. Therefore, you can basically walk up to anyone on the side the road and strike up a conversation without hesitating.

Working in Sweden continued...



Aurora Borealis

If you are working in a University or a research facility, everybody speaks English. So, “no worries” [that is my Australian language kicking in there!]. However, I’m a big believer that learning a new language can never hurt so I’m kommer att lära sig svenska så gott jag kan.

Utilities

Most of the electricity in Sweden is sourced from nuclear (~40%) and renewable resources (~50%). That is why, there is no major fluctuation in the unit price whatsoever and it is significantly cheaper than most other countries. During winter, houses are heated by district heating which is considered in Sweden as a basic human right. Also, Sweden has one of the world's fastest broadband connections and the Swedes have unlimited internet browsing.

Swedish PhD!

Well let me tell you about that. A PhD undertaken in a Swedish University is quite different here. It takes a student about 4-5 years on average to complete. The students need to have at least a M.Sc. degree or substantial industrial experience to be admitted. They need to complete 60 credits of course work over the period of their PhD. More importantly, they are considered as employees, rather than students. Therefore, they get taxed but they are paid almost at the same level as a graduate engineer in industry. Their salary increases after finishing their 2nd year of their PhD study.

Last but not the least – my work

The whole world is concerned about the environment, and researchers around the world are investigating new ways to reduce the impacts of using fossil fuels to help the world’s environment.

In Europe, several research initiatives are currently in place to make the energy and transport sector fossil fuel

free. One of these research activities covers the operation of a pilot plant and looking at ways of producing alternatives to fossil fuels from black liquor derived from the pulp industry. This research is the key to taking the modern Bio-refinery concept on to an industrial scale. The concept proposes to use the biomass resources to the fullest by consuming those over several steps. If you are interested about the plant and research, you can get more details here:

<http://www.ltu.se/org/tvm/Avdelningar/LTU-Green-Fuels?l=en>

The last step of this “biomass consumption” is to produce transport fuel (di-methyl ether) through gasification. In 2013, Volvo Trucks announced its plans to use dimethyl ether (DME) in its heavy trucks from 2015 in North America, as an alternative to diesel fuel, because DME has the performance qualities and energy efficiency of diesel but can lower CO² emissions by 95 percent and produces no soot. I know, this is exciting research right!

If you have managed to read through the above paragraph and yet, not been so bored that you have subsequently fallen asleep, then I am proud to tell you that I am part of this research project. I hear you saying that you want to know more. You can check out the Department of Engineering Sciences and Mathematics at the Luleå University of Technology and all of our other exciting research projects here: <http://www.ltu.se/org/tvm?l=en>

If you are ever visiting the Luleå University of Technology do call in to visit me to say Hello [Hallå]. I’m the one wearing the really nice jacket.

Wishing you all the best and regards,

Kawnish Kirtania

Senior Research Engineer,
Luleå University of Technology



“Eco-friendly cellulose nanofibre membranes”. Thesis review by Swambabu Varanasi [PhD 2014]

My PhD research focused on developing the ‘green’ nano-membrane having high mechanical strength and pore size control. Cellulose is abundantly available green material so we used cellulose nanofibre to produce membranes for ultrafiltration applications.

Cellulose nanofibre diameter controls the pore size of the nanofibre membranes and aspect ratio controls the preparation of nanofibre membrane via filtration. There is currently no easy means of rapidly quantifying aspect ratio of nanofibres because the two ends of nanofibres cannot be seen in microscopic images due to entanglement between fibres, although diameter distributions can be measured from microscopic images at high magnification. A simple method was developed to estimate aspect ratio of nanofibres from sedimentation and yield stress measurements. The gel-point was measured both from the height of a layer of cellulose nanofibres sedimented from a dilute suspension or from the lowest solids concentration at which a yield stress could be measured using a vane rheometer. The two methods were closely in agreement for all samples. Aspect ratio was then calculated using either the Effective Medium (EMT) or Crowding Number (CN) theories.

Fabrication of nanofibre sheet is time consuming for the existing methods because they use fine filter media to retain the cellulose nanofibres on filter medium. A rapid and commercially feasible method for preparing cellulose nanofibre sheet was developed to produce high quality nanofibre sheets using large pore size filter medium. The retention of nanofibres is improved by using the concentration of the forming suspension higher than connectivity threshold to allow the connected fibre suspension to bridge over the large pore openings. Nanofibre sheet preparation required 13 minutes in total.

Cellulose nanofibre sheets possess good dry and wet strength compared to standard cellulose fibre sheets. However, wet strength of nanofibre sheet is low for use in certain applications like filtration. The effect of the addition of two cationic polymers, CPAM and PAE, on cellulose nanofibre sheet forming characteristics such as water drainage and nanofibre retention and strength of cellulose nanofibre sheet is investigated. It is found that the retention of nanofibre increased with the addition of either polymer; in addition wet strength of nanofibre sheet greatly increased with the addition of PAE.

