MONASH University

MONASH
CHEMICAL
ENGINEERING

September 2019 Vol 12, Issue 3

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

Chemical Engineering Post Graduate Association Conference	4
Dr Peter Uhlherr, Monash Chemical Engineering's first PhD student	9
Monash Women in Chemical Engineering – Bronwyn Adams – first female chemical engineer in Victoria	12
New Masters of Industrial Chemical Engineering at Monash-Suzhou	13
Imagine life without clean water!	17
Open day 2019	20
ACL injury 'epidemic': research reveals repetition's role in breakdown	24
Improving digestibility and release characteristics of functional foods	26
pH effect on processed cheese manufactured with various starches	27
Athena Swan Initiative	28
Alumna announced as Tasmania's Young Professional Engineer of the Year	30
Building a solar cell tester	33
Update from the ACJRC in Future Dairy Manufacturing	38
Alumni news	43
Department update	47

WELCOME FROM THE HEAD OF DEPARTMENT

Open Day 2019 was made extra special by the opening of Engineering's new Maker Spaces for student teams and entrepreneurs. Chemical Engineering's Monash BrewLab featured their efforts and highlighted this new aspect of experiential learning. We are also forming a new Solar Desal team to field test our new OMP Water Purification Prototype with Oxfam.

The Chemical Engineering Postgraduate Association (CEPA) has their annual conference coming up on October 31st. We are excited to have contributions from RMIT, Uni Melbourne, Deakin, CSIRO and from our own department's Malaysian campus. This year's conference also has support from the Monash Centre for Membrane Innovation, the ARC Research Hubs for Energy Efficient Separation and Computational Particle Technology, BioPria, the Monash Postgraduate Association, 2D Water, Air China, and Agilent. Please join us for the industry and alumni networking event on level 4 of New Horizons from 6 pm to 8 pm. See you there!

The Athena SWAN program recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all. Monash University joined Athena SWAN in 2015 and received the Bronze award in 2018. As part of the 2018-2021 action plan, we have formed a committee in Chemical Engineering composed of academics, graduate students, and undergraduate students to work in improvement of department policies, practices, and activities.

Finally, an initiative of Tam Sridhar, followed up by an enormous amount of work by Aibing Yu, is finally coming to fruition – Chemical Engineering at Monash Suzhou. You can see pictures of our new students and laboratories in this issue of Focus. This is a wonderful new opportunity and we look forward to welcoming you to Suzhou!

Mark M. Banaszak Holl
Professor and Head, Department of Chemical Engineering

CHEMICAL ENGINEERING POSTGRADUATE ASSOCIATION

The Chemical Engineering Postgraduate Association (CEPA) has had one of its biggest years yet, with several events still to come. Despite a change in funding at the beginning of the year, we have been able to continue to successfully run our monthly TGIF (Thank God It's Friday) social gatherings, while also including several cultural celebrations such as Eid al-Fitr and Mid-Autumn Festival; and events outside of the Chemical Engineering offices such as a barbeque at the start of the year. In academic events, we were also grateful to have Tim Davey, a PhD graduate from New Zealand who now works at Dulux Paints in a technical research position, give a "Life After PhD" talk about his career journey and research.

We also have the biggest event on the CEPA calendar for the year, the annual CEPA conference, coming up in only a month and a half! Besides our keynote speeches from Dean of Engineering Elizabeth Croft, R&D manager at Simplot Australia Jocelyn Midgley and Dr Joanne Tanner of BioPRIA, this year we have over 60 presenters of both talks and posters, including some from Deakin University, RMIT and even Monash Malaysia campus, who have been awarded department travel grants. The conference this year will be sponsored by Air China and Agilent, with additional travel grant prizes sponsored by 2D Water, BioPRIA, the ARC Research Hub for Energy-Efficient Separation, the ARC Research Hub for Computational Particle Technology, Monash Membrane Innovation and Monash Chemical Engineering. For the first time, posters will be presented at our alumni and industry networking event after the conference, with refreshments provided by Chemical Engineering's own Monash BrewLab.

The conference promises to be an interesting, exciting, and enjoyable event, so please register (for free!) before the 1st of October via our website at monashcepa.org/conference. If you miss the deadline but still want to register, feel free to send the organising committee an email at eng.cepa@monash.edu and we should be able to happily accommodate you.

In the future, we plan to run more ambitious and engaging social events. In the past, CEPA had little interactions with other postgraduate groups around Monash University. However, due to this year's committee ambitious and support network, we have plans to collaborate with different student groups to allow our postgraduate students to expand their social and academic network. For example, we have already organised a joint Oktoberfest celebration in collaboration with the School of Chemistry Postgraduate student group: Chemistry Honours and Misc Postgraduate Society (CHAMPS), with drinks provided by our own Monash BrewLab! Additionally, we have been actively interacting and collaborating with other student groups within the Faculty of Engineering by extending an invitation to them to our major events.

Additionally, the CEPA committee has actively focused on giving back to the community by hosting charity events. For the first time this year, CEPA - in collaboration with BioPRIA and the Department of Chemical Engineering, hosted a bake sale for 'Australia's Biggest Morning Tea' in May. Here, the Department raised over $400 for the Cancer Council, to help cancer research within Australia. We plan on hosting more charity events in the future to highlight the generosity and kindness that is within the Department.

We are also planning a number of initiatives to engage new students and support current students. We're in the process of updating the CEPA welcome booklet which will introduce new students to the department and CEPA, as well as creating a buddy system where some members of the CEPA committee can provide a first point of contact for newly arriving students as they begin their PhD. Student representation in the department has been an issue this year, so we've talked to postgraduate student representatives in other schools via MPA and are in the process of creating an official student representative position on the committee.

Throughout this year we have been supported by so many people and organisations. The Department of Chemical Engineering has been our biggest supporters since the beginning. Many thanks to Mark Banaszak Holl, Lilyanne Price, Tracy Groves, Kim Phu and Laura McManus for providing advice and guidance to this year's committee. Special thanks to our sponsors, Monash Postgraduate Association (MPA), Faculty of Engineering, BioPRIA, 2D Water, ARC Research Hub for Energy-Efficient Separation, the ARC Research Hub for Computational Particle Technology, Monash Membrane Innovation, Air China, and Aglient for supporting our upcoming student conference. Lastly, we would like to thank all past and present postgraduate students, as without their support, we would not be here.

Reflecting on the last six months, the CEPA Committee is proud of all we have achieved so far. We hope to finish the year strong and leave a good legacy for future generations. Thanks to this year's committee, we have set the groundwork for kickstarting inter-departmental and inter-faculty collaboration within Monash University. Moving forward, we hope to expand our networks to other universities around Victoria and Australia - allowing our postgraduate students to broaden their academic and social circle.

JOIN US AT THE ANNUAL CHEMICAL ENGINEERING POST GRADUATE ASSOCIATION CONFERENCE THIS OCTOBER

The 9th Annual Chemical Engineering Postgraduate Association (CEPA) Conference for 2019 will be held at the Monash University Clayton Campus in Melbourne, Australia. It is an opportunity to meet, greet and interact with fellow members of the scientific community of the Faculty of Engineering.

Since 2011, the CEPA conference has been run by students as an opportunity to showcase the wide range of research within the department. Students from around Australia are invited to present their work to their peers, academics and industry representatives, receive helpful feedback, and open avenues for collaboration.

Chemical Engineering at Monash encompasses a wide range of topics, from nanomaterials and computational modelling to biotechnology and food engineering. The CEPA conference provides a unique opportunity to learn about research in a range of fields, which encourages cross-disciplinary work. Following very positive feedback from the previous years, we have designed the 2019 program around abstract submissions. Presentations are aligned with the following exciting engineering fields related to work performed at Monash University: membranes, biotechnology, food engineering, fuels and energy, modelling, nanomaterials, and renewable and sustainable engineering

Please visit the conference website for more information, including sponsorship opportunities, on the conference speakers, topics and organisers. Registration is open via the website:

https://www.monashcepa.org/conference

We look forward to welcoming you to our 2019 conference in Melbourne.

The CEPA conference committee invites students, staff, alumni and industry partners to share canapé and a few drinks while trying out our new beer brews made by our very own MonashBrewLab Team and exchange stories of how engineering contributes to industry in our communities and organisations around the world.

Conference awards will be presented during the evening.

Post-Conference Alumni and Industry Networking Event
October 31, 6pm - 8pm
Level 4 New Horizons Building,
Monash University Clayton Campus

REGISTER AT https://www.monashcepa.org/registration

CONFERENCE PROGRAM (DRAFT)

We are pleased to announce we have a wonderful program with 68 abstracts, including 49 oral presentations and 19 posters.

In addition to contributors from every engineering department at Monash University, we will also be welcoming presenters from Monash Malaysia, RMIT, University of Melbourne, CSIRO, and Deakin University.

08:30 - 09:00		**REGISTRA**
09:00 - 09:10		**Opening Ceremony,**
09:10 - 09:40		**Keynot**
09:40 - 09:50		**Spo**
	Theme: Modelling, Location: S1	**Theme: Membranes, Location: S2**
09:55 - 10:10	Oral: Universal Behaviour of Associative Polymer Solutions, Mr. Aritra Santra	Oral: Recycling Textile Mill Effluent Using Flat Sheet Mem Fabricated by Different Phase Inversion Techniques, Ms
10:10 - 10:25	Oral: 3D printing of tuneable coloured agglomerates and strain distribution study, Dr. Jun Zhang	Oral: Mesoporous Silica- Nanofibrillated Cellulose Comp High Performance Depth Filtration, Ms. Seyedeh Simin M
10:25 - 10:40	Oral: Viscometric Functions and Rheo-optical Properties of Dilute Polymer Solutions: Comparison of FENE-Fraenkel Dumbbells with Rodlike Molecules, Mr. Isaac Pincus	Oral: Compatibility in MMMS for gas separation, Ms. Ruji
10:40 - 10:55	Oral: Photoelastic properties of 3D printed particles, Dr. Negin Amini	Oral: Effect of edge functional groups on salt rejection b oxide membrane, Ms. Ruosang Qiu
10:55 - 11:25		**Morning Tea, Sp**
11:25 - 11:55		**Keyno**
	Theme: Biotechnology, Location: S1	**Theme: Food Engineering, Location: S2**
12:00 - 12:15	Oral: Radial wicking in paper for Bio-Diagnostics, Mr. Michael Her-taeg	Oral: Understanding the potential protective effect of mil omega-3 fatty acids, Ms. Mitra Nosratpour
12:15 - 12:30	Oral: Lazy yeast and cell-to-cell variation in microbial recombinant protein production, Mr. Kevin Hu	Oral: A high data capacity chipless RFID sensor for food Fatemeh Babaeian
12:30 - 12:45	Oral: Freeze-drying of Human Red Blood Cells for Biomedical Application, Ms. Francisca Diana Alves de Sousa	Oral: Can salt and sugar be removed from bean process affecting their quality?, Mr. Lavaraj Devkota
12:45 - 13:00	Oral: SVM-based model for the prediction of recombinant protein yield in the periplasm of Escherichia coli, Mr. Kulandai Arockia Rajesh Packiam	
13:00 - 14:00		
14:00 - 14:30		**Keynot**
	Theme: Nanotechnology / Sustainable and Renewable Engineering, Location: S1	**Theme: Modelling, Location: S2**
14:35 - 14:50	Oral: Controllable Synthesis of a Novel Porous Tetrahedral Ag3PO4 Photoanode with Superior Photoelectrochemical Performance for Solar Hydrogen Production, Ms. Wen Chai Ng	Oral: Computational investigation of solvation dynamics effect on heterogeneous catalysis, Mr. Swarit Dwivedi
14:50 - 15:05	Oral: High-throughput perovskite solar cell materials discovery, Mr. Adam Surimak	Oral: Modelling stability and flexibility of insulin aspart in biocompatible ionic liquids, Ms. Vidya Sundaram
15:05 - 15:20	Oral: New class of porous liquid type III, Mr. Hamidreza Mahdavi	Oral: DEM study on effects of friction coefficient and incl screw conveyor performance, Ms. Xin Li
15:20 - 15:35	Oral: Preparation of fine copper powder by plasma discharge electrolysis process, Ms. Lingling Shen	
15:35 - 15:50	Oral: Efficient Synthesis of Multicomponent Metal-Organic Frameworks, Mr. Brandon He	
15:50 - 16:00		**Closing Ceremony, Is**
17:00 - 20:30		**DRINKS AND NE**

CONFERENCE KEY DATES

Registration closes - 1 October 2019

Conference - 31 October 2019

Networking event - 31 October 2019

TION OPEN, Location: S1-S4 Foyer		
Gabriel Huynh (Conference Chair), Location: S3		
e, Prof. Elizabeth Croft, Location: S3		
nsored Talk, Agilent, Location: S3		
	Theme: Fuels and Energy, Location: S3	**Theme: Food Engineering, Location: S4**
mbranes . Shaik Nazia	Oral: Molybdenum ditelluride: A high rate anode for sodium-ion battery, Mr. Manas Ranjan Panda	Oral: Concentrations of important dietary antioxidants in grapes and their fate during wine making, Ms. Xueqing Liu
osites for Miri	Oral: Co-Gasification of Waste Tyre Char – Coal Char: A Study on the Kinetic Parameters and CO_2 Gasification Reactivity, Ms. Miriam Issac	Oral: Fermentation analysis and effect on beer, Mr. Daniel Rojas Sanchez & Ms. Gina Pacheco Arredondo
ing Hou	Oral: Redox flow battery, Mr. Ehsan Ghasemiestahbanti	Oral: Mathematical Modelling of Mass Transfer during Antisolvent Vapour Precipitation, Mr. Kian Siang Lim
y graphene	Oral: A critical review of ash slagging mechanisms, slag viscosity measurement methodologies and their applications to coal and biomass slags, Mr. Tanvir Alam	Oral: Modelling of solvent extraction process for separation of palm carotene from crude palm oil, Mr. Hoe Boon Chin
onsored by: Air China, Location: S1-S4 Foyer		
te, Dr. Joanne Tanner, Location: S3		
	Theme: Modelling, Location: S3	**Theme: Membranes, Location: S4**
k fat on	Oral: Numerical investigation of particles flow and mixing performance in various sizes bladed mixer, Mr. Angga Herman	Oral: Investigating the effect of solvents on PVDF-TiO2 membrane fabricated by non-solvent induced phase separation method, Mrs. Shruti Sakakar
l safety, Ms.	Oral: Particle Migration in Spiral Inertial Microfluidics: A Simulation Study, Mr. Mahdi Naseri	Oral: Functionalized Porous Interlayers for Li-S batteries, Mr. Areeb Shehzad
sing without	Oral: Powder Scale Modelling of Heat Transfer and Melt Pool Dynamics in Selective Laser Melting, Mr. Erlei Li	Oral: Mild-annealing reduced graphene oxide membrane for nanofiltration, Mr. Yang Li
	Oral: Comprehensive Modelling of Blast Furnace Including Pulverised Coal Injection and Hot Metal Tapping, Mr. Lingling Liu	
Lunch, Location: S1-S4 Foyer		
te, Dr. Jocelyn Midgley, Location: S3		
	Theme: Sustainable and Renewable Engineering, Location: S3	**Theme: Biotechnology/Nanotechnology, Location: S4**
and it's	Oral: Structure analysis and swelling phenomenon of physical and chemically modified nanocellulose foam, Ms. Laila Hossian	Oral: Real-Time and In-Situ Monitoring of H2O2 Release from Living Cells by a Stretchable Electrochemical Biosensor Based on Vertically Aligned Gold Nanowires, Ms. Quanxia Lyu
	Oral: Heat Drying as a Novel Method to Speed-up the Production of Nanocellulose-based Films in Spray Deposition Technique, Mr. Humayun Nadeem	Oral: An investigation into the long-term fluorescence and material stability of organosilica nanosensors in biological fluid, Mr. Gabriel Huynh
ination on	Oral: Improvement of formaldehyde production yield via hydrogenation of syngas using ionic liquid, Ms. Nooshin Asadi	Oral: Cyto-EM grid preparation via saw atomisation, Mr. Dariush Ashtiani
	Oral: Energy efficient production of Nanocellulose, Mr. Wriju Kargupta	Oral: Application of polyethylene glycol gelatin water aqueous biphasic system in encapsulation of hydrophilic compounds, Ms. Jia Min Lee
	Oral: Separation of graphite and metal oxides in spent lithium-ion batteries using froth flotation, Ms. Rabeeh Golmohammadzadeh	Oral: Selective, Information-directed Dynamic Covalent Assembly of Sequence-specific Peptoids, Mr. Samuel Leguizamon
aac Pincus (Conference Co-Chair), Location: S3		
TWORKING, POSTER SESSION (17:00 - 18:30)		

