

DEPARTMENT OF  
CHEMICAL ENGINEERING  
MONASH UNIVERSITY

# *focus*

TEACHING AND RESEARCH NEWS FROM THE  
DEPARTMENT OF CHEMICAL ENGINEERING

*Chemical Engineering Focus Newsletter*

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**MONASH** University  
Engineering

# *focus*

TEACHING AND RESEARCH NEWS FROM THE  
DEPARTMENT OF CHEMICAL ENGINEERING

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# MONASH RESEARCHERS CREATE PHOTOVOLTAIC MATERIALS THAT ARE ACTIVE AFTER DARK

“We have successfully created an ultrathin film of monolayered tungstate nanodots that are photovoltaic after dark.”

Research from of A/Prof Xiwang Zhang and colleagues from the Department of Chemical Engineering was recently showcased in *Chemical Communications*. Their paper, **Constructing ultrathin film with “memory” photocatalytic activity from monolayered tungstate nanodots** examines the unique properties of nanodots to enable coatings to perform post-irradiation antibacterial reactions, which has great potential for self-cleaning glass coatings.

The group successfully created an ultrathin film of monolayered tungstate nanodots, resulting in “remembered” photocatalytic activity. Photoinduced electrons are quickly stored in the ultrathin film upon irradiation due to the reduction of tungsten ions and discharged to produce superoxides, enabling postirradiation antibacterial activities.

This research has overcome a major drawback of 2D photocatalytic nanosheets: conventional photocatalysts are only active under light illumination and they stop functioning once external irradiation ceases, as the lifespan of photogenerated charge carriers is generally around a few nanoseconds or shorter. This means no light no activity. This drawback limits the application of solar-driven photocatalysis to strictly during daylight hours.

To retain photocatalytic activity after light ceases, a few attempts have been made to combine  $\text{TiO}_2$  photocatalysts with carbon nanotubes (CNTs) or PdO nanoparticles. Photoinduced electrons in  $\text{TiO}_2$  migrate to CNTs or PdO under irradiation and diffuse back to  $\text{TiO}_2$  forming radical species to extend activity in the dark.

However, their large sizes make the composites unsuitable for the synthesis of transparent ultrathin films with memory photocatalytic activity, which is vital for many practical applications such as functional glass coatings.

The group fabricated an ultrathin transparent film with memory photocatalytic activity for the first time using monolayered tungstate nanodots (NDs) as building blocks via the low-cost layer-by-layer (LBL) method. Different from the  $\text{TiO}_2/\text{CNTs}$  and  $\text{TiO}_2/\text{PdO}$  nanocomposites, the tungstate NDs can generate electrons under light irradiation and then store the photogenerated electrons at the tungsten sites due to the reduction of tungsten elements from  $\text{W}^{6+}$  to  $\text{W}^{5+}$ , which simplifies the electron storage process. The stored electrons can be released in the dark forming oxidizing species via the reversible oxidation of  $\text{W}^{5+}$  to  $\text{W}^{6+}$ .

[READ FULL ARTICLE HERE.](#)

This article originally appeared in *Chemical Communications*, 52, 6985-6988, 2016

The image was originally published in *Chemical Communications* and featured as the back cover image.



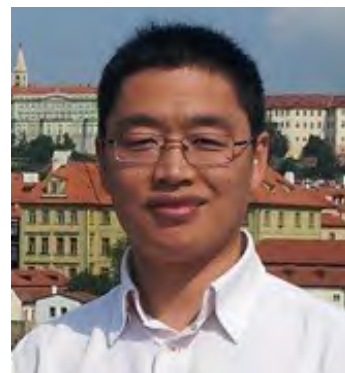
Ultrathin transparent film with memory activity for antimicrobial application

## About Associate Professor Xiwang Zhang

A/Prof Zhang is an Associate Professor at the Department of Chemical Engineering, Monash University, Australia.

After obtaining his PhD from the Research Centre of Eco-Environmental Sciences, Chinese Academy of Sciences in 2006, he worked at the Nanyang Technological University as a Research Fellow and Senior Research Fellow in between.