The method developed to prepared nanofibre sheet with high wet strength, was adapted to prepare nanofibre

membranes and nanofibre composite membranes. Their performance in filtration applications was then evaluated. Cellulose nanofibre composite membranes were prepared using suspensions of cellulose nanofibres, silica nanoparticles (22nm) and polyamide-amine-epichlorohydrin (PAE) via filtration. It was demonstrated that silica nanoparticles act as spacers to control pore size of nanofibre network. PAE was added to adhere the negatively-charged nanoparticles to the nanofibres and also to improve the wet strength of the membrane. Membranes prepared with nanofibres alone showed high flux but low rejection due to large pore size. In contrast, nanofibre composite membranes showed water flux of 80 LMH (litres per square meter per hour) and Molecular Weight Cut Off of 200 kDa. The addition of silica nano particles controlled pore size. These results demonstrate the potential of cellulose nanofibre composite membranes in ultrafiltration. The produced membranes are readily recyclable as a feed stock to a conventional paper making process. By conducting these studies, a novel strategy to rapidly produce eco-friendly cellulose nanofibre composite membranes for ultrafiltration applications was developed.

At the moment, I am currently working as Postdoctoral Research Fellow in the Department of Chemical Engineering. I am working with Warren Batchelor and Gil Garnier on the Department’s new industry transformation hub (BAMI) projects. This post doctoral research will focus on developing sustainable packaging and filtration materials.

Swambabu Varanasi
Postdoctoral Research Fellow
Department of Chemical Engineering
Monash University



Young Scientist Research Award – Sharmen Rajendran

Mr Sharmen Rajendran was recently shortlisted for the Young Scientist Research Award in the category of Physical Sciences by The Royal Society of Victoria. He wrote an abstract based on his research, titled 'Chemical Looping Combustion of Victorian brown coal with inherent CO₂ capture and H₂ generation'.

This award is presented to PhD candidates who are in their final year of research. The submission had strict guidelines and comprised multiple parts including the rationale, aims, methodology, results, discussion, conclusion, ongoing work and the importance of the research being undertaken. The submission was assessed by a panel of scientists who were also the judges on the night of the award.

During the award ceremony, Sharmen was required to give a 15 minute summary of his research to the judging panel. During his talk, Sharmen explained that *"The driving force behind this research is the vast reserves of brown coal in Victoria which powers more than 85% of the state. It is expected that these reserves will last for more than four centuries at the present rate of consumption. Chemical Looping Combustion is a new technology with the capacity to inherently capture the generated CO₂ from the combustion*

of coal without using materials such as sorbents or pure O₂ which are costly. The research was performed using a vast array of equipment and analytical instruments to better understand the chemistry and mechanistic behaviour of the system. The experimental results were complemented by results obtained through the use of modelling software. It was found that iron-based ores were suitable candidates for use in Chemical Looping Combustion of Victorian brown coal. The recommendations for future work included scaling-up of the present 10kWth reactor scale, performing a techno-economic analysis and investigating the potential of co-generation. This research and others in the Carbon Capture and Storage (CCS) scene are vital to reduce the atmospheric concentration of CO₂ to ensure a habitable Earth for us and our posterity."

The presentation and ceremony were held at the Royal Society of Victoria's headquarters in the CBD on the 25th of September 2014. The final stage involved giving a presentation based on the submitted abstract. Mr Rajendran was the runner-up in the field of Physical Sciences for his presentation on the night. The night ended with the opportunity to mingle and network with members of the society as well as people from the industry.

2014 ARC Future Fellows

On the 23rd of July 2014, Education Minister Christopher Pyne announced \$115 million in funding as part of the ARC's Future Fellowships scheme. The ARC Future Fellowships go to the best and brightest mid-career researchers, with 150 researchers across Australia selected this year. [Associate Professor Cordelia Selomulya](#) is one of Monash's new 2014 ARC Future Fellows.

Cordelia was awarded the ARC Future Fellowship for her project "Scaling-up microfluidic drying as an efficient

route to manufacture uniform and functional particles as high-value products". The ARC Future Fellowship will enable Cordelia to conduct her research to transform the manufacturing of high-value products for pharmaceuticals, functional foods, and biotechnology applications. The prestigious ARC Future Fellowship period is from 2014 until 2018.

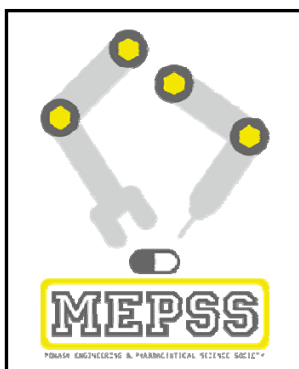
The Provost, Professor Edwina Cornish, congratulated the Fellows. "I'm delighted to hear that 10 Monash researchers became Future Fellows. This funding will enable our researchers to tackle a variety of important issues from genetics to globalisation," Professor Cornish said. "The announcement reflects the breadth and quality of research at Monash and I wish to thank the ARC for this important investment."

Monash has been awarded 95 fellowships since the scheme began in 2009. It promotes research in areas of critical national importance by giving outstanding researchers incentives to conduct their research in Australia.