CEPA WISHES TO THANK ALL OF OUR GENEROUS SPONSORS FOR THEIR SUPPORT OF THE 2019 ANNUAL CEPA CONFERENCE

2D WATER

AIR CHINA 中国国际航空公司 STAR ALLIANCE MEMBER

BioPRIA

MONASH University | MONASH CHEMICAL ENGINEERING

MONASHBREWLAB

ARC RESEARCH HUB ENERGY-EFFICIENT SEPARATION

MONASH University | MONASH MEMBRANE INNOVATION

MONASH University | MONASH ENGINEERING

mpa est. 1961 | monash postgraduate association
Inspiring and supporting postgraduates

ARC Research Hub for Computational Particle Technology CPT

Agilent

BECOME A CEPA CONFERENCE SPONSOR AND GET INVOLVED

The annual CEPA conference is an unmissable opportunity to connect with Australia's future research leaders!

The conference - an important professional development event for research scholars - brings together postgraduate students and their mentors to exchange and share their experience and research on all aspects of Chemical Engineering. Presentations and other events provide a unique opportunity to network. If your organisation is invested in engineering and development, then the Chemical Engineering Postgraduate Association (CEPA) would be delighted to welcome you to the 9th Annual CEPA conference.

WHY SPONSOR THE CONFERENCE:

- Meet and recruit amazing and innovative talent
- Attend and engage with students and academics
- Support and invest in Australia's future
- Brand product promotions and feedback

DOWNLOAD OUR PROSPECTUS TO LEARN MORE

DR PETER UHLHERR, MONASH CHEMICAL ENGINEERING'S FIRST PHD STUDENT

As the Department looks ahead to a new decade, placed as one of the highest ranked chemical engineering departments in Australia, with over 70 academic and research staff and 460 undergraduate students, it is worth a moment to reflect that when the department commenced in 1961, it had only one academic staff member, no equipment and no support personnel.

Dr Peter Uhlherr has the honour of being the first PhD candidate (supervised by Charles Sinclair, the 'Senior Lecturer in Charge' and the only academic) at Monash Chemical Engineering during the first two years of the new department, as well as fulfilling the role of Senior Teaching Fellow as one of only four academic staff from 1963.

Sinclair and Uhlherr both came to Monash from the University of Sydney. After being appointed to the post of Senior Lecturer, Charles Sinclair offered Uhlherr a PhD scholarship to follow him to Monash.

"I could have stayed at Sydney", recalls Dr Uhlherr, "but my romantic interest was living in Melbourne at the time and it was very convenient".

Reflecting on this period, Dr Uhlherr notes that although it was at times hectic and stressful with little support, no laboratory space, facilities or instrumentation, it was also very rewarding as he had the opportunity to help shape the new department and its research direction.

However, as Dr Uhlherr experienced, being the first and for a time only PhD candidate in a department that was still establishing itself, was not without difficulties.

"There was no laboratory manager or HR person, there was no technician so I bought hand tools, supplies and some instruments, then when I was ready to get something constructed, I did most of it myself."

"It would have been easy to stay in Sydney and slot into the department there, however I would have had little or no influence on the teaching or research approach", Dr Uhlherr said.

The initial focus of the department was to establish strong undergraduate and laboratory programs with each academic having the freedom to develop the courses along their own lines of research and interest.

Dr Uhlherr remembers that in its early days the department was experimental and empirical. The big topics of the day included minerals processing and metallurgy, and fluidization. Dr Uhlherr's own research focused on particle fluid systems and by the late 60s became known as rheology.

Upon completing his PhD he spent some time at the Atomic Energy Commission in Luca Heights, before returning to Monash in 1967, where he remained until his retirement in 1997. But he remained on a casual basis, teaching one or two course a year until 2009.

Dr Uhlherr spent most of his professional career at Monash (45 years!) – long enough to teach both parents and their children - helping to shape the department that it is today.

An important legacy from his postgraduate research was a photographic method of visualizing the motion of a particle through a fluid by capturing multiple images of the particles on s single negative, helped by a technician/photographer in Chemistry who became a life long friend.

This interest remained with him his whole life, and five of his own postgraduate students used photographic techniques in their particle system research – all well before the digital age.

Photography has always been important to Dr Uhlherr- with his attention now turned to capturing images of fungi around eastern Melbourne.

In the early days of the department, photography was important in other ways too, with journals articles photographed on negatives because photocopies did not yet exist

Some early images of Monash are etched on his memory, including the arrival of the union building on the back of a semitrailer. The old farm house served the student union for two years. Or the image of Professor Ken Hunt (faculty Dean and only Professor) barefoot and pants rolled up pushing his secretary's car out of the mud of the 'Egg' car park during the 1961/62 construction phase.

Dr Uhlherr fondly remembers these earlier days of the university with regular staff and student cricket matches, and when the VC would drop around to meetings for a cuppa and a chat.

THE EARLY DAYS - IN PICTURES

Clockwise form top: The 'School House' - student union building for 3 years, 1963; Des Smith (Chem Eng photographer) with the departments high speed 16mm movie camera, capable of taking 10000 images per second, 1970s; electrical engineering building, 1963; making a movie for MESS, 1964, using departments 16mm movie camera. Opposite page - Dr Uhlherr in the 1990s

Engineering faculty (without technicians)1962

Engineering faculty 1963

Chemical Engineering 1966

Chemical Engineering 1971

From the Editor's Desk

Industrial Chemical News was launched by Irvin Schwartz at Bill Communications in October 1980. In the few years since its inception, *ICN* has developed a unique personality among business magazines. Its colorful format has won a place in the hearts of industrial chemists, who feel that it speaks to them and for them.

age. Chemical Trivia is a much loved feature. *ICN* publishes letters from readers and Heard From The Lab, a bulletin board of pet peeves and anecdotes contributed by readers. None of these features may be original, but it is the quantity and mix that give *ICN* a feeling that this is indeed a "chemist friendly" publication.

McNaughton's goals: To maintain strong personal link with readers and provide more valuable information.

ICN publishes monthly news and features on developments that industrial chemists want to know about, in a style that is interesting to read.

In addition to the news and features, *ICN* has included a high degree of reader interaction. The Benchmarks survey, with questions in every issue, together with answers from a previous survey, draws an enthusiastic response. Readers send in software reviews for our computer cover-

We want to continue that tradition. We want to be the magazine that every chemist wants to read first. But we won't be content to rest on successes of the past. As well as maintaining a strong personal link with readers, we want to become more valuable to you in the work place.

As you read through this issue, you will come to an advertisement for more staff. We are going to build the editorial content of this magazine into something that we the editors and you the readers can be proud of. We will have a wider coverage of information that you need, in more depth. We want you to have more fun and to get more value from this magazine than from any other professional publication you read.

McGraw-Hill publishes a large number of business magazines. The support facilities here are impressive. Just within the Process Industries Market Focus Group, there are 10 other publications on subjects that may intelest you (see page 2). But McGraw-Hill purchased *ICN* because it feels that this magazine reaches a dynamic sector that it wasn't previously reaching—industrial chemists, who are working in some of the most exciting fields of modern technology.

In the short time I have been editor-in-chief of *ICN*, I have been able to meet a number of readers and contributors. I like what I see. This is a good magazine with an enthusiastic audience and an impressive staff. As we grow together, I would like to enlist your aid in helping us to grow into something that is more and more important to you. Tell us what you like, and don't like. Make suggestions. Contribute articles. Participate in the surveys. Write letters. And give me a call. My number is (212) 512-6603. I look forward to hearing from you.

Kenneth J. McNaughton
Editor-in-Chief

Industrial Chemical News (7) 5 p5, April 1986

MONASH WOMEN IN CHEMICAL ENGINEERING – BRONWYN ADAMS – FIRST FEMALE CHEMICAL ENGINEER IN VICTORIA

Diversity in engineering is an ongoing conversation and a work in progress, and although chemical engineering is statistically a bit ahead of some other disciplines, there are still only 13% women in engineering (all disciplines) in the Australian workforce. As a result, female pioneers and success stories are still widely shared and discussed, and their achievements remain relevant even in 2019.

Diversity in engineering is an ongoing conversation and a work in progress, and although chemical engineering is statistically a bit ahead of some other disciplines, there are still only 13% women in engineering (all disciplines) in the Australian workforce. As a result, female pioneers and success stories are still widely shared and discussed, and their achievements remain relevant even in 2019.

One such pioneer was Bronwyn Adams. She was the very first female graduate of chemical engineering in Victoria, one of the very first chemical engineers to graduate from the Monash Chemical Engineering degree, and the first female chemical engineer in Victoria. Bronwyn's father was a chemical engineer, and originally she was planning to study at Melbourne University, but when she heard that Professor Owen Potter was moving to Monash to start a new chemical engineering degree, she decided she would come also, and she started her new degree in 1963. According to her family, she was an excellent student and quietly determined. In part- she probably had to be to prove herself as the only woman in the class. When she graduated in 1971, she could not get a job – she received repeated rejection letters saying the company "did not employ women" and her Mum, Jean Adams, remembers a huge pile of them, which the family kept for many years. She got her break at Altona Petrochemical Company in 1971, and built her career in chemical engineering from there. She then moved to the University of Melbourne, eventually as a senior manager in science and education faculties. Finally she developed a new career as a consultant, working in diverse technical and organisational development assignments for some years. Tragically she died suddenly of an aneurism in 1999 at age 48. A large obituary was published in The Age and a memorial scholarship was established in her name at Melbourne University shortly afterwards. She appears in the Encyclopedia of Australian Science.

I had heard of Bronwyn Adams many times when I worked at Monash – her name and achievements came up regularly at alumni events (some of the regular readers of this newsletter were Bronwyn's classmates and co-workers), she was featured on the Monash Engineering 50 years webpage along with the pioneering women in other disciplines of engineering at Monash. At one stage Paul Taranto from Qenos, who worked with Bronwyn at APC, had discussed establishing a new Joint Vic IChemE/EA award for women in chemical engineering and naming it after Bronwyn Adams, but unfortunately we didn't know how to get in touch with her family to ask permission.

Fast forward to 2019, and I was looking through some information about my Dad's family history, including a letter from my great Aunty Dorothy "Dorrie" Waddell when I first moved to Melbourne for my first industry job in the mid 1990s. In the letter, Great Aunty Dorrie invited me to come and visit her and mentioned that her granddaughter - Bronwyn Adams - was also a chemical engineer. I knew immediately that this had to be the same person and was amazed at the family connection, and frustrated that I hadn't known this until now! Our grandmothers– Amy Pat Waddell and Dorothy Waddell – were sisters from Kin Kin (near Gympie) in Queensland, which means Bronwyn was my 2nd cousin. I recently met Bronwyn's mum Jean (a few weeks before she died at 93 years old) and her sister Sue Coffey and they generously shared their stories of Bronwyn's life and career.

The Waddell family had 7 sisters and 3 brothers, and it turns out that there is a high proportion of female engineers in the Waddell family descendants. It's a large family and I haven't tracked down all of my 2nd cousins but there are female scientists and engineers among the descendants of the other Waddell siblings as well, in contrast to the other (equally large) branches of my family tree. The original Waddell sisters all convey the same general sense of strong, independent women finding their own path and though life and career (if this option was open to them).

Bronwyn was the first female graduate of Chemical Engineering at Monash and in Victoria, the first female engineer at APC, and was a very early pioneer of chemical engineering nationally. Despite the passage of 50 years, women are still breaking into previously unchartered territory: Cordelia Selomulya and I were the first female academic staff members at Monash; I was the first female promoted to Professor of Chemical Engineering at Monash; and the first female Head of Department in the Faculty of Engineering. I find the link between the Waddell family and women in chemical engineering fascinating, and I am proud to think that I am related to Bronwyn Adams and her achievements.

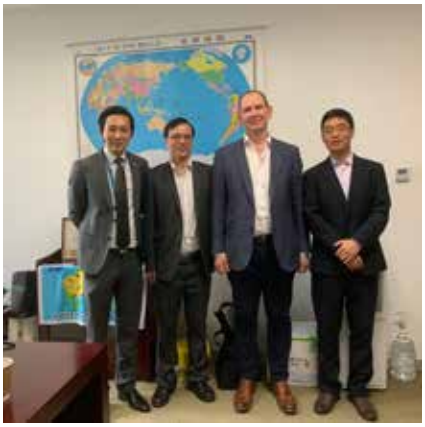
Professor Karen Hapgood, September 2019

NEW MASTERS OF INDUSTRIAL CHEMICAL ENGINEERING AT MONASH-SUZHOU

Monash Chemical Engineering is now active in three of the world's major cities – Kuala Lumpur, Melbourne, and the greater Suzhou-Shanghai metropolitan area.