In 2010, he joined Keppel, a multinational corporation in Singapore as an R&D Manager. He was awarded a prestigious Australian Research Council (ARC) Australian Research Fellowship at the end of 2010 and commenced his ARC fellowship at the University of Queensland in 2011. He was then granted a prestigious Larkins Fellowship and appointed as Associate Professor in 2012 by Monash University.



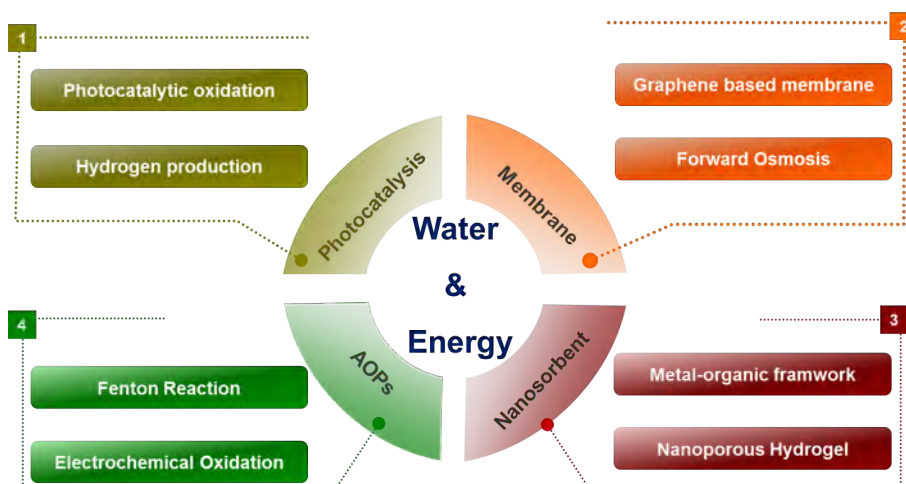
Xiwang Zhang's research interests focus on environmental functional materials for water treatment, particularly high performance membranes and catalysts. Xiwang Zhang has published > 75 journal papers in many high impact journals, including *Advanced Materials*, *J. Am. Chem. Soc.*, *Advanced Functional Materials*, and *Angewandte Chemie*.

[Read more](#)

## About the Membrane and Catalysis laboratory

The Membrane and Catalysis Laboratory is devoted to the development of low-cost technologies for environment protection and resource recovery from waste, particularly membrane and catalytic oxidation technologies.

RESEARCH FOCUS OF THE GROUP - CLICK ON THE IMAGE TO LEARN MORE ABOUT EACH OF THE RESEARCH AREAS



# DR BIAO KONG RECEIVES VICE-CHANCELLOR'S COMMENDATION FOR THESIS EXCELLENCE

Congratulations to Department of Chemical Engineering graduate Dr Biao Kong, who was the 2015 Faculty of Engineering recipient of the Vice-Chancellor's Commendation for Thesis Excellence.

Biao received the award in recognition of his outstanding doctoral thesis entitled *Prussian blue derived nanoporous hetero-interfaces for sensitive bio-probing*.

The award acknowledges both the quality of the thesis and the research. This award is one of the highest academic honors bestowed by the University.



Biao, who was supervised by Professor Cordelia Selomulya during his time at Monash, currently holds the position of Senior Research Fellow at Stanford University in the USA.

His research interests include multifunctional porous nanopores for *in vivo* imaging and biosensing, highly integrated devices for diagnosis and treatment of disease and the design and synthesis of porous materials for catalysis, energy storage and conversion.

In his still young career, Biao has received many awards and honours including most recently:

- » The Academic Star in Victoria, Melbourne
- » The Mayor's Award of Youth Development and Innovation, Shanghai
- » Special Academician-Award of Tongji-KELAN Education Foundation, Shanghai
- » The "Wong Lo Kat" Award Fund for Young Outstanding Student, Fudan University
- » National Scholarship, Ministry of Education & Finance, China,
- » The First Prize, Unilever-RSC Chemistry Presentation Competition
- » Top-Grade Award of BAOSTEEL Education Foundation

Biao received the Vice Chancellor's Award for Thesis Excellence at