L to R: Wenjie Liu and A/P Cordelia Selomulya

Monash Engineering & Pharmaceutical Science Society



The Monash Engineering & Pharmaceutical Science Society (MEPSS) is a student-run club for students in the B.E./B.PharmSci double degree. Our main objective is to strengthen connections between students in the degree, and build networks with the degree's alumni.

In partnership with the Department of Chemical Engineering, we've been running a peer-mentoring program, which is now in its second year. Every two weeks, students of the double degree meet (over pizza) to hear a short talk by a fellow student, usually focusing on employability skills — someone's experience of a vac-work program, advice on tricky interview questions, assessment centres, etc. This is followed by a casual chat where students from earlier years talk with final year members — something that would otherwise be difficult, given the two-campus nature of our degree. The mentoring program was very successful last year, with over three-quarters of attendees rating it as "helpful" or "very helpful". With con-

sistently higher attendance this year (around 70% of our membership at every session), we think we're on to something.

This year, MEPSS is very excited to be running our first alumni night. The careers of our alumni are amazingly diverse, given the small numbers of our cohort, and as a club we think that this is one of our strengths. We're looking forward to building stronger networks both amongst our alumni, and between alumni and current students, through MEPSS. We hope that our alumni night will offer us a chance to build these networks, and to hear what our alumni have been up to since graduating.

Our many thanks go to the Department for their continued support, and to our committee for their efforts and preparation in making our events run smoothly.

MEPSS President 2014 **Blake Riley**

If you're interested in getting in touch (or keeping in touch, alumni!), please don't hesitate to contact us at:

Email: mepss@monashclubs.org

Web page: www.monashclubs.org/clubs/MEPSS

Biotechnology and Food Engineering (BFE) research group installs new pilot scale microfluidic jet spray dryer



Top L to R: Azila Jumaat, Krystel Li Pin Hiung, Liao (the engineer from Nantong Dong Concept Pty Ltd)
Bottom: Martin Foerster

A new pilot scale microfluidic jet spray dryer was recently delivered to the Biotechnology and Food Engineering (BFE) research group, led by A/Prof. Cordelia Selomulya. The dryer is specially designed in collaboration with Nantong Dong Concept Pty Ltd to demonstrate the scalability of the microfluidic drying approach, with three microfluidic nozzles for a higher capacity of production. The equipment, funded by the Monash Research Accelerator program, is an integral part of A/Prof. Selomulya's research in advanced manufacturing of functional particles. Current and future projects supported by her ARC Future Fellowship will utilise the dryer to study encapsulation for nutraceutical applications, spray drying of fortified dairy powders, and fabrication of other functional microparticles.

\$2,000 grant to establish the Postgraduate Industry Linkage Program

CEPA is pleased to announce that it has been awarded a grant of \$2,000 from the Office of the Vice-Provost (Learning and Teaching) to establish the Postgraduate Industry Linkage Program (PILP). The grant was funded by the *Better Teaching, Better Learning Student Bursaries Scheme* for individuals or teams whose projects were deemed to significantly enhance the student academic experience.

Currently, there is a lack of industry engagement with potential employers for our postgraduate students. Our research indicates that 84% of postgraduates are worried about finding employment and 76% are willing to set aside time to visit potential employers, therefore industry engagement is needed to enhance their academic experience. Internal research also indicated that 97% of students would be interested in a networking skills seminar.

The Postgraduate Industry Linkage Program, the first of its kind within the Department of Chemical Engineering, aims to enhance the student academic experience via soft skill development and industry engagement. A specialised soft skill development seminar will equip students with the skills and confidence required to network successfully. Industry engagement will be facilitated through company site visits. Two companies from different industries will be targeted to highlight the diverse range of employment opportunities available to master's and PhD students. Furthermore, this will provide students with an opportunity to connect with industry rep-

resentatives by networking in a real setting. Contacts with industry representatives will give students a competitive advantage when applying for graduate employment. This project has the potential to serve as a flagship program for other departments to follow.

Planning for the program is currently under way. Look out for CEPA communications to stay up-to-date and take advantage of this program.

Peter Tsirikis

PhD Student & President, Chemical Engineering Postgraduate Association [CEPA]

Email: peter.tsirikis@monash.edu



The PILP development team (left to right)

Purnami Chandran, Baiqian Dai, Teck Kwang Choo, Martin Foerster, Peter Tsirikis, Sally Yue, Biao Kong (absent)

Photography courtesy of Jiahua Chew

Mr Pratham Arora wins at the IITB-Monash Research Academy annual award ceremony known as the Oskars

Mr Pratham Arora, an IITB-Monash Academy/Chemical Engineering student was recently awarded the "Best Collaboration Award" at the Annual Academy Oskar Night organized by IITB-Monash Research Academy. Pratham said "Effective communication and exchange of ideas among the supervisors and the industry partner have paved the path for this award. The world today has a persistent need for ammonia, which sustains its agricultural and mining activities. There is also a need to bring down the dependence on fossil fuels and in turn limit global warming. Unlike the majority of ammonia produced around the globe which relies on fossil fuels mainly natural gas, this study investigates biomass gasification, where the syngas provides a source of hydrogen. The ammonia process reported for biomass as a feedstock is often similar to the steam methane reforming process except that the methane reforming is replaced by biomass gasification. Unfortunately, the associated economics tends to prohibit the use of biomass, because of the much lower scale of the

biomass plants. This project proposes a new process specifically designed for small scale ammonia manufacture. The simulations performed in ASPEN Plus highlights the economic and environmental benefits that could be derived for small-scale ammonia from biomass plant. The study also involves an in-depth study of the Dual Fluidised Bed Gasifier and performing a Life Cycle Assessment (LCA) of the whole process. My research focuses on Techno-economic evaluations of biomass pyrolysis/gasification with carbon capture for the production of ammonia from synthesis gas".