Our new Master of Industrial Chemical Engineering, part of a double Master program with Southeast University, had its inaugural class arrive at the Monash-Suzhou campus in July. HOD Mark Banaszak Holl and Prof Xiwang Zhang met on campus with all 39 new students in early September. The students formed part of the interview team for our new Suzhou-based academic hires as they reviewed and provided comments on the Model class part of our interview process. We had a great couple days of interviewing with the help of Prof Aibing Yu, Southeast University Vice-President Liu Pan, and our fantastic professional staff. We will introduce you to the newest academic members of the department in our next issue. In the meantime, please enjoy these pictures of our new Master class and the new teaching laboratory facilities currently under construction.

We begin teaching our Master course in late February of 2020.



The Monash-Southeast University partnership is an Australia-China joint venture which aims at establishing a world-class research and training institute in China through a combined effort of Monash University (Monash) and Southeast University (SEU).

THE MONASH DIFFERENCE

Monash Engineering qualifications are professionally accredited and internationally recognised. We provide a total experience for our students. We want to teach highly skilled engineers, while developing well-rounded individuals, who are ready for professional life, leadership and success. That's the Monash difference.

Engineering – your way

At Monash, you can complete your engineering qualification in just four years, or study for five years and graduate with a double degree or a masters. Our engineering students complete a common first year to gain a broad understanding of engineering and the different specialisations. And there are plenty of options for you to branch out in your subsequent years of study.

Studying a double degree with Monash is a great choice for students who have a passion for two disciplines and would like to further their career options. Monash Engineering is aligned with nine degrees from other Monash faculties. More and more organisations seek engineering graduates with expertise in multiple areas and Monash Engineering caters for this with the opportunity to complete two degrees, in just five years.

A total learning experience

Great engineers are so much more than just their skills – they're planners, leaders, team players and communicators. At Monash, our engineering courses aim to produce highly skilled engineers who are ready for life, ready for work, ready for the world.

The Monash Engineering Leadership Program, the Work Ready Program, and the Monash Industry Team Initiative, are all designed to help our students become well-rounded engineers, and better develop their strengths and their passions as people. Monash Engineering students are able to branch out by way of activities such as – studying abroad or joining a club such as the Monash Unmanned Aerial Systems Club (UAS Club).

Learn and do in world-class facilities

Engineering is a hands-on discipline. At Monash, you get the chance to develop your skills in some of the world's best engineering facilities, like the Cave2 immersive visualisation platform, the largest wind tunnel in the Southern Hemisphere, one of the world's most powerful electron microscopes, and the New Horizons Centre – a collaboration between Monash and the CSIRO.

Professionally accredited, globally recognised

Monash Engineering degrees are recognised by a range of professional engineering bodies (depending on the specific degree), including Engineers Australia, The Institution of Chemical Engineers, Engineering Accreditation Council Malaysia, and the Australian Computer Society.

Reading online?

Find out more about the student experience at Monash

Find out more about our facilities

STUDENT & INDUSTRY ENGAGEMENT

We believe there's more to great engineers than excellent technical skills alone. And that's why Monash Engineering provides a range of programs designed to give you the knowledge and skills you'll need to be confident and articulate professionals, and to be well and truly ready to take your excellent engineering skills to your chosen industry.

Reading online?

Find out more about student & industry engagement

MONASH SOARS NINE SPOTS TO 75TH GLOBALLY IN THE WORLD UNIVERSITY RANKINGS

Monash continues to advance its reputation as an international powerhouse, high-calibre research and educational institution, climbing nine places to rank equal 75th globally in the THE World University Rankings 2020 released recently. The University achieved improved results in the THE World University Rankings 2020 key indicators that capture performance, placing it above the top 75 per cent of the 1396 institutions considered globally.

President and Vice-Chancellor Professor Margaret Gardner AO said the results were recognition of Monash as an emerging international powerhouse in higher education.

“Monash is highly regarded for its solution-focused research into major global issues, such as the provision of clean water, long-term planetary health, and the eradication of mosquito-borne diseases.

“We strive for excellence by fostering a truly diverse, innovative and sustainable research and teaching environment that supports our goals to be excellent, international, enterprising and inclusive – rising to 75 is a true reflection of our ambition and commitment measured by the highest international standards.”

This latest rise sees Monash jump in all three of the leading university ranking measurements. This includes:

The Academic Rankings of World Universities – Monash leapt 18 spots to 73, up from 91 in 2018

QS World University Rankings – ranked 58 globally (up one spot)

Monash’s research performance also ranked above international standard in the 2018 round of the Excellence in Research for Australia (ERA) rankings, by the Australian Research Council (ARC).

THE World University Rankings’ methodology uses 13 carefully calibrated performance indicators to provide the most comprehensive and balanced comparisons, trusted by students, academics, university leaders, industry and governments.

Grouped into five areas, the performance indicators include: teaching (the learning environment); research (volume, income and reputation); citations (research influence); international outlook (staff, students and research); and industry income (knowledge transfer).

The latest THE World University Rankings follow the THE World Reputation Rankings released earlier this year, in which Monash rose 17 places to rank in the 91-100 band, reinforcing its position in the top 100 universities in the world.

SHANGHAI RANKINGS

We are proud to rank #1 in Australia for Chemical Engineering, Materials Science and Engineering, Nanoscience and Nanotechnology, Energy Science and Engineering and Metallurgical Engineering, according to the Academic Ranking of World Universities’ (ARWU) ShanghaiRankings Global Ranking of Academic Subjects 2019.

IMAGINE LIFE WITHOUT CLEAN WATER!

Many people across the globe have to live with this situation on a daily basis.

Professor Xiwang Zhang and his research team asked themselves "What solutions can be offered to combat this issue?" Partnering with Oxfam, Prof Zhang and his research team have developed the OMP Water Purification Prototype which is solar driven, compact and portable. The OMP Water Purification Prototype can deliver clean water to people who are living in resource poor, remote or conflicted areas when they need it the most. Head of Chemical Engineering Professor Mark Banaszak Holl said "we are looking forward to seeing the results from the next phase of the research project, which is field testing the OMP Water Purification Prototype."

https://youtu.be/PgE6F8h3RzA

OTHER MEDIA

Water solutions without a grain of salt

Health Medicine Network - http://healthmedicinet.com/water-solutions-without-a-grain-of-salt/

ScienceMag - https://scienmag.com/water-solutions-without-a-grain-of-salt/

Science Daily - https://www.sciencedaily.com/releases/2019/07/190723163940.htm

VIDEO, Behaviour Works Australia - https://www.youtube.com/watch?v=PgE6F8h3RzA&feature=youtu.be

PUBLISHED PAPER

Spatially isolating salt crystallisation from water evaporation for continuous solar steam generation and salt harvesting

Yun Xia, Qinfu Hou, Hasan Jubaer, Yang Li, Yuan Kang, Shi Yuan, Huiyuan Liu, Meng Wai Woo, Lian Zhang, Li Gao, Huanting Wang and Xiwang Zhang

Energy Environ. Sci., 2019,12, 1840-1847

READ MORE

WATER SOLUTIONS
WITHOUT A GRAIN OF SALT

An estimated 844 million people don't have access to clean water while every minute a newborn dies from infection caused by lack of safe water and an unclean environment.

Seawater desalination and wastewater recycling are two ways to ease the problem of water shortage, but conventional approaches are energy intensive and based on the combustion of fossil fuels. In fact, water treatment takes up roughly 3 per cent of world's energy supply.

Researchers at Monash University have developed energy-passive technology that is able to deliver clean, potable water to thousands of communities, simply by using photothermal materials and the power of the sun.

Led by Professor Xiwang Zhang from Monash University's Department of Chemical Engineering, researchers have developed a robust solar steam generation system that achieves efficient and continuous clean water production from salty water with almost 100% salt removal. Through precisely controlling salt crystallisation only at the edge of the evaporation disc, this novel design can harvest the salts as well.

The feasibility and durability of the design have been validated using real seawater from Lacepede Bay in South Australia with a water production rate of 650ml/hour. This technology is a promising solution to water shortage in regional areas where grid electricity is not available.

Findings were published in the top international journal of Energy & Environmental Science.

"Water security is the biggest challenge the world faces in the 21st century, especially as population grows and the effects of climate change take shape. Developing and under resourced communities feel the effects of these factors the most," Professor Zhang said.

"Utilising solar energy for water treatment has been widely considered as one of the sustainable solutions towards addressing the scarcity of clean water in some communities without sacrificing our environment or resources.

"Despite the significant progress achieved in material development, the evaporation process has been impeded by the concentration of salt on the surface, which affects the quality of water produced."

Researchers created a disc using super-hydrophilic filter paper with a layer of carbon nanotubes for light absorption. A cotton thread, with a 1mm diameter, acted as the water transport channel, pumping saline water to the evaporation disc.

The saline water is carried up by the cotton thread from the bulk solution to the centre of the evaporation disc. The filter paper traps the pure water and pushes the remaining salt to the edges of the disc.

The light absorbance was measured to 94 per cent across the entire solar spectrum. The disc also exhibited a rapid temperature increase when exposed to light in both dry and wet states, rising from 25C to 50C and 17.5C to 30C respectively within one minute.

This technology has also great potentials in other fields, such as industry wastewater zero liquid discharge, sludge dewatering, mining tailings management and resource recovery. Future studies will look to extend this technology to these new applications with industry support.

"Our study results advance one step further towards the practical application of solar steam generation technology, demonstrating great potential in seawater desalination, resource recovery from wastewater and zero liquid discharge." Professor Zhang said.

"We hope this research can be the starting point for further research in energy passive ways of providing clean and safe water to millions of people, illuminating environmental impact of waste and recovering resource from waste"

Professor Zhang is the Director of the ARC Research Hub for Energy-efficient Separation (EESep). The Hub aims to develop advanced separation materials, innovative products and smart processes to reduce the energy consumption of separation processes that underpin Australian industry.

PORE-SCALE MODEL DEVELOPMENT HIGHLIGHTED ON THE COVER OF INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH

Understanding the relationship between fluid flows and structural properties of a packed bed is very important for various industrial applications including water filtration and natural gas and petroleum extraction.

PhD candidate Yongli Wu from the ARC Research Hub for Computational Particle Technology, supervised by Dr Qinfu Hou and Professor Aibing Yu, recently developed a pore-scale model (*Ind. Eng. Chem. Res.* 2019, 58, 5041–5053), which included both the inertial and viscous effects of flow through a packed bed. Thus, the new model enables the study of flows with high Reynolds numbers.

The present pore-scale model can effectively represent the essential features of the pore structures inside the packed bed with low computational costs, compared to the traditional computational fluid dynamics and direct numerical simulations.

The model can generate useful information at different length scales. At the macroscopic bed scale, the model can quantitatively investigate the permeability of the packed bed. At the microscopic pore/particle scale, the model can attain the pore-scale fluid flow and pressure distributions and link them to the pore structures of the bed.

Fundamentally, coupling the present model with the discrete element method is promising for the simulation of liquid-solid flows at equivalent scales, i.e., the particle scale for solid phase and the pore scale for fluid phase.

Yongli is currently preparing the further development of the model to dynamic systems, such as fluidization systems, for publication and plans to submit his thesis in August 2019.

ABOUT SIMPAS AND AIBING YU

Laboratory for Simulation and Modelling of Particulate Systems (SIMPAS) is a world class, multi-disciplinary research facility established and directed by Professor Aibing Yu, Vice-Chancellor's Professorial Fellow, Pro Vice-Chancellor and President (Suzhou), Monash University.

Its research aims at understanding the mechanisms governing particulate packing and flow through rigorous simulation and modelling of the particle-particle and particle-fluid interactions at both microscopic and macroscopic levels, with its application oriented to mineral/metallurgy/chemical/materials industries. Its goal is to be internationally recognised through excellence in fundamental and applied research in particulate science and technology.

Professor Aibing Yu specialises in process metallurgy, obtaining BEng in 1982 and MEng in 1985 from Northeastern University, PhD in 1990 from the University of Wollongong, and DSc in 2007 from the University of New South Wales (UNSW). After two years as Postdoc Fellow with CSIRO Division of Mineral and Process Engineering (90-91), he was with UNSW as Lecturer (92-95), Senior Lecturer (95-97), Associate Professor (98-01), Professor (01-14) and Scientia Professor (07-14). In May 2014, he joined Monash University as Vice-Chancellor's Professorial Fellow, Pro Vice-Chancellor and President of Monash-Southeast University Joint Research Institute (later changed to Monash Suzhou). He has been the Inaugural Director of the UNSW Centre for Simulation and Modelling of Particulate Systems (01-07), Deputy Director of ARC Centre of Excellence for Functional Nanomaterials (08-10), Founding Director of Australia-China Joint Research Centre for Minerals, Metallurgy and Materials (13-15), and ARC Research Hub for Computational Particle Technology (16-). He has received numerous prestigious awards including UNSW Scientia Professorship, ARC Federation Fellowship, NSW Scientist of the Year, and AAS Ian Wark Medal and Lecture. He is a Fellow of the Australian Academy of Science (AAS), Australian Academy of Technological Sciences and Engineering (ATSE), Royal Society of New South Wales (RSNSW), and Institution of Chemical Engineers (IChemE).

2019 EUREKA PRIZES FINALISTS

We are thrilled to announce that Professor Matthew Hill and his research team were semi finalists in the 2019 Australian Museum Eureka Prizes finalists.

The Broad Spectrum Respiratory Canister Team were nominated in the category *Defence Science and Technology Eureka Prize for Outstanding Science in Safeguarding Australia.*

(https://www.youtube.com/watch?v=pgwMD_ZQ4hY)

MONASH SOLAR DESAL TEAM - NEW TEAM STARTING UP

We are recruiting student members for the new Monash Solar Desal Team.

All HDR and UG students from engineering and other faculties are welcome to join.

Imagine life without clean water! Many people across the globe have to live with this situation on a daily basis.

Professor Xiwang Zhang and his research team asked themselves “What solutions can be offered to combat this issue?” Partnering with Oxfam, Prof Zhang and his research team have developed the OMP Water Purification Prototype which is solar driven, compact and portable. The OMP Water Purification Prototype can deliver clean water to people who are living in resource poor, remote or conflicted areas when they need it the most. Water quality is fundamental to life; not only is it essential for our health, but also for our crops, animals and the environment. It is becoming increasingly scarce and unsafe globally due to climate change, increased demand, and industrial and municipal waste.

We plan to form a student team similar to Monash Brewlab to further design, manufacture and test this prototype, aiming to support the introduction of our water purification system for use in the most affected areas of remote off-grid Indigenous communities. Our ultimate goal is to enhance health and livelihood among people affected by contaminated water.

Successful applicants will develop a funding proposal for this new team in consultation with Chem Eng academics, for consideration by the Faculty of Engineering’s Student Team’s Council.