The project is being carried out under the supervision of A/Prof. Andrew Hoadley from Monash University and Prof. Sanjay Mahajani and Prof. Anuradda Ganesh from IIT-Bombay. The project is also being sponsored by Orica Mining Services. The Department wishes to congratulate Mr Arora on his award.

Achievements and Managing Workloads whilst being an Elite Athlete by Alexandra Gummer



I am currently playing for Melbourne Victory Women's Football team, which competes in the W-League (women's equivalent to the A-League) we train approximately 5-6 times per week plus a game and individual gym programs. This puts an immense strain on a full time study load but being registered as an Elite Athlete as a part of the Elite Athlete Sports Program, it has made it manageable.... Just!

I am required to be very, very organised with my schedules as I need to know what trainings clash with tutorials, lectures, laboratory sessions and labs, so I can organise ahead to ensure I avoid missing out on either training or classes. In addition I also require a part time job which adds an extra load into my organisational skills. Both the Chemical Engineering Department and Science faculty are extremely helpful so that I can juggle my sporting commitments and my studies.

Previously I have played for the Adelaide United W-League team (2013-2014) where I was required to move to Adelaide halfway through the semester, with only a weeks notice! I was able to move all of my laboratory sessions before I left and I was fortunate enough to have great group members in my assignments which enabled me to complete my studies in Adelaide. I was also fortunate enough to have the assistance from the University of South Australia, which allowed me to sit my exams

and tests at their venues. After my season at Adelaide I was runner-up leading goal scorer with two goals from seven appearances.

This year I will be also travelling to Japan as part of the Melbourne Victory Squad to compete in the International Women's Club Championship where we will play against South American champions Sao Jose Esporte Clube, Japanese champions Okayama Yunogo Belle and English Premier League side Arsenal Ladies. Fortunately, this occurs after semester 2 concludes so it will not interfere with my studies.

Some of my other accomplishments that I have achieved in my football career whilst studying at Monash University include:

- Travelling to Japan and China in 2011 for the Australian School Girls (U19) team.
- Runner up Victorian Women's Premier League Best and Fairest in 2013 (3rd in 2014)
- 4 Green and Gold medals from Australian University Games in addition to two silver and two bronze medals (2011-2014)
- A Monash Full Blue Sporting Award (2011)

I would like to thank the Chemical Engineering department, the Science faculty and the Elite Athlete Sports Program for making it possible to achieve my dreams on and off the field.

Alexandra Gummer is studying a double degree in Bachelor of Engineering (Chemical) and Bachelor of Science (Biochemistry and Molecular Biology). Alex commenced her degree in 2011 and is expected to graduate at the end of 2016.

Students on the ball for Melbourne Victory—Women's Football

Melbourne Victory has selected two Monash students for the upcoming 2014-15 campaign.

The reigning W-League champions recruited Alex Gummer who is currently studying Bachelor of Engineering and a Bachelor of Science, and Jess Au who is studying a Bachelor of Biomedical Science.

Alex was previously with Adelaide United, where she scored two goals from her seven appearances in the 2013/2014 season.

Alex is extremely excited about her selection into the squad.

"Being selected into the squad is a fantastic opportunity for me to play at a high level, and I can't wait to see what this season brings," Alex said.

"It's such an honour to be selected, and I hope this year the team can continue it's reign as champions."

Jess Au has been a train-on player with Victory in previous seasons as well as being a member of the 2011 U17 Young Matildas training camp. This year her performances for WPL side South Melbourne FC led to her selection into the Victory squad, an achievements she's very proud of.

"To be selected into the Victory side after being a train-

on when I was younger is an amazing opportunity and I can't wait to see what challenges the season brings," Jess said.

Director of TeamMONASH™, Martin Doulton is extremely proud of the efforts of Alex and Jess.

"It's fantastic to see two of our students picked for the squad, and it's a great credit to their passion and perseverance, we will all be watching throughout the season to see how they go," Mr Doulton said.

Alex is part of the [Enhance Elite Athlete Program](#), which has allowed her to continue her studies while playing in the W-League.

Melbourne Victory lost their first match of the season to Newcastle Jets on September 13.

Their following match on Sunday 21 September they won 5-3, against Western Sydney Wanderers.

See the Melbourne Victory W-League [Facebook](#) page to stay up to date with all the results.

Sprinting for success while keeping my Engineering studies on track by Michael Beltrame



My athletic 400 meter sprint training started in 2010. This was also the year I started my Chemical Engineering degree at Monash University. Throughout the last 5 years, I have been training 6 days a week whilst completing my university degree. Trying to juggle the two competing schedules has had a slight impact on both my university studies and my training at times.

In 2010, I was selected to join the Australian Athletic Target Talent squad for the 400 meters relay which enabled me to race in the Australian uniform at the Sydney track classic. During my 5 hard years of training, injury has plagued my path with two navicular stress fractures, one requiring surgery and a minor back operation early in April 2014. Despite my injury setbacks, I have managed to come first in the 2013 Victorian open Track and Field championships with a personal best [PB] time of 47.19 seconds in the 400 meters. On that day, I also came 3rd in the 200 meters, ending the season with a PB of 21.66 seconds. A week after this race, I ended up with my second navicular stress fracture, ending my season short. However my time of 47.19 seconds in the 400 m remained the 7th fastest race time in Australia for the 2013 season.

During the 2013-2014 season, I concentrated on the task of rehabilitating my left foot after my surgery. Once I was cleared for training again, I tried to get back to my standard of 47 second 400 meter running. However another problem was lingering with my glutes and lower back (which was the initial causes of my foot injuries). The lower back issue required surgery in April 2014.

Once again, I needed extensive rehabilitation work to get back to form again. There is continuing maintenance to this area, but I am back on track and building up for the upcoming season. The goal for this year is to continually build and make the National final in the 400 meters, placing me in the top 8th fastest in the country for the 400 meters.

I will finish my engineering degree during the first semester of 2015. After completing my degree, I will then focus on training exclusively over the 2015/2016 season in preparation for the National Olympic Selection Trials to be held in April 2016. Through my dedicated training, I wish to be placed, at least, in the top 6 of the finals and earn my spot on a 4 x 400 meter relay team for the 2016 Rio Olympic games. This is my dream!

Studying engineering has given me a lot of insights into understanding the mechanics of running and dictates how I train and compete. Because of engineering, I am very calculated, thorough and strategic in how I approach training and competition. I am always searching for knowledge on how to better my technique and make my weaknesses stronger.

Throughout my Engineering degree at university, Monash has provided me with continual support via the Elite Monash Athlete Program and the Department of Chemical Engineering. For this unwavering support, I would like to thank them greatly for.

I very much look forward to finishing my university degree next year and then focusing on training hard with the hopes of representing Australia on the international stage.



Dr Tina Arbatan, R&D Chemist at DuluxGroup

After studying non-stop since entering the first grade in primary school, I was finally ready to leave school and get on with my life. It was Christmas time in 2011 when I finally started writing up my PhD thesis. Thankfully, I had enough publications to allow writing a thesis by publication, which meant most of the hard work was already done and it was just a matter of months before I could hand in my thesis. So close to finishing my studies, I now had a bigger challenge to face. Finding a job!

Having spent so many years studying, the idea of leaving academia simply did not appeal to me. Academia was my comfort zone. I knew how things worked. I had so many connections, knew so many outstanding potential collaborators, and had finally learnt how to do research. A career in academia was the best option, or so I thought. It did not take long, however, before I realized finding a position in academia was not an immediate option. I talked to a few academics I knew and asked if they had any postdoctoral positions available. Sadly, there were not many postdoctoral positions I could apply for. Even if there was any, it did not take long before I received a rejection letter in response to my application. I finally had to face the truth; maybe it was time to leave university after all.

Job hunting is stressful and time consuming. A lot of time and effort is put in to prepare a proper job application. To receive a rejection email, one of those beginning with an infamous 'we regret to inform you...' statements, is simply gloomy. Luckily for me, I did not receive many of those emails as I was fortunate enough to get an offer for the first industry-based position I applied for, and it is now just over two years that I have been working as a Research and Development Chemist in Dulux.

I have been asked by several fellow graduate students if my doctoral degree has been useful in my current position. The answer is No! Professional success is not guaranteed by piling up university degrees, but by the process you get through before you get a degree. It is not your degree which will get you the job, but the skill-set you have achieved through getting a degree. Skills such as problem solving, the ability to both work in a team and autonomously, and analytical thinking are, indeed, the attributes you need to focus on and promote later on when you are applying for a job. If your degree has helped you advance those strengths, then your degree has been useful. Otherwise, it is just a piece of paper your employer might never even request to see.

I often think about the days I was still a first year PhD student and cannot help thinking about how lost and insecure I used to feel. I was not sure about my research project. I was not confident at all whether or not I could even graduate and the idea of being overqualified for most of the positions in the job market after graduation was utterly disturbing. If I had a chance to go back in time and talk to myself 5 years ago when I had just begun my PhD, I would perhaps have a few words of advice to help myself overcome that anxiety. I would ask myself to calm down and focus on what is important, that is to broaden my knowledge and skill-set, rather than worrying about publishing more papers; to collaborate more with other researchers and to widen my field of research; to use the opportunities available to postgraduates for a research stay in a research institute overseas, and to make the most of my postgraduate life instead of worrying constantly about what would happen next. Last but not the least, I would tell myself what Fernando Sabino, John Lennon, and I all agreed on: "In the end, everything will be okay. If it's not okay, it's not yet the end."