More info here

Professor Xiwang Zhang
Director of ARC Research Hub for Energy-efficient Separation (EESep)

MONASH OPEN DAY 2019

On the 4th August 2019, the Department of Chemical Engineering again welcomed hundreds of future students to the department's Open Day display area. Thanks to the Open Day committee, led by Professor Matthew Hill and Mrs Trina Olcorn, which had worked on our Open Day program for the last 12 months, we showcased new exhibits in 2019 that more closely represented the cutting edge research underway in the department, captivating the Open Day visitors.

The visitors were introduced to our current research in food, water, energy and biomedical devices.

Professor Gil Garnier and the BioPria team put forth a particularly popular example of their natural fibre technology – their blood tests on a piece of paper. The Bioresource Processing Institute of Australia (BioPRIA) team performed over 130 tests across the day. A huge thank you to the BioPRIA team for their efforts on the day.

In addition, the department's Academic and Professional staff, together with our higher degree research and undergraduate student volunteers showcased all the department's education options.

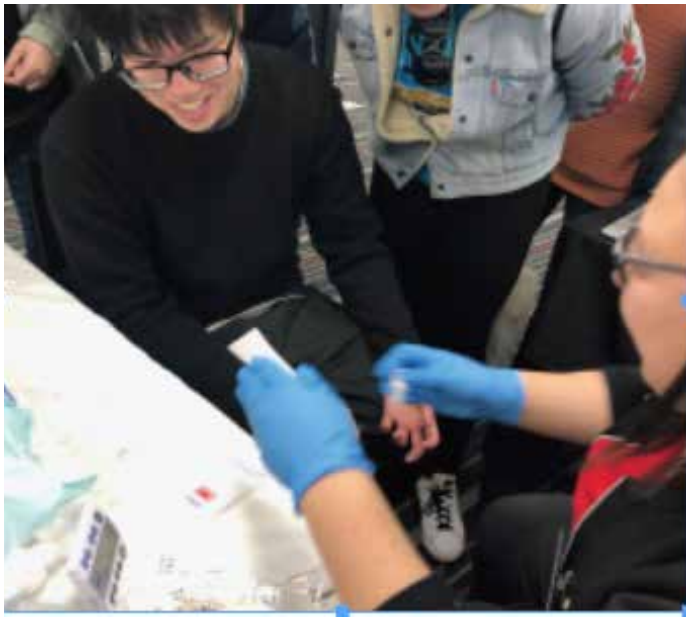
During the day long event, the staff and students explained the impacts of our current research and how it will affect the visiting student's futures and careers. Questions from the Open Day visitors included "What can a degree from the Department of Chemical Engineering at Monash University offer me? and "What kind of jobs do chemical engineers do?" Our staff and student volunteers explained that Chemical engineers' skill sets are widely applicable, which makes Chemical engineers incredibly valuable across industries. Chemical engineers approach problems in a unique way. They are trained to see pain points. They have the ability to figure out what the barriers are and create innovations to overcome them. Chemical Engineers' careers can include but not limited to Analytical Chemist. Energy Manager. Environmental Engineer. Manufacturing Engineer. Materials Engineer. Mining Engineer. Production Manager. Quality Manager. There is demand for chemical engineers who can excel in critical problem-solving and can work in multidisciplinary teams. There will always be demand for consultants, facility and process engineers, and the myriad of other specialties that Chemical engineers can get into. The Departments' staff and students explained that chemical engineers are playing a growing role in environmental sustainability, where they develop cleaner ways to produce and use energy, plastics, paint, food products, and more.

With a degree in Chemical Engineering from Monash University the world is your oyster

The staff and student volunteers also explained to the future students that a degree in Chemical Engineering from Monash University can help them work across the globe as the Bachelor of Engineering (Honours) and associated double degree courses at all Monash University campuses are accredited for the purpose of admission to membership of Engineers Australia at the level of Professional Engineer. The Institution of Chemical Engineers (UK) has accredited the following as equivalent to the MEng degree from a recognised UK university:

- Bachelor of Engineering (Honours) in the field of chemical engineering
- Bachelor of Science and Bachelor of Engineering (Honours) in the field of chemical engineering
- Bachelor of Biomedical Sciences and Bachelor of Engineering (Honours) in the field of chemical engineering
- Bachelor of Engineering (Honours) in the field of chemical engineering and Bachelor of Pharmaceutical Science.

READ MORE https://www.monash.edu/__data/assets/pdf_file/0010/1985446/IChemE-CaseStudies.pdf



In addition, a Chemical Engineering degree from Monash University is also accredited by ICheme Australia. IChemE accreditation provides benchmarking of academic programmes against high, internationally recognised standards. This is of increasing importance as the globalisation of engineering products and services demands greater confidence by employers in the skills and professionalism of the engineers they recruit. Modern society relies on the work of chemical, biochemical and process engineers - they help manage resources, protect the environment and control health and safety procedures, while developing the processes that make the products we desire or depend on. Chemical engineering is all about changing materials into useful products used every day in a safe and cost effective way. For example, petrol, plastics and synthetic fibres such as polyester and nylon, all come from oil. Chemical engineers understand how to alter the chemical, biochemical or physical state of a substance, to create everything from face creams to fuels.

Chemical engineering continues to evolve rapidly as a profession. Nowhere is the need to take account of change more important than in the education and academic formation of engineers. It is essential that new graduates have the skills to perform in an ever-wider variety of roles and industries. Moreover, they must not only be equipped to contribute quickly during their early careers, but also have a quality academic grounding in chemical engineering principles ‘to last a lifetime’ and to enable them to contribute to solving society’s challenges. Our aim, to recruit the brightest and most innovative people into the discipline of chemical engineering, which in turn challenges us to provide them with an education that will stimulate and develop their talents.

A highlight was the great 'soft launch' of the Monash MakerSpace. It was buzzing all day, filled with students, parents and staff members. A big thank you to the Monash BrewLab Team and SMUCE and Pharmaceutical Science/Chemical Engineering (MEPSS) as well as the many other students who supported their Club/Teams. Thank you to all of the students who made Monash Open Day a big success.

SMUCE held the ever popular Faculty of Engineering Open Day BBQ and the BrewLab helped bring the MakerSpace to life. BrewLab’s new bar facility was certainly the talk of the day as well as all of their new brewing equipment.

Our student teams once again outdid themselves in showing off their successes and engaging future students and parents. The Department was wonderfully represented by both the BrewLab Team and SMUCE during this year’s Open Day. Our student volunteers were busy conducting tours of campus, greeting inquisitive potential students, and staffing our new demonstrations. It was a truly great day for research and education on show inspiring future students with the opportunities to study Chemical Engineering at Monash. Our students and team once again demonstrated our faculty's commitment to excellence, quality, and professionalism. Such days are not possible without this assistance and the department appreciates the team culture that students brought to the day - together we made Open Day 2019 a great success for the Department.

BREWING SUSTAINABLE PROCESSES AND INDUSTRY PARTNERSHIPS

As September has come around very quickly, the Monash Brewlab has hit the ground running with a variety of brews, events and interviews for our current recruitment drive. As a team consisting of just over 30 students from a variety of degrees, we cannot wait to bring in the new members and teach them the art and science of brewing.

Earlier in September, the team served some of their most recent beers at an Australasian Association for Engineering Education event here at Monash. Sharing Hella Ella (Pale Ale), a French Saison and Knox Your Sox (IPA) for the first time, the beers were a huge success with the guests. From serving the beer and working the bar to describing the beers, our team continued to develop our sensory and technical knowledge.

Recent beer brews include a Belgian style Witbier called “Oops… I did wit again”, which has mandarina bavaria hops, orange peel and coriander seeds. Currently fermenting, this beer does well in both cool and warm climates and should be a refreshing beverage for spring time. Upcoming beer brews include a Southern English Brown Ale with double the alcohol content, called “Double or Nuting”, a 6.2% ABV beer aimed to help say goodbye to the cold.

The team also joined one of their partners, Grain & Grape, at a brewing demonstration last Saturday 7th September. Chris White from Whitelabs flew in from America and the team was lucky enough to meet Chris and his staff during the event, providing a very interesting insight into the yeast scene. Meeting many home and professional brewers from all around Melbourne, the team left with free yeast in their hands and a spring in their step. Thanks again to Grain & Grape for putting on this event!

Over the next month, the BrewLab team aims to cater at a variety of Monash events, finalise its recruitment, as well as move offices to our new home. To keep updated on our movements, look us up on Facebook or Instagram to hear more!

MONASHBREWLAB
EST. 2018

We provide an opportunity for students to learn, design, and operate brewing systems in a safe environment! Our focus lies on gaining experience and developing a passionate community around beer, by inspiring other student communities for craft brewing.

We might not make the best beer (yet), but we love doing it!

WHAT ARE WE DOING?

- Developing a student-operated nano-scale brewery on campus
- Creating unique beers for the Monash community
- Enhancing the brewing skills of our team
- Entering into competitions and festivals to make ourselves known

WHY SHOULD YOU GET INVOLVED?

- Access to the best engineering students in Australia
- Opportunity for collaboration in research and innovation
- VIP invitations to our events
- Publicity through sponsorship

HOW CAN YOU HELP US?

- Mentoring
- Expertise and knowledge
- Donations (equipment and ingredients)
- Experience for students (tours, courses, training)
- Sponsorship

JOIN US FOR A COLD ONE @

MonashBrewLab

brewlab@monash.edu

MONASHBREWLAB

Faculty of Chemical Engineering
Monash University
Tel: +61 3 9905 3555

www.monashbrewlab.com

ACL INJURY 'EPIDEMIC': RESEARCH REVEALS REPETITION'S ROLE IN BREAKDOWN

When Richmond key defender Alex Rance jumped to spoil a mark in the opening game of the 2019 Australian Football League season against Carlton, he landed as he had hundreds, probably thousands, of times before.

Only this time the consequence was different. When he landed, he clutched at his right knee, which was later confirmed that he had ruptured his anterior cruciate ligament.

No one fell across him, he hadn't landed awkwardly or hyper-extended his leg, and he had no history of knee injuries. He'd just … landed.

It was the first ACL injury of the 2019 AFL season, and it was barely an hour in. Since then, more than nine AFL footballers have injured their ACL, in addition to those such as Carlton co-captain Sam Docherty, who injured their knees in preseason matches or at training.

In the women's league, the numbers are just as disturbing – Erin Phillips and Chloe Scheer in the same match, the 2019 AFLW Grand Final, No.1 draft pick Nina Morrison, Alex Williams and Brianna Moyes. All had their seasons cut short by ACL injuries.

But it isn't just happening at the elite level. According to a study published last year in the Medical Journal of Australia, the number of young Australians requiring knee reconstructions in the previous 15 years rose 70 per cent. The greatest increase was in children under 14.

Almost 200,000 ACL reconstructions were performed during the study period, while the direct hospital costs of reconstructions for a single year, 2014-15, was estimated to be $142 million.

It's a global trend, with more than two million injuries worldwide annually.

In the United States, there are approximately 200,000 ACL injuries every year, and, like Australia, it's rising among young people and professional athletes, particularly in sports such as the NBA and NFL competitions.

Investigating fatigue

In the search for answers to what's been described as a global sporting "epidemic", a group of academics from the University of Michigan in 2013 began investigating whether material fatigue, or accumulated ACL microdamage at a molecular level, rather than a single-force incident, could be to blame for ACL failure during normal athletic activity.

"What we found from the tested cadaver knees," he said, "was chemical and structural evidence of microdamage of the ACL femoral enthesis", which is where the ligament attaches to the thigh bone, and where the ACL typically tears.

The results were consistent with ACLs removed from patients undergoing ACL reconstructions.

The anterior cruciate ligament is the primary knee stabiliser, and one of the major ligaments connecting the tibia (shin bone) and femur (thigh bone) bones.

It runs diagonally deep within the knee and is composed mainly of collagen fibres that assemble in a hierarchical order to form the ligament, along with a small proportion of elastic fibres, thereby giving the ACL high tensile strength. Its function is to provide rotational knee stability.

Collagen is often described as the glue that holds our bodies together. It's the most abundant protein in the human body and, as well as our ligaments, is found in our bones, muscles, skin and tendons.

Turning to 'jello'

Using atomic-force microscopy to characterise the ACL collagen at a nanometre scale, or one billionth of a metre, Professor Banaszak Holl and his team were able to identify "a consistent unravelling of the molecular structure of the collagen" in the ACLs of the cadaver knees, effectively turning the ligament into "jello".

"This disruption of the collagen's helical assembly results in reduced tensile strength and abnormal shape of the collagen fibrils," he said.

“This damage may, at least in part, be responsible for the reduction in structural integrity that has been shown to lead to non-contact ACL failure during repetitive strenuous athletic manoeuvres.”

“So, we have all these holes that are about the size of a collagen fibre, where there’s big nanostructure damage,” Professor Banaszak said. “That’s not too surprising, because we know the collagen triple helixes are unwinding, but you can see it as a nanoscale effect.”

Professor Banaszak Holl said the results of this latest research throws into serious doubt the argument that ACL injuries are mostly caused by single-force events and a lack of neuromuscular training.

“The dominant focus here in Australia has been for neuromuscular agility training, and really it has been argued that the problem is not what we’re saying here,” Professor Banaszak Holl said.

“It’s argued that the issue is a single-force event, so we’re making quite a different argument. We’re saying that continued use has generated damage that isn’t repaired at a quick enough rate, to a point where the ligament can’t handle forces that it normally would and should.”

Succumbing younger

Dr Wojtys has been studying the issue for more than 30 years, and in that time has noticed a marked increase in younger and younger athletes and women succumbing to ACL injuries.

“Incredibly, we’re seeing that the peak age for ACL failures is 14 now for females, and in men 17,” he said, attributing the rise to children entering sporting pathways, and increased training loads, at younger ages, and the increased participation of women in sport.

“This will lead to people in their mid-20s suffering from osteoarthritis and other chronic health conditions later in life such as obesity and cardiovascular disease,” he said.

Call for change

The researchers are advocating for changes in training regimes until non-invasive techniques are developed that can determine who might be predisposed to an ACL injury because of submaximal loading cycles.

“It turns out that the kind of problem we know we’re seeing here, we know that the MRI techniques people have been using are tuned up for the wrong thing,” Professor Banaszak said.

“We’re very interested in endoscopes, and it turns out there’s a confocal endoscope made by Optiscan Imaging, which was originally a technology developed and spun out from technology developed here at Monash University, and we’re working closely with them both at Monash University and at University of Michigan to try and translate this research for initial evaluation of the knee problem and for the surgical repair process.

“The high-resolution imaging and small diameter of their endoscope gives us some unique research and potentially surgical capabilities.

“We’re also thinking now of every non-invasive way we can, and I’m sure other people will, too, once they get our data, to try and come up with ways that let us test for this damage, but non-invasively.”

Until then, Professor Ashton-Miller says, “we have to ask ourselves, is more always better”?