Dancing with Design by Monica Montanaro

My dancing life started well before my university life and as a dancer, I always found it difficult when people told me to let dancing go so I could focus on my University studies. I would think, 'Why should I give up something I love? It's just not fair!' so I have continued with my dancing during my double degree in Pharmaceutical Science and Chemical Engineering.

Currently, I am finishing my final year of my double degree. A year when most people believe in giving up their entire lives for their final year projects, but not I. I am a firm believer that having a life outside of university keeps you sane and helps you prioritize things in your life. So, I didn't give up my dancing during my final year, instead, I started teaching children how to dance.

The reason behind this thinking was because I found that dancing and teaching gave me something to look forward to every week; it allowed my brain to rest and let me express all the pent up emotions I held in during each week and expressed it through my dancing. Although it has been tough trying to juggle

both my final year project and the dramas that ensue, along with my life outside of university, I would have found that giving up my dancing, which I love would have made me insane! So, I kept on studying and dancing, and then, dancing and studying.

Throughout my time dancing I have completed multiple practical exams and I am now applying for my dance teaching diploma. I feel that completing these exams whilst studying at university has helped me organize my time more effectively, along with helping me to relax and enjoy the little free time I had.

For those who are thinking of giving up on their sport, dance or that other passion that you have outside of University which you love to do. I say to you... think again! Believe me, when you're studying as hard as you need to be in your final year, you will want to enjoy the little things in life that bring you some form of joy.

Society of Monash University Chemical Engineers (SMUCE), 2014

The Society of Monash University Chemical Engineers has had an extremely successful 2014, with the continuation of industry, academic and social events from previous years, in addition to the implementation of two new initiatives for students. In total, 139 people benefited from being SMUCE members this year.

Social Events

2014 has been a successful year in the social department for SMUCE. Late in 2013 we held the annual lawn bowls for design students, where an afternoon filled with lawn bowls, beverages and pizza occurred with a solid turnout of over 40 people. This event was successfully held recently at the Melbourne Bowls Club in Windsor. The first social event of the 2014 calendar was the trivia night, held in Sir Johns Bar on the last Thursday night of semester 1. This event was highly successful with approximately 80 students coming and enjoying the event. The most elegant social event for the year was the Annual SMUCE Gala Ball which was held at the beautiful Brighton Savoy overlooking Middle Brighton beach! A sumptuous 3 course meal and unlimited beverages were enjoyed by 200 students and staff. We were fortunate to have Kathleen Murphy, a former Monash student, as a guest speaker for the evening to talk about her experiences and work life. The night was a success with many students dancing the night away at the after party. Overall, it has been a very successful year for SMUCE on the social side.

Academic Initiatives

SMUCE Peer Mentoring

This year, SMUCE began a peer-mentoring program. The aim of this program is to connect students in their early years of chemical engineering with students studying at a third and fourth year level. This allows new students to develop networks amongst other students within the faculty, while also enabling them to realise the opportunities available during their time at university. The program has a very informal nature, with no commitment needed from mentees. Instead, open sessions were held on a fortnightly basis throughout both semesters and new mentees were always welcome. SMUCE would like to thank the 20 mentors who volunteered their time to help approximately 25 other students during the 2014 program.

Mock Networking Event

After the 2014 Vacation Employment Day which was held on 24th July 2014, SMUCE then hosted a Mock Networking Event. This initiative encouraged students to develop a basic set of networking skills in a friendly environment, by means of conversations with each other and academic staff. After the

event, students were given feedback on the way in which they presented themselves. SMUCE would like to thank the academic staff who were able to help on the day.

GroupUp

SMUCE started a new initiative called "GroupUp", to directly help students academically. GroupUp facilitates forming study groups for students prior to an assessment and throughout the semester. It aims to help students to collaborate with each other.

Student Feedback

SMUCE continued to collect feedback from students from all chemical engineering units, early in the semester. The feedback was disseminated to the teaching staff of the Department to enhance the student's learning experience during the semester.

Industry News

It has been a busy year for the SMUCE industry team. The Careers Guide was launched early in the year with a total of 400 copies being printed. The guide contains 17 chemical engineering company profiles and targeted advice for students. Additional information included, insights into the chemical engineering industry, how to prepare for the job market and future career planning. We hope this will assist students in applying for jobs and increasing their future employability.

SMUCE continued our weekly Thursday lunchtime industry seminars during 2014. Companies were invited to present to our students about who they are and what they do. They also advised students on potential employment opportunities, including vacation employment or graduate role applications. The seminars aim to provide students with a link to industry and allow them to meet industry representatives in person to discuss work experience in industry.

In order to assist students in applying for vacation work, Vacation Employment Day was organised. This is a one-day event held during the winter break. Exxon Mobil, NES Global Talent and Monash Employment and Careers Development were invited to present to our students. Topics covered in the events included how to apply for vacation employment, careers opportunity with Exxon Mobil also in the oil and gas industry presented by NES Global Talent.