“Until we have more answers, it’s not worth pushing our bodies and ligaments to the extreme because of the potential long-term damage it can cause. There are limits to what the human body can do.

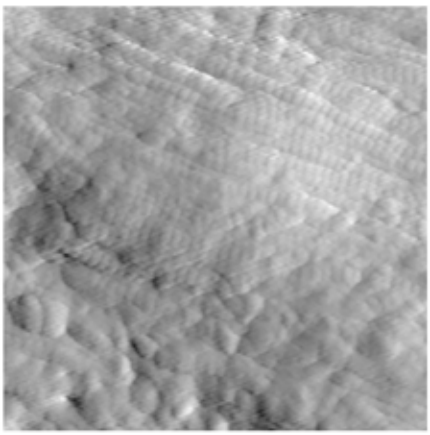
“Less practice, less repetition and less fatigue in our joints and ligaments will ultimately lead to less injuries. And this should be the main focus of sporting clubs and athletes of all ages and levels of professionalism.”

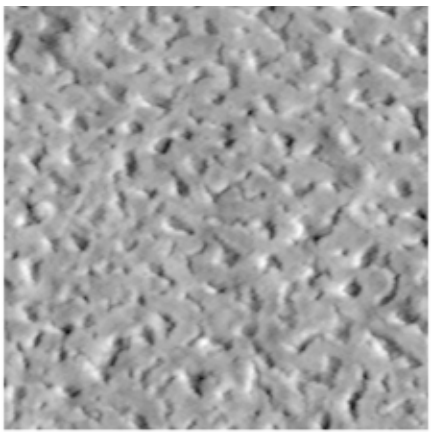
First published in Monash Lens: https://lens.monash.edu/2019/07/24/1375888/acl-injury-epidemic-dead-legs-tell-knee-tale

Right: Collagen fibrils of a healthy ACL:

“This is a nice smooth ligament, where you can actually see the collagen fibres,” Professor Banaszak said.

Far right: And here’s what a repetitive stress injury of an ACL looks like on a molecular scale





IMPROVING DIGESTIBILITY AND RELEASE CHARACTERISTICS OF FUNCTIONAL FOODS

A recent study by Department PhD student Qianyu Ye, together with supervisors Meng Wai Woo and Cordelia Selomulya, reports on the preparation of riboflavin-loaded whey protein isolate (WPI) microparticles in an attempt to develop a simple methodology by which the gastric digestibility can be improved and altered to be fit for purpose.

WPI are milk proteins that can help the delivery and digestion of nutraceuticals and functional foods that are being developed to improve health, for example, enhanced cognitive performance, gut immune function and improved anti-oxidant capabilities.

In their pure form, a great number of active components in functional foods lack bioavailability by oral administration because of poor solubility and/or permeability in the gut. Moreover, some bioactives are unstable during food processing (exposure to heat, oxygen, light) or in the gastro-intestinal tract.

In the past decades, encapsulation strategies using food-grade carriers have been proposed to protect and incorporate active ingredients into functional foods. WPI – one such carrier – is a water-soluble, cheap, safe and nutrient-dense coating material consisting of a mixture of around 60% β-lactoglobulin, 22% α-lactalbumin, 5.5% bovine serum albumin and 9.1% immunoglobulins.

The overall objective of the study was to propose a simple methodology that facilitates the tuning of spray-dried WPI microparticles in regard to gastric digestibility, release sites, and release profiles via desolvation and crosslinking. Riboflavin was selected as the core material, as the fluorescence probe to track the digestion process of WPI, and as the ligand molecule to investigate the mechanism of ligand-WPI complex.

The study found that the release characteristics and digestibility of WPI-riboflavin microparticles could be easily tuned by ethanol content and calcium ion concentration. Samples produced from 30% v/v ethanol at 1 and 2mM Ca^{2+} showed good gastric resistance and sustained intestinal release.

The coupling between desolvation and spray drying demonstrated great potential for applications in the food industry as a versatile and low-cost approach to microencapsulation with proteins for targeted release.

About Qianyu Ye

Qianyu Ye obtained her Bachelor in Chemistry at Lanzhou University in 2011 and Master in Chemistry with distinction at the University of Melbourne (2016). She started her PhD study at Monash University in May 2017, under the supervision of Prof Cordelia Selomulya. Her work focuses on encapsulation strategy for improved bioavailability and targeted release of functional food ingredients.

Citation: Qianyu Ye, Meng Wai Woo, Cordelia Selomulya. Modification of molecular conformation of spray-dried whey protein microparticles improving digestibility and release characteristics. Food Chemistry 280 (2019) 255–261

pH EFFECT ON PROCESSED CHEESE MANUFACTURED WITH VARIOUS STARCHES

Recently graduated PhD student Grace Talbot Walsh, along with her colleagues at the Food and Dairy GRIP, has published work on the impact of pH on processed cheese. The overall objective of the study was to determine whether manipulating the pH could reduce the negative sensory characteristics associated with high starch cheeses, which can be manufactured at a reduced cost.

Processed cheese (PC) is a stable, homogenous cheese product made from the heating and shearing of natural cheese and fat in the presence of emulsifying salts. Many processed cheeses are shelf stable and do not require refrigeration, allowing for extended shelf life and reduced transportation needs when compared with natural cheese.

In recent years, much work has been dedicated to developing processed cheese with increased health benefits, with many reduced fat and reduced sodium cheeses currently available on the market. Despite these products already being commercially available, processed cheese is still perceived by many as an 'unhealthy' alternative to natural cheese, with sales of processed cheese further declining with the decreasing cost of natural cheese.

As price is still a limiting factor in food consumption, cost reduction of processed cheese by reducing manufacturing costs may aid in increasing sales of this product. Although the cost of natural cheese is slowly declining, it is still one of the most expensive raw ingredients in PC manufacture.

However, reducing natural cheese during PC has a negative affect on the body texture and taste of the cheese. Although modified starches have been reportedly used for high level incorporation into processed cheese without negatively affecting product texture, non-modified natural starches are preferred in industry due to their reduced cost. However, the inclusion of non-modified starches is currently limited to relatively low concentrations as starch use of 4% and over known to negatively affect product hardness and meltability

In these experiments, processed cheeses containing 5% w/w potato, waxy maize or corn starch were manufactured in the pH range 4.5–6 to investigate the effect of pH on the physical and microstructural characteristics of high-starch processed cheese. Their work demonstrated that increasing cheese pH during manufacture can reduce the negative physical characteristics associated with high starch processed cheese and may provide industry with a cost-effective method to increase the sensory acceptance of such products.

Decreasing cheese pH to 4.8 also led to high acceptability in terms of texture and firmness, however the low pH negatively affected sensory analysis with consumers reporting 'acidic' and 'sour' tastes. Increasing cheese pH to 6 also lead to starch matrix breakdown and was scored higher than the control cheese in terms of overall liking, flavour and texture.

The work presented in this paper shows that increasing the pH of a high starch processed cheese increases starch distribution in the cheese matrix and overall consumer satisfaction, and may allow industry to incorporate higher concentrations of starch in a processed cheese product whilst retaining high sensory and physical characteristic acceptability.

Citation Grace Talbot-Walsh, David Kannar, Cordelia Selomulya. pH effect on the physico-chemical, microstructural and sensorial properties of processed cheese manufactured with various starches. LWT - Food Science and Technology 111 (2019) 414–422

ATHENA SWAN INITIATIVE

To be truly excellent we need to embrace diversity – in all its forms – and make it part of the fabric of who we are.

The Athena SWAN Charter was established in the UK in 2005 to encourage and recognize commitment to advancing gender equality in science, technology, engineering, maths and medicine (STEMM) fields. The program provides a standardized methodological framework for collecting data and identifying gaps and opportunities in gender equity processes, along with workshops to support successful accreditation, constructive feedback and support from gender equity experts.

Athena SWAN's international reputation for achieving tangible outcomes has led its expansion to Ireland, Australia (SAGE Pilot), the United States of America (Pilot SEA Change) and Canada (Dimensions).

The Science in Australian Gender Equity (SAGE) Pilot of Athena SWAN was introduced in Australia in 2015. A total of 45 organisations (Universities, Medical Research Institutes and Publicly Funded Research Organisations) joined the SAGE Pilot, forming three cohorts with staggered application timeframes for Athena SWAN accreditation.

All participating members are committing to undertake a thorough self-assessment process of institutional gender equity policies, programs, practices and data in order to develop a robust, measurable action plan to address the identified gaps and opportunities. By being part of Athena SWAN, institutions are adopting 10 key principles within their policies, practices, action plans and culture.

We signed up to Athena SWAN principles in 2015. Our participation in this program aligns closely with our strategic goals to be excellent and inclusive as articulated in Focus Monash, the University's 2015-2020 strategic plan. Underpinning strategies are to attract and retain successful academic women in STEMM disciplines, and to further promote an inclusive workplace culture for people irrespective of their gender, cultural background, sexuality, disability, ethnicity or religion.

Monash has made demonstrable improvements in gender equity, but change isn't happening fast enough, particularly in science, technology, engineering, mathematics and medicine (STEMM). As SAGE states, "Women comprise more than half of science PhD graduates and early career researchers, but just 17% of senior academics in Australian universities and research institutes. The loss of so many women scientists is a significant waste of expertise, talent and investment, and this impacts our nation's scientific productivity."

Our journey

Following a two year mandatory self-assessment period, we submitted our inaugural application for Athena SWAN Bronze Award as part of Cohort 1 in March 2018. We are proud to be one of the 15 inaugural winners of the Athena SWAN Bronze Award in Australia, announced in December 2018.

In developing our submission for this award, the Monash Athena SWAN Committee, in collaboration with STEMM academics, action teams and other staff embarked on a reflective analysis of our staff profile, policies, procedures, practices and cultures. This culminated in the development of a comprehensive four-year action plan to drive the advancement of women and diversity in STEMM.

Department of Chemical Engineering Athena Swan Committee:

Ailsa Azizah, Rabi Golmohammadzadeh, Mark Banaszak Holl, Laura-lee Innes, Miriam Issac, Maria Arteaga Jaime, Kajal Khodaskar, Laura McManus, Akshat Tanksale, Jing Zhang

FUTURE WOMEN LEADERS CONFERENCE

Applications are now open for Future Women Leaders Conference featuring Prof Rose Amal (UNSW) as plenary speaker and Dr Robert Mun (ARC) as keynote speaker. The full program and criteria for applicants can be found in the link below. The program is suitable for ECR (recent PhD graduates, postdocs, level A-C) in Engineering and IT. For the first time, selected participants will have their registration costs and accommodation (if travelling from outside Melbourne) fully covered.

Date: 18-19 November 2019
Venue: Monash University, Clayton, Melbourne VIC

The Future Women Leaders Conference is a unique event specially designed to support women in engineering and IT to progress their academic careers.

The two day conference co-hosted by Monash University, the University of Melbourne and UNSW will gather early career academics in engineering and IT from around Australia. The conference will be chaired by Prof Cordelia Selomulya and Dr Pierre Le Bodic (Monash), Prof Ana Deletic (UNSW), and Prof Elaine Wong (University of Melbourne), and will feature a range of exciting speakers, including Prof Rose Amal (UNSW), Prof Karen Hapgood (Deakin University), Prof Robert Mun (ARC) and others.

Attendees will attend skill development workshops, learn strategies to deal with the specific challenges facing women in engineering and IT, and network with their peers.

The Future Women Leaders Conference is a unique event specially designed to support women in engineering and IT to progress their academic careers.

Details here

https://www.monash.edu/engineering/future-women-leaders-conference

ALUMNA ANNOUNCED AS TASMANIA'S YOUNG PROFESSIONAL ENGINEER OF THE YEAR

Congratulations to department Alumna Phoebe Nash, who has been announced as Tasmania's 2019 Young Professional Engineer of the Year.

The Engineer of the Year Awards identify and reward outstanding achievement in the practice of engineering and service to the profession. Recipients of these awards are recognised for their substantial contribution to the engineering profession, and their ability to innovate and inspire in their fields.

Phoebe is currently an engineer at Stornoway, a Tasmanian based company specialising in, among other things, water and waste water treatment design and operation.

Since commencing at the company two years ago, Phoebe's key project has been the TasWater 5 Towns Regional Towns Water Supply Project. This challenging project has involved designing, constructing and commissioning four brand new water treatment plants in five regional townships in Tasmania, which had not formerly had potable drinking water available to them, in an extremely short timeframe of a year.

During this time Phoebe was also involved in designing and delivering a seawater ozone treatment system for CSIRO's Bribie Island Research Centre (in QLD) to keep their prawns free of white spot disease. Ozone disinfection treatment is a novel way to treat white spot disease which is a significant threat to the Australian prawn industry.

Phoebe enjoys the cross disciplinary nature of her role. Due to the small size of the company and the type of projects that are taken on, Phoebe can take the design through to implementation.

"On any given day my role involves designing the process for a new water or waste water treatment plant, looking at ways to improve the quality and efficiency of an existing plant, providing advice to our operating staff for the plants we maintain or tendering and quoting to win new work". Phoebe said.

In addition to her busy work schedule, Phoebe is also a guest tutor for the first year engineering students at the University of Tasmania for the Engineers without Borders Challenge.

"This has been a great way to share some practical industry experiences with engineering students and also to learn about humanitarian engineering practices – particularly around understanding the needs of the community in question prior to coming up with solutions.", Phoebe said.

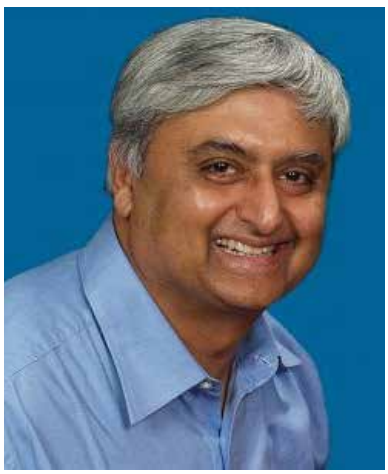
WORLD FIRST LASER INCUBATOR FOR BLOOD

Researchers in the blood diagnostics group at BioPRIA, together with their industry partner Haemokinesis, have developed the world's first blood incubator based on laser technology. According to study results published in Scientific Reports (https://www.nature.com/articles/s41598-019-47646-y) this work could bring pre-transfusion testing out of the pathology lab to point-of-care, with reduced time to treatment and the potential to save the lives of bleeding-out patients.

Safe blood transfusion requires compatibility testing of donor and recipient to prevent potentially fatal transfusion reactions. Detection of immunoglobulin G (IgG) antibodies requires incubation at 37 °C, often for up to 15 minutes. Current incubation technology predominantly relies on slow thermal-gradient dependent conduction. To address this problem, a team of scientists from BioPRIA developed laser incubation, where targeted illumination of a blood-antibody sample in a diagnostic gel card is converted into heat, via photothermal absorption. The laser-incubator heats the 75 µL blood-antibody sample to 37 °C in under 30 seconds. They show that red blood cells act as photothermal agents under near-infrared laser incubation, triggering rapid antigen-antibody binding. Further, no significant damage to the cells or antibodies for laser incubations of up to fifteen minutes is detected. Laser-incubated immunohaematological testing is demonstrated to be both faster and more sensitive than current best practice — with clearly positive results seen from laser incubations of just 40 seconds.

**This research was supported by the Australian Research Council Linkage Project LP110200973 and Haemokinesis Pty Ltd.*

PROFESSOR RAVI PRAKASH JAGADEESHAN ELECTED TO FELLOW OF THE SOCIETY OF RHEOLOGY



Congratulations to Professor Ravi Prakash Jagadeeshan on his election to fellow of the Society of Rheology. He will be awarded the Fellowship at the SOR meeting, 20-24th October 2019 in Raleigh, USA

Professor Ravi Prakash Jagadeeshan leads the Molecular Rheology group at Monash University. He is well known for his work on multiscale modelling and computer simulations of macromolecules to investigate their microstructural dynamics and relate them to rheological properties of polymer solutions. He obtained his PhD (on granular flows) in 1989 from the Indian Institute of Science, Bangalore.

After postdoctoral research with Sir Sam Edwards (Cavendish Lab., Cambridge) and with Prof Hans Christian Oettinger (ETH), and brief stints at the (Indian) National Chemical Laboratories, Pune and the Indian Institute of Technology, Madras, he joined the Department of Chemical Engineering at Monash University in 2000. He was an Alexander von Humboldt Fellow at the University of Kaiserslautern in 1999-2000 and has held several visiting appointments at University of Warwick, Caltech, Stanford University, MIT, Rice University, ANU and at the Max Planck Institute for Polymer Research at Mainz. He was the President of the Australian Society of Rheology from 2006 to 2008, and has been the joint editor of the Korea-Australia Rheology Journal since 2008.

MONASH CHEM ENG ACTIVE

CHEM ENG TAKES ON PARKRUN!

It's official! Chem Eng is now taking over parkrun. Parkrun organises free, weekly, 5km timed runs around the world (even in Malaysia). They are open to everyone, free, and are safe and easy to take part in. These events take place in pleasant parkland surroundings and we encourage people of every ability to take part; from walkers or those taking their first steps in running to Olympians; from juniors to those with more experience; we welcome you all.

You need to register and bring your printed barcode on the day.

Go to https://www.parkrun.com.au/ to register Hope to see you there (no pressure as usual - but here is some photos for inspiration).

AROUND THE BAY FOR A GOOD CAUSE

Akshat with his wife (Sonika Tyagi (Sonika is a senior lecturer in the School of Biological Sciences at Monash) and his children Charvi Tanksale (elder) and Paravi Tanksale

Again this year, his second year in a row Associate Professor Akshat Tanksale rode 250 km in the Around the Bay. This was one of his biggest rides. But this year, his family is also joined me on the ride to cover a total distance of 310 km. The ride was his kids longest ride by a great distance!

Akshat's family rode in the Around the Bay to raise funds for disadvantaged children who cannot afford to go to school (1 in 6 Australian kids). He would like to thank everyone who donated. The support provides these children books, bags, school supplies, study help and an opportunity to break the cycle of disadvantage.

You can still show your support for Akshat Tanksale by making a donation today

https://www.aroundthebayfundraising.com.au/fundraisers/akshattanksale

MONASH 10,000 STEPS CHALLENGE!

The Department of Chemical Engineering is getting ready for the Monash 10,000 Steps Challenge! We have our first team up and running with Kim Phu (Team Leader), Tracy Groves, Ruiping Zou, Trina Olcorn and Jenny Chen forming the "Well Being Team" We are keen to see other staff and student teams of the Department get their registrations in www.monash.edu/wellbeing This year's challenge is FREE to all participants and we're also moving towards a more sustainable solution. After years of providing single use plastic pedometers, Monash University is asking participants to use a previously provided pedometer, download the app or purchase a discounted Fitbit or Garmin product. The only question remaining is - who within the Department will be top dog? Not that we are competitive at all!

BUILDING A SOLAR CELL TESTER

PhD student Adam Surmiak is driven by the challenges posed by a new and sustainable energy future.

At the laboratory of Professor Udo Bach (part of the Centre of Excellence in Exciton Science), Adam has built a novel solar cell testing setup that enables parallel, real-time and comprehensive measurements of up to 16 solar cells in precisely controlled conditions.

To tackle pollution and energy security at a global scale, researchers of Professor Udo Bach's laboratory investigate sustainable, cleaner, more efficient and perhaps most importantly, cheaper alternatives to state-of-the-art silicon solar panels. The potential of the commonly known group of materials which may achieve this – the perovskites, first discovered in the 19 century - has only been realised in the last 10 years when the first application as an active material generating power from sunlight took place.

Since this initial breakthrough, perovskite solar cells (PSCs) have achieved significant power conversion efficiency that can compete with commercially available solar cells. A number of factors can determine PSC performance, including compositions, thicknesses and fabrication method. The spectrum of potentially promising perovskite-based combinations is enormous, but premature degradation limits commercialisation. A world record efficiency of PSC (24.2% as per 2019) needs to be stabilised to become a commercially available product. Research over the last decade has focussed on fabricating improved and more stable perovskite solar cells by testing thousands of compositions, architectures and designs. But currently these tests are cumbersome and time consuming.

Adam's research into the characterisation of PSCs will enable fast, reliable and reproducible tests of perovskite cells in a laboratory scale, delivering structured data for post-processing. The versatility of this new system allows users to design their own measurement protocols, as in the perovskite world - one protocol does not suit all and a small electrical or conditional change can ruin laboratory trials in seconds, potentially discouraging or misleading researchers.

This specialised piece of equipment can screen more compositions and potentially narrow down the search and contribute towards commercialisation of that new technology.

Looking ahead, Adam acknowledges that faster characterisation is one thing, but part of his PhD project is also aimed at speeding up the production of promising perovskite solar cells. In affiliation with the CSIRO he is working on another novel technique that combines fabrication and characterisation of the PSC. He hopes that by joining forces with the best researchers from CSIRO at Clayton, he will be able to prove that Australia can become a world leader in third Generation Solar Cell manufacturing.

About Adam Surmiak

Adam graduated in 2014 from Wroclaw University of Science and Technology in Wroclaw, Poland with a Bachelor of Engineering Degree in Electronics and Telecommunications and a Master of Engineering in Mechanics and Machine Build (Sensors). He was awarded a Postgraduate Research Award at the University Nebraska-Lincoln in the United States where he spent 12 months. Following a year in the UK as a Project Engineer, Adam came to Australia to work as an Interactive Developer before joining Monash to commence his PhD.

Adam is passionate about renewable energy sources and zero-carbon policies, in particular the transition of technology from laboratories to large scale production. His vision is to create cheaper and more efficient solar cell materials. As part of his PhD, he is developing a high-throughput methodology for solar cell material discovery. Adam is part of Centre of Excellence in Exciton Science, and a research affiliate with CSIRO. He is an active member of the Chemical Engineering Postgraduate Association (CEPA).

About the Centre of Excellence in Exciton Science

The Centre of Excellence in Exciton Science, led by Professor Udo Bach, is funded by the Australian Research Council to bring together researchers and industry to discover new ways to source and use energy. The Centre is a collaboration between Australian universities and international partners to research better ways to manipulate the way light energy is absorbed, transported and transformed in advanced molecular materials.

It works with industry partners to find innovative solutions for renewable energy in: solar energy conversion, energy-efficient lighting and displays, security labelling, and optical sensor platforms for defence.

OLGA PROSKURINA HAS BEEN AWARDED A MONASH SCHOLARSHIP TO STUDY A RESEARCH PROJECT UNDER MONASH'S NEW IITB-MONASH JOINT PHD

Olga Proskurina is the first student for the Department of Chemical Engineering to join the newly established Reverse IITB-Monash Research Academy program. Olga is looking forward to starting her exciting research journey to gain her PhD on the research topic on composite polymer coatings impregnated with platelets of graphene oxide and its derivatives for improving corrosion resistance to polymer coatings.

Olga says "I decided to undertake a PhD degree by research because I've always had a passion for digging deeper and finding answers of fundamental mechanistic. The happiest moments in life for me are the ones I get from the feelings of understanding why things happen the way they do. Corrosion of metal is such a common yet complicated process at the same time."

"I'm looking forward to undertaking my research project with my Monash University supervisor Professor Raman Singh and my IITB supervisor Professor M.J.N.V. Prasad. Both of these supervisors will give me an opportunity to satisfy my thirst for knowledge and understanding in the area of Metallurgical Engineering and Materials Science."

Her PhD program at Monash University will give Olga the opportunity to study for a year at IITB in her second year in the lab of Professor M.J.N.V. Prasad.

As a PhD student, Olga hopes that she will be able to broaden the human understanding of world, and contribute to giving this world a much better and happier future.

About the IITB-Monash joint PhD

Indian Institute of Technology Bombay (IITB) and Monash University joint PhD award program supports four new enrolments each year in the faculties of Engineering and Science.

For this joint PhD, the students' home campus will be at Monash University in Australia. Students will be required to undertake no less than 12 months (post confirmation, i.e. after their first 12 months of enrolment) at IITB in India.

Students completed all relevant elements of the Monash Doctoral Program. This may include coursework, training, academic progression milestones and examination processes.

Upon successful completion of this program, students will graduate with a joint PhD award from both IITB and Monash, receiving a dual-badged testamur. Information on closing dates for the 2020 intake will be provided shortly.

https://www.monash.edu/graduate-research/future-students/research-degrees/monash-iitb-joint-phd

Prof. M.J.N.V. Prasad

Professor Prasad's is based at the Indian Institute of Technology Bombay. His research focusses nanocrystalline, amorphous, metal matrix composites and implant materials, mechanical behaviour of materials including indentation, fatigue, creep and superplasticity, electrodeposition and alloy development, and oxidation and protective coatings

He has received numerous awards including Excellence in Teaching 2015, INAE-Young Engineer 2013 award from the Indian National Academy of Engineering, New Delhi, and best Ph.D thesis 2010 in Materials Engineering with a Prof. K P Abraham medal and a cash prize from IISc, Bangalore.

Professor Raman Singh

Professor Raman Singh's primary research interests are in the relationship of Nano-/microstructure and environment-assisted degradation and fracture of metallic and composite materials, and nanotechnology for advanced mitigation of such degradations. He has also worked extensively on the use of advanced materials (e.g., graphene) for corrosion mitigation, and stress corrosion cracking, and corrosion and corrosion-mitigation of magnesium alloys (including for the use of magnesium alloys for aerospace, defence and bioimplant applications).

Prof Singh's professional distinctions and recognitions include: editor of a unique book on non-destructive evaluation (NDE) of corrosion. He has over 220 peer-reviewed international journal publications, 15 book chapters/books and over 100 reviewed conference publications,

CONGRATULATIONS TO THE 2019 CHEM ENG PRIZE WINNERS

TOM SHEMBREY - JENKINS FAMILY 'FOLLOW YOUR DREAM' BURSARY

Tom Shembrey is currently in his 4th year (of 5) of a Biomedical Science/Chemical Engineering double degree, a degree he chose as he wasn't sure whether to study medicine (like the rest of my family) or cut out my own path as an engineer. After a year of studying both degrees, his attraction to engineering closed the door on life as a doctor, however Tom decided to continue to study biomedical science to stay connected to future opportunities in bioengineering. Last summer Tom interned at a fertiliser plant with Incitec Pivot in Geelong, and he would love to follow their graduate program to Phosphate Hill near Mount Isa when after university. In the meantime, Tom has applied to work as a chemical lab assistant in Karlsruhe, Germany next year and is currently anxiously awaiting news. Tom has just finished up his 4th season with Monash Blues Football Club and is now am sinking his teeth into study again before exams.

David Jenkins (BE – Chemical Engineering 1970) was raised in a family who valued education. Both of David's parents grew up during the Great Depression where many parts of Australian society experienced various hardships, challenges and missed opportunities. When his father passed away David decided to donate the proceeds from his estate to the Faculty of Engineering at Monash in the form of an annual scholarship. David says that he made this decision "To recognise the education opportunities that my parents did not have and to benefit others in the same circumstances".

CARSON YUAN - THE YONG CHER BIAU MEMORIAL AWARD

Carson Yuan is a 6th-year student who is finishing a Bachelor of Pharmaceutical Science and Bachelor of Engineering (Honours). He is also one of the founders of Monash BrewLab and now the External Operation Deputy. Being drawn by the intricacy of chemical engineering and the advancing technologies in the industry, Carson partook in various vacation research projects and solved a range of problems through the integration of coding and modelling. As the year is comes to a close, Carson is looking into industrial projects on prototype development and commercialisation, especially in the water and pharmaceutical industry.

The Yong Cher Biau Memorial Award is awarded annually to the student achieving the highest overall marks in the 3rd year of the Bachelor of Chemical Engineering degree and gifts prize money to the recipient.

CHOON HOONG CHOE - THE OWEN POTTER AWARD

Choon Hoong Choe is a Monash University graduate (Bachelor of Chemical Engineering, 2018) and is currently working as a process and mechanical engineer in the water industry. His work revolves around both office and site work. In the office he executes costing, design and development, drafting, documentation and procurement; much of which reflects academic tasks with a greater emphasis on cost. Choon also finds the technical engineering skills learnt at university very useful - the fundamentals, be it brief and simple or complex and detailed. Choon believes academia is a great steppingstone to industry. On site, he plans and manages delivery, installation, testing and commission of water treatment plants. Site work is more practical; emphasis on detail is greater, i.e. methods, limitations and constraints. When given the option for office or site work, Choon chose both as he wanted to understand both aspects of the business.

The Owen Potter Award is awarded for Chemical Engineering Excellence. It is awarded annually to the top graduate of the Bachelor of Chemical Engineering degree and gifts prize money and a commemorative medal to the recipient.

UPDATE FROM THE ACJRC IN FUTURE DAIRY MANUFACTURING

ACJRC Dairy Workshop | Future Dairy Manufacturing

Recently, the ACJRC held the 3rd Dairy workshop featuring the future dairy manufacturing. Among the 42 participants, 22 of them were representatives from the Bega, Saputo/Devondale, Fonterra Australia and Burra Foods. Some of the industry partners attended the dairy workshop for three years in a row! This year's "Future Dairy Manufacturing" covered the exciting topics, including the use of high-pressure processing (HPP) in dairy manufacturing, the biotechnological transformations used for tailoring dairy ingredients, and milk and milk-like systems as a new formulation approach for drug delivery.

Unlike the previous workshops that only focused on the lectures, the attendees had an opportunity to understand the capability and impacts of Monash's Food and Dairy research via lab visits and discussions. With great interest, the industry partners visited ACJRC pilot-scale lab where the spray dryer, homogeniser, and the newly-established BrewLab team were located, and the membrane lab led by Prof. Xiwang Zhang.

In addition, a discussion led by Prof Cordelia Selomulya on the future engagements between the dairy industry and education partner was held to understand the needs and expectations from dairy industry.

Thank you to all speakers – Prof Hilton Deeth (UQ), A/Prof Federico Harte (Pennsylvania State University, US) and Prof Ben Boyd (Monash) for the wonderful lectures.

BEGA INTERNSHIP FOR FINAL YEAR STUDENT

Final year Chemical Engineering student Fahad Mubashshir spent last summer as an intern at Bega Cheese, and was fortunate enough to follow that up as a Product Development Graduate during June-July.

During the 12 week internship, Fahad was part of a multidisciplinary team developing the infrastructure for Bega's loss monitoring system to identify challenges faced by the dairy sites.

Fahad was also able to gain laboratory experience during his time at Bega, as he conducted experiments relevant to checking reliability of data sources in the system. Some of his activities included standardising the testing procedure through creating best practice SOPs, automation of the manual data collection for the Loss Monitoring System, Implementation data visualisation tool to analyse data and provide new insights, and revisiting the testing practices relevant for loss monitoring and reducing lab testing costs by 50%

During Fahad's time as a Product Development Graduate role he worked on a new method of producing enzyme modified cheese (EMC) and the design of cooling bath for analogue mozzarella cheese blocks. EMC process design included designing the process line, replicating the process in process flow diagrams, sizing equipment and working on formulation of EMC recipe. Moreover, it entailed mechanical design of equipment for the EMC line and analysing plant footprint according to the sized equipment.

Fahad's time at Bega has given him a clearer idea of the opportunities open to Chemical Engineers.

"My experience at Bega made me realise the role of chemical engineers in food industry and how it can be quite sophisticated in terms of technicality. The best part about working for Bega is that the business is evolving towards innovative solutions for producing Fast Moving Consumer Goods (FMCG) everyday", he said

Fahad found the most challenging aspect as an intern was gathering information efficiently. As opposed to university assignments, where all the information required could be collected from the lecturer, the Bega work assignments involved contacting several departments to obtain the information I needed to complete my project at Bega. It is important to understand the business structure well from the start to find the right people when looking data or information.

"My internship project involved a steep learning curve and I had the opportunity to learn more about data analysis and interpretation. It complemented my knowledge from university quite well as I was able to relate the physical process performances with millions of data through data visualisation. I believe, expanding my skill set in sectors made me more competent as an engineer", Fahad said.

"My experiences in these development projects were slightly different than what I had in mind for "real-life engineering". It made me realise that chemical engineering work is not only limited to process design. A process engineer has the opportunity to revolutionise the manufacturing process and the business."

Platinum seminar

Space Food System Challenges and Integrative Solutions for Long-duration Exploration Missions

Event Description

Seminar Abstract

The space food system is central to crew health and performance, but there are numerous challenges to provisioning an adequate system within the limited resources available on long-duration exploration missions. Shelf life studies have shown that the processed, shelf-stable foods used on the International Space Station (ISS) will only retain acceptable nutrition and quality for one to three years under ambient storage conditions. On a Mars mission the food may be prepositioned prior to crew launch, with no resupply, and possibly with no refrigeration, requiring stability for at least five years. Due to mass, volume, and other logistical constraints, the food for a multi-year Mars mission may be more limited in variety and choice than it currently is on 6-month ISS missions. Unacceptable food, either due to menu fatigue from limited choice or due to nutritional or quality degradation, may lead to under-consumption, body mass loss, muscle loss, and eventually nutritional deficiencies that may affect physical and behavioural health and performance. Technologies that provide a food system with adequate nutrition, acceptability, variety, and safety for long-duration missions are a critical need to support the success of human space exploration. Studies addressing formulation, processing, packaging, and storage strategies may help increase shelf life and/or reduce mass and volume. Alternative provisioning strategies, such as inclusion of bioregenerative salad crops grown during a mission, are challenged by resource constraints, and food safety and reliability concerns, but offer potential nutrition and variety solutions. Technologies that support personalized nutrition may enhance individual health. Studies addressing food system improvements and health outcomes could lead to the design of more efficient, targeted dietary interventions. Results from these studies will help to determine an optimal food system strategy and will identify areas where additional research is required to improve shelf life or food system composition.

Speaker

Dr Grace Douglas, NASA Johnson Space Centre, Houston, United States

Dr. Grace Douglas serves as the lead scientist for NASA's Advanced Food Technology research effort, which focuses on determining methods, technologies, and requirements for developing a safe, nutritious, and palatable food system that will promote astronaut health during long-duration space missions. Her responsibilities include assessing the risk of an inadequate food system to crew based on vehicle design and mission concept and developing the research path that will ensure the food system meets crew health requirements on spaceflight vehicles. She earned a B.S. and M.S. in food science from the Pennsylvania State University and North Carolina State University, respectively, and a Ph.D. in functional genomics from North Carolina State University.

Date: Thursday 26 September 2019

Time: 4 pm - 5 pm

Venue: Lecture Theatre E7, Building 72
14 Alliance Lane
Clayton, Vic 3800 Australia

Registration link

https://www.eventbrite.com.au/e/platinum-seminar-dr-grace-douglas-nasa-johnson-space-center-tickets-55940756308

FOR ALL ENQUIRES, PLEASE CONTACT

Dr Lin Lin
Department of Chemical Engineering
Australia-China Joint Research Centre in Future Dairy Manufacturing

T: +61 3 9905 4682
M: +61 420 464 830
E: ruohui.lin@monash.edu

2019 DEANS AWARD FOR EXCELLENCE IN RESEARCH BY A RESEARCH FELLOW

Dr Zhang's research impact, in the field of smart, chemically active membrane technology, has been recognised with a Dean's award for excellence in research.

Her work steps beyond traditional passive membranes, designed purely on the basis of pore structure, to include active chemical interactions, ion control, and sophisticated three dimensional design.

It was noted that Dr Zhang's work is particularly sophisticated in both design and scope, coupling to important material strategies including aptamers and metal organic frameworks (MOFs) as well as taking advantage of well-known, but little utilized, physical phenomena such as periodically oscillating chemical reactions.

This work is internationally recognized for its excellence and creativity and has resulted in many publications in the top journals in the field including *Sci. Adv. , J. Am. Chem. Soc., Adv. Mater., Angew. Chem., Nano Today, ACS Nano*, and *Adv. Funct. Mater*. This work is critical for developing advanced, next generation solutions for important applications including water desalination and biological ion sensing and thus has an impact across multiple fields.

Dr Zhang's research cuts across the boundaries of nanotechnology, materials science, chemistry, biomedical engineering, and chemical engineering. The research is exceptionally creative fundamental science with direct ties to impactful, translatable engineering.

PHD ALUMNUS HEADING TO COPENHAGEN

Congratulations to Dr Cameron Hunt, who has been accepted into a Postdoctoral program in Denmark.

Cameron Hunt has accepted a position as at DTU in Copenhagen - the H C Oersted COFUND Postdoc program

The programme is named after Hans Christian Ørsted, discoverer of electromagnetism and founder of the University and achieves the goals of Marie Skłodowska-Curie COFUND by increasing the European-wide mobility possibilities for training and career development of experienced researchers. The programme enables experienced researchers from all over the world to carry out curiosity-driven, bottom-up research projects within all branches of engineering science at DTU.

PODCAST NEWS

Professor Cordelia Selomulya was recently invited as a guest on episode 11 of the FT Next podcast series.

Episode 11: Leveraging your network: How collaboration is key to solving the challenges of tomorrow

Collaboration is becoming more essential to solve the challenges that are facing our industry. This episode, organized by the IFT Sensory & Consumer Sciences Division, features two seasoned professionals and longtime members of IFT. They share their experiences while working in interdisciplinary teams, discuss hurdles and hopes for the future, and talk about the role of IFT to encourage and facilitate collaboration.

LISTEN HERE

PHD STUDENT VISITING PENNSYLVANIA STATE UNIVERSITY

PhD student Swarit Dwivedi joined A/Prof Akshat Tanksale's group at the beginning of 2017 under a Co-Funded Monash Graduate Scholarship and Faculty of Engineering International Post-graduate Research Scholarship.

Swarit is currently spending six weeks in the USA at Pennsylvania State University to develop a reaction forcefield for Zr-based Metal Organic Frameworks (MOF). During his visit, he will be hosted by Professor Adri van Duin's research group.

Swarit's visit has been made possible through his project led by Professor Alan L. Chaffee from the School of Chemistry at Monash University. Professor Chaffee has a project funded by a Monash-Penn state collaboration related to the investigation of CO_2 conversion into many valuable products. Converting CO_2 into fuel and other valuable product will thus complete the carbon dioxide cycle and will eventually lead us towards a sustainable future.

Professor Adri van Duin is the inventor and main developer of the ReaxFF reactive force field method - enabling large-scale (>100,000 atoms) fully reactive, nanosecond-scale molecular dynamics simulations on complex materials. ReaxFF currently describes a large section of the periodic table. Applications include combustion, catalysis, material failure, surface chemistry.

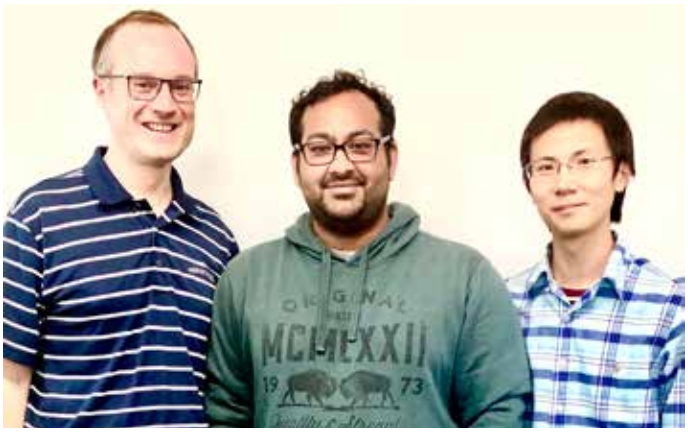
While at the university, Swarit has also been invited to present his work to Prof. John Mauro's research group. John Mauro worked in Corning as a senior research manager of the Glass Research Department and is the co-inventor of Corning Gorilla® Glass products. The team has built a collaboration with Prof. Mauro's research group to study the mechanical properties of MOFs.

Following his PhD, Swarit hopes to continue his research and apply his knowledge to communicating science and teaching.

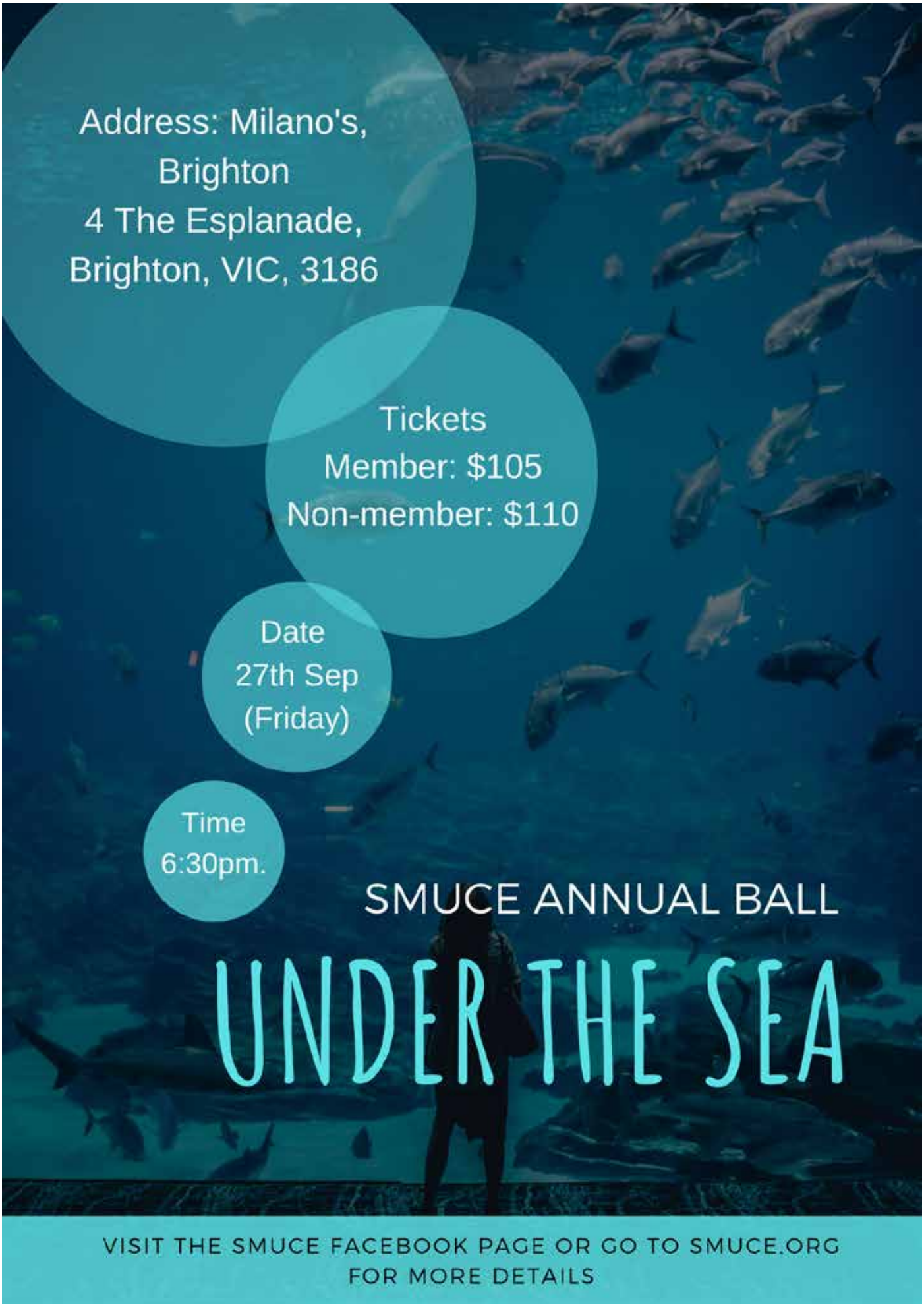
"After my PhD, I would love to stay the academic field as a researcher, a science communicator, and a teacher, and I hope to either start or be part of a scientific/technological organization that directly impacts society", he said

Swarit has taken the opportunity to visit Philadelphia and attend a football game. PennState University's main campus and state college is a small city where things revolve around PennState University. Beaver Stadium (part of the campus) is the third biggest stadium in the world with a capacity of 106,572 people.

Swarit will be presenting his work in APATCC-2019, Sydney this October.



Clockwise from top left:
With Prof. John Mauro(left) and Dr. Yongjian Yang (right) at PennState Materials Science & Engineering Dept;
With Prof. Adri van Duin (left) and Dr. Yun Kyung Shin (right) at the Research East building of PennState University;
Swarit has taken the opportunity to experience some local highlights, including a football match at Beaver Stadium.


Address: Milano's,
Brighton
4 The Esplanade,
Brighton, VIC, 3186
Tickets
Member: $105
Non-member: $110
Date
27th Sep
(Friday)
Time
6:30pm.
SMUCE ANNUAL BALL
UNDER THE SEA
VISIT THE SMUCE FACEBOOK PAGE OR GO TO SMUCE.ORG
FOR MORE DETAILS

CSU GRADATION - A BROAD MIND WILL TAKE YOU FURTHER

Getting into university is awesome. And graduating from uni – well that's the ultimate! It's a time to enjoy the here and now, but our graduates are always looking ahead – and thinking about the possibilities the future may bring.

Under the Central South University and Monash University 2+2 Engineering Program, students will study in China for the first two years. After meeting the English language and academic requirements as well as the Australian visa requirement, the students can transfer to Monash for the third and fourth years of study. On successful completion of the program, students will gain both CSU and Monash University Bachelor of Engineering degrees. The students for the first 2+2 class in materials science and engineering were selected in 2005, and we developed classes for civil engineering, mechanical engineering, chemical engineering and transportation after that. We have enrolled 838 students during the past years and 432 students have completed their first part of studies at CSU and went to or are going to Monash University to continue the further studies. To date, 252 students have graduated from both our universities.

Monash Engineering recently congratulated students from partner university Central South University (CSU) on completing their 2+2 Bachelor of Engineering degrees at Monash University.

Fei Fei Zhang and Jie Zhao received their PhD testamurs. Rui Mao, Meng Yuan Liu, Yi Jie Wang, Yi Rong Xu, Jie Zhao and Zi Chao Huo received their MAE testamurs all in the field of chemical engineering at the August 2019 ceremony.

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/SocietyOf-MonashUniversityChemicalEngineers/)

PhD Scholarship in Chemical Engineering

The Opportunity

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

PhD Project – Implantable biosensors for real-time and continuous monitoring of disease

A full scholarship is available for a PhD student to conduct research on development of a new class of biochemical sensors to detect and quantify disease-related protein biomarkers in animal models of disease. The research will be conducted in Dr Simon Corrie's group (Nanosensor Engineering Lab) in the Department of Chemical Engineering, in collaboration with research groups at Monash and overseas.

This project will combine nanoparticles and engineered antibodies which can be injected into the skin to bind target proteins and produce signals detectable using a range of common biomedical imaging modalities. Using nanoparticles sourced either from the NEL or from commercial sources, the student will design and express engineered antibodies that, when bound to the nanoparticle surface, can transduce protein binding events for detection outside the body. A strong background in Analytical Chemistry and/or Molecular Biology (or Protein Engineering) is essential. Additional experience in animal studies is desirable.

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

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

Faculty / Portfolio: Department of Chemical Engineering, Faculty of Engineering

Location: Clayton campus, Monash University

Main Supervisor: Dr Simon Corrie

Remuneration: $28,900 p.a. full-time rate (pro-rata) 2019 rate.

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

Candidate Requirements

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

Submit an Expression of Interest

EOIs shall comprise:

- A cover letter that includes a brief statement of the applicant's suitability
- A curriculum vitae, including a list of published works
- A full statement of academic record, supported by scanned copies of relevant certified documentation
- Contact details of two academic referees
- Evidence of English-language proficiency (international applicants only)

Enquiries and EOIs shall be sent, preferably in the form of a single PDF attachment to an e-mail, to:
Dr Simon Corrie
Email: simon.corrie@monash.edu

Closing date, August 30, 2019

JESSE GIVENS-LAMB

BACHELOR OF ENGINEERING (HONOURS) AND BACHELOR OF SCIENCE, (MAJOR CHEMISTRY, CHEMICAL ENGINEERING)

What attracted you to engineering?

I was attracted to engineering because of the problem solving skills that I believed engineering would teach me. Thankfully this turned out to be true! I now have the ability to approach problems in a logical, sequential manner that helps me break down larger problems into smaller ones that can be easily tackled. Additionally, these problem solving skills have helped me understand the world around me and truly appreciate it.

What are you studying at Monash? What does it involve, what do you actually do?

During 2018 I completed my double degree in Science and Engineering, majoring in Chemistry and Chemical Engineering. These fields are incredibly broad, but what they really involve is getting a grasp for the world around us. Although this does involve learning in lectures, both areas of my degree have laboratory components where we get to experience hands-on learning. Through this I've found that Chemistry is about understanding reactions, interactions and changes at molecular scale, whereas Chemical Engineering takes a step back and looks at the same concepts but at a larger scale. For Chemistry laboratories I've used thousandths, millionths and sometimes even billionths of a gram worth of reactants, however In Chemical Engineering laboratories typically we use kilograms of material for those reactions!

Apart from study, what else were you involved in both at Monash and off campus? (Paid work, sport, clubs, hobbies etc)?

I've made a really conscious effort to be involved in as many things as possible whilst studying. I've supported myself financially by working part time as a public speaker and tutor and have also volunteered my time with Youth Without Borders and play casual futsal for some fun! On campus I am involved with the Chemical Engineering Society (SMUCE) as their Vice President, am a Mentor Leader for Access Monash, which mentors disadvantaged high school students and also am actively involved with both the science and engineering faculties as part of their Science Student Ambassador program and Future Finders exhibition.

What was the best thing about being a student at Monash?

Monash is a great place to learn, but I think more importantly it's a great place to develop. The opportunities available outside of the classroom provide avenues to learn so many skills, meet so many new people and ultimately better prepare yourself for your future.

What advice do you have for prospective students starting uni next year?

It's easy (and natural!) to be intimidated by university life when you first arrive. It's a large place that is full of people who seem to know what they are doing. I found that the best way to overcome this is to get involved in university life. Ask questions in your lectures, chat to your tutors and also be sure to come to O-Week and join some clubs and societies!

ALUMNI NEWS

MAGGIE DU

BACHELOR OF ENGINEERING (HONOURS) AND BACHELOR OF PHARMACEUTICAL SCIENCE, (MAJOR CHEMICAL ENGINEERING)

Why did you choose Monash?

Monash's highly-ranked and internationally acclaimed reputation was what initially attracted me to study here. I understood that Monash's strong industry connections and established research programs would allow me to explore my interests and provide many professional opportunities during my undergraduate. Studying a STEM degree, it was also vitally important to me to gain sufficient hands-on practice in the lab - a focus which Monash shares and implements in its Science and Engineering course structures.

What attracted you to engineering?

In high school, my favourite subjects were maths and science, so it was a natural progression for me to choose this course. I enjoy solving intricate problems and understanding how things work: a degree in Engineering offers me a chance to pursue those interests and also promises a multitude of career options.

What is the best thing about being a student at Monash?

Being at Monash, I am constantly surrounded by inspiring individuals and astounding innovations. In class, the passion of my lecturers is clearly evident, and as a student, I get to feed off their enthusiasm, whether it be about astrocytes or heat exchangers. Beyond the technical component of my degree, Monash also offers me a broad spectrum of leadership programs to enhance my employability and gain invaluable insight into industry from guest speakers.

What made you choose the specialisation/major you studied?

My foundation units made me realise my fascination with the vitality and intricacy of chemical processes, hence my specialisation in Chemical Engineering and Formulation Science. I want to be able to help translate our available technologies and scientific knowledge to applicable products and services that ultimately enhance our quality of life. My chosen dual major helps me develop the fine technical skills essential to understanding both small laboratory batch reactions and industrial-scale processes.

What advice do you have for prospective students starting uni next year?

Don't hesitate to get involved! Sign up for everything, talk to everyone, and keep an open mind when you first start uni. Monash offers an endless assortment of opportunities and programs for you to take advantage of.

SHERILYN D'COSTA

BACHELOR OF ENGINEERING (HONOURS) AND BACHELOR OF BIOMEDICAL SCIENCE (MAJOR CHEMICAL ENGINEERING)

What made you choose the specialisation/major you studied?

High school biology introduced me to the theories behind how the human body functions and the molecular targets of treatment drugs. But while I was trying to find the perfect degree to complement my interests, I learnt that chemical engineering made it possible to manufacture these drugs for large scale distribution. What attracted me to this specialisation is that engineers implement the innovative ideas that scientists come up with and transform them into practical solutions.

Tell us about what you studied – What was it? What did it involve? What did you actually do?

This double degree was an introduction to a range of theories and their practical applications. While the biomedical degree introduced me to human physiology and the biochemistry of drugs, the chemical engineering component was about understanding the concepts behind the transport of fluids, controlling the temperature and pressure of a process and thermodynamics. Engineering wasn't just about solving equations. Towards the end of the course we were working through applying these equations in designing stress resistant vessels and simulating an entire manufacturing process using software like Aspen Plus and HYSYS.

Despite the challenges, I found chemical engineering to be very rewarding as it disciplined my work ethic and motivated me to keep going past the initial failures I encountered.

Apart from study, what else were you involved in both at Monash and off campus? (Paid work, sport, clubs, hobbies etc)?

Apart from study, I was involved in a bunch of activities across both the Medicine, Nursing and Health Science (MNHS) faculty and the Engineering faculty. I was accepted into the Engineering Leadership Program in the second year of my course where we learnt about developing those soft skills required in a working environment. I was on the first executive committee of the Robogals Monash Committee as the Partnerships Manager, which involved securing funds to run our events.

What was the best thing about being a student at Monash?

Monash has always had an atmosphere of inclusion regardless of the course, the department or the student society. It was the perfect environment to meet people who shared my interests and ideas about a career in the field. I think the best part of the learning experience at Monash was the approachability. There was never a sense of superiority or power play. I felt comfortable talking to lecturers and tutors and they were forever ready to answer questions and explain complex concepts repeatedly and involve themselves in thought provoking discussions.

What advice do you have for prospective students starting uni next year?

As an international student, travelling halfway across the world to a new city can be hard. Be prepared to step out of your comfort zone. Involve yourself with activities that build your confidence and help you learn about the professional you want to be.

STAFF

FOCUS ON STAFF
TRINA OLCORN

Current Role: Undergraduate Program Administrator

Brief overview of role: The Undergraduate Programs Administrator is responsible for supporting the Manager Academic Programs within the Student Services Administration Office of the Department of Chemical Engineering. The Undergraduate Programs Administrator is responsible for the undergraduate academic administrative functions of the department, including course advice to current and prospective students, advertising and marketing, school liaison, and academic staff support.

Worst job and why? Working at my parents restaurant - I hated that it took away my weekends of socialising.

What projects are you currently working on and what does it involve? I am currently working on the demonstrator teaching budget, making it more accurate according to the number of hours.

What is your favourite place in the world and why? Home - there's no place like it!

Name the person you'd most like to sit next to on a long-haul flight and why? My husband but not my husband - he's the worst flyer.

Tell us something about yourself that your colleagues wouldn't know? I have been skydiving twice from 14000 feet.

FOCUS ON STAFF
JANETTE ANTHONY

Current Role: Executive Assistant to Director of Bioresource Processing Research Institute of Australia (BioPRIA) , Professor Gil Garnier

Brief overview of role: Janette has held EA roles at Barton Institute of TAFE, Chisholm and Homesglen Institute working for senior executives and has been a key member of BioPRIA Institute, Department of Chemical Engineering at Monash University, as Executive Assistant to the BioPRIA Director, Janette's role involves a range of effective secretarial, administrative and office management of the operations of BioPRIA in conjunction with assisting other Academics, colleagues within the Institute and the Institutes's external partners. As Hub Manager of ARC PALs ITRH Hub, her job involves operational and administrative support to the Hub Director, other senior staff and reporting to and engaging with key external stakeholders including ARC.

Worst job and why? I am an active person and enjoy multitasking. I am self motivated and feel accomplished when students in the Institute complete their doctoral degrees. I dislike minute taking.

What projects are you currently working on and what does it involve? In administration there is not just one project to focus on but many little and sometimes complicated projects that govern the day. Projects include funds management, HR processes, and student admin. My current focus is organising video recordings of the institute research activities for the website and presentation at overseas conferences.

What is your favourite place in the world and why? I think it will be a beautiful European city. I am going to embark on a holiday April 2020.

Name the person you'd most like to sit next to on a long-haul flight and why? Michele Obama, an inspiring and the most down to earth First Lady with unerring honesty and lively wit.

DEPARTMENT ADMIN UPDATE

During September, I was lucky enough to be hosted by the SIMPAS group to visit Monash Suzhou campus. Thank you Aibing and Ruiping for this amazing experience and opportunity to get a greater understanding of the Chinese business, culture and see the country from the student's perceptive. It was an invaluable experience to see the students in their own environment and discuss their challenges and Monash study journey.

For this visit, I collaborated with Monash Suzhou professional staff and was welcomed by Chris Wen and Marshall Young who provided me with a tour of the Monash Suzhou facilities and campus where our students are undertaking their HDR degree. The Department is currently undertaking recruitment of an academic position which will be located at the Monash Suzhou campus from February 2020 and we are currently in the process of setting up a laboratory at the campus for the staff and students. This is an exciting time for the Department and our Suzhou colleagues as it has enhanced our collaboration further with our colleagues.

During this visit, one day I was hosted by two students in the SIMPAS group from Clayton who were also in China due to their research project. Thank you Wenchao Gao and Mengmeng Zhou for showing me around the beautiful city of Suzhou and introducing me to "Bubble Tea" (the real thing). It was a pleasure to see the students in their home country and see how proud they are of their culture and country. I am looking forward to seeing them back in Australia in December.

What an amazing country! I will definitely be returning as I enjoyed every minute of the experience and are so grateful for the opportunity of collaboration and new friendships.

Tracey Groves

XMAS @ MELBOURNE ZOO PARTY

Reminder that the 2019 Xmas function has been booked for Friday 6th December at the Melbourne Zoo, Elliott Ave Parkville, To book your place for this event, please register and pay your $30.00 via:

https://www.eventbrite.com.au/e/2019-christmas-party-melbourne-zoo-tickets-53845903547

CONTACT MONASH CHEMICAL ENGINEERING

Department of Chemical Engineering
Monash University
Clayton Victoria 3800
Telephone: +61 3 9905 3555
Facsimile: +61 3 9905 6686
eng.monash.edu.au/chemical
LinkedIn (https://www.linkedin.com/groups/4849052/about)

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 join up here to be added to our newsletter mailing list.

MONASH University

MONASH
CHEMICAL
ENGINEERING

monash.edu/engineering/departments/chemical