The 2015 SMUCE committee are looking forward to bringing students more events and initiatives in the coming year.

Laura De Rango

President [2015]

SMUCE

Society of Monash University Chemical Engineers

C/O Department of Chemical Engineering,

Building 35, Room 226

Monash University, Clayton Campus 3800



Society of Monash University Chemical Engineers (SMUCE) 2015 Committee

President	Laura De Rango
Vice President (Social)	Alexandra Gummer
Vice President (Academic)	Fatema Abbas Husain
Vice President (Industry)	Georgia Jaffray
Treasurer	Melissa Paciepnik
Secretary	Georgina Catto-Smith
4th Year Reps	Marek Bialkower Michael Ah-Cann Kim Sho
3rd Year Reps	Luca Stamatescu Ben Costa Samantha Bird
2nd Year Reps	TBA
SMUCE office	located opposite the E1-E3 lecture theatres (ground floor of Building 32)
Email	smuce@monashclubs.org
Check out SMUCE on	Facebook

Connecting Monash Chemical Engineering students with Industry



The Society of Monash University Chemical Engineers (SMUCE) is the student organisation responsible for linking together industry, the Monash Chemical Engineering Department and Monash students. Throughout the year, SMUCE invites industry members to talk to students about their company, being a chemical engineer and to inform students about possible career opportunities. There are also promotional opportunities available such as listing in the **SMUCE 2015 Careers Guide**. If your company

would like to connect with SMUCE and Monash Chemical Engineering students, please contact Kim Sho, Industry Vice President.

Georgia Jaffray

Industry Vice President [2015]

SMUCE

Society of Monash University Chemical Engineers

C/O Department of Chemical Engineering,

Building 35, Room 226

Monash University, Clayton Campus 3800

News in brief

- Congratulations to **Tristan Lambert** who is our 1st place winner and **Cameron Hunt** who is the 2nd place winner for the 2014 3MT competition. Tristan represented the Department in the Engineering Faculty Final for the Three Minute Thesis (3MT) competition, which was held on Wednesday, 27 August 2014.
- The Department congratulates **Tina Arbatana, Xiya Fangb and Wei Shen** who have received the award of '**Chemical Engineering Journal Top Cited Papers for 2011 and 2012**' for their journal paper "Superhydrophobic and oleophilic calcium carbonate powder as a selective oil sorbent with potential use in oil spill clean-ups" published in: Chemical Engineering Journal, 2011, Volume 166, pp. 787-791 DOI: 10.1016/j.cej.2010.11.015 [<http://www.sciencedirect.com/science/article/pii/S1385894710010995#>]
- **Chemeca Medal - Professor Tam Sridhar.** Professor Tam Sridhar has been awarded the 2014 Chemical Medal. The Medal is the most prestigious award in the chemical engineering profession in Australia and New Zealand. It is awarded to a Chemical Engineer who has made an outstanding contribution, through achievement or service, to the practice of Chemical Engineering in its widest sense and who continues to serve the profession.
- **The ThyssenKrupp Industrial Solutions Medal & Prize - Dr Nicky Eshtiaghi.** This award recognises practical services to the profession and to the practice of chemical engineering in Australia or New Zealand, in technical, marketing or management field, by a person under 40. Nicky is a former Monash Engineering ECR Alumni of the year awardee, and is chair of the Joint Victorian Chemical Engineering Committee. Nicky received her PhD in 2009, and immediately started work as an academic at RMIT, where she is now a Senior Lecturer. Please join me in congratulating Nicky on her Chemeca 2014 awards.
- **Monash team wins the Macnab-Lacey Student Design Prize 2014 for the 2nd time in a row.** It has just been announced that the Monash team formed by **Richard Arthur, Jimmy Nguyen, Trang Truong, Kirilly Wagstaff, Daniel Wielechowski and Makarios Wong** are the winners of the 2014 Macnab-Lacey Student Design Prize with their project "RABL Engineering: Ammonia Production Facility, Black Liquor as a Feedstock for Green Ammonia and Electricity Production". This is the second successive year a team from Monash has won the prize. The prize will be awarded to the student design project that best shows how chemical engineering practice can contribute to a more sustainable world. Malcolm Wilkinson, Chair of the Sustainability SIG of the IChemE, said that *"there were a number of strong entries and two were highly commended by the judges and ran the Monash entry close; namely "Group One Diesel: Biodiesel from Biomass" from Imperial College, London and "Products from Propylene - Isopropanol" from Manchester University."* The whole Department of Chemical Engineering would like to congratulate the team on their success.
- Congratulations to **Adam Rady** who received the first place prize in the Carbon Reduction poster category at the All-Energy Conference and Workshop. David McManus presented the prize of \$750 which was sponsored by BCIA.
- The Department congratulates **Dr Akshat Tanksale** on his recent promotion to Senior Lecturer.

The Department welcomes the following new HDR students starting their degree [August —December 2014]

PhD:

Ms Negin Amini [Supervisors: Akshat Tanksale, Victoria Haritos] **Research Topic:** Biomass pre-treatment and separation for fuels and chemicals production

Ms Xiaofang Chen [Supervisors: Huanting Wang, Yonggang Zhu] **Research Topic:** High-efficiency CO₂ conversion using a photocatalytic microreactor with novel catalysts

Mr Ankit Malhotra [Supervisors: Aibing Yu, Xuchuan Jiang] **Research Topic:** Engineering enzyme nano-complexes for simultaneous capture & conversion of CO₂ into sustainable fuel

Mr Ruihuan Ge [Supervisors: Karen Hapgood, Mojtaba Ghandiri] **Research Topic:** Creating tuneable agglomerates via 3D printing

Ms Dao Nguyen Tuong Lam [Supervisors: Karen Hapgood, Mojtaba Ghandiri] **Research Topic:** Synthesis and Characterization of TiO₂-Doped MeOx as Photocatalysts for Toxic Compound Degradations

Mr Pradeep G.C. [Supervisors: Lizhong He, Victoria Haritos, Geoffery Dumsday] **Research Topic:** Engineering robust enzyme nano-complexes for simultaneous capture and conversion of CO₂ into sustainable fuel

Ms Yan Wang [Supervisors: Wenlong Chen, George Simon] **Research Topic:** Preparation of nanocellulose crystal from ramie sticks and NCC/polymer composite membrane

Mr Li Wan [Supervisors: Huanting Wang, Xiwang Zhang] **Research Topic:** Heteroatom-Doped Graphene-Based Carbon Materials for Electrocatalysts for Fuel Cells

Mr Junhai [Scott] Liao [Supervisors: Aibing Yu, Qijun Zheng] **Research Topic:** Granular flow mechanics

Mr Mehrotra Ravi Kumar [Supervisors: Aibing Yu, Baoyu Guo (External)] **Research Topic:** Refractory corrosion modelling in cement rotary kilns

Ms Azmir Jannatul [Supervisors: Aibing Yu, Ruiping Zou] **Research Topic:** Engineering nanostructured enzyme complexes for conversion of cellulose into sugars

Ms Ananda Kumar Madura Bairavi [Supervisors: Lizhong He, Yuan Gao, Wei Shen] **Research Topic:** Engineering robust enzyme nano-complexes for simultaneous capture and conversion of CO₂ into fuel

Mr Chen Ruoyang [Supervisors: Wei Shen, Mengwai Woo, Li Yuan Zhang] **Research Topic:** Fabrication of Pickering Emulsion and its Application Properties

Mrs Iman Ghanim Jabaz [Supervisors: Lian Zhang, Dong Chen] **Research Topic:** A morphological study of filiform corrosive attack on cerated AA2024-T351 Aluminium alloy

Congratulations to the following HDR students who completed their degree [August-December 2014]

PhD:

- **Dr Swambabu Varanasi**, Thesis Title: "Eco-friendly cellulose nanofibre membranes" [Supervisor: Warren Batchelor]
- **Dr Aswan Al-Abboodi**, Thesis Title: "Development of in situ hydrogel for biomedical applications and delivery of blood stage malaria vaccine" [Supervisor: Peggy Chan]
- **Dr Thanh Huynh Nguyen** "Prediction of the tablet strength: development of the unified compaction curve model for wet granulation" [Supervisors: Karen Hapgood and David Morton (Faculty of Pharmacy and Pharmaceutical Sciences)]
- **Dr Sigappi Narayanan** "Laminate zeolite structure prepared using papermaking techniques for carbon dioxide capture: synthesis, characterisation and performance" [Supervisors: Warren Batchelor, Paul Webley]
- **Dr Lunxi Li** "Laminate zeolite structure prepared using papermaking techniques for carbon dioxide capture: synthesis, characterisation and performance" [Supervisors: Huanting Wang, Jianfeng Yao]
- **Dr Yi-Lan Elaine Fung** "Nickel aluminate reinforced porous ceramic hollow fibre membranes" [Supervisors: Huanting Wang, Jianfeng Yao]
- **Dr Stephen Martin Viduka** "Discrete particle simulation of solid separation in a jiggling device" [Supervisors: Karen Hapgood, Yuding Feng, Phil Schwarz]
- **Dr Jian Ke Wang** "Mixing of fluids and suspensions in a laminar stirred tank" [Supervisors: Ravi Jagadeeshan, David Boger, Jie Wu]
- **Dr Niken Audrey Wijaya** "Elucidating the mechanism underpinning ultra-clean coal production from Victorian brown coal and its application as a gasification fuel" [Supervisor: Lian Zhang]
- **Dr Bithi Roy** "Oxy-fuel Fluidized Bed Combustion of Victorian Brown Coal" [Supervisor: Sankar Bhattacharya, Luguang Chen]

Masters:

- **Ms Hui Hui Chiam**, Thesis Title: "Investigation of fibre-fibre bonding and effect on sheet mechanical properties" [Supervisors: Warren Batchelor and Wei Shen]
- **Mr Fei Tzhung Ryan Moo** "Improved control of granule properties via steady state granulation" [Supervisor: Cordelia Selomulya, Karen Hapgood]

Company participation?

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.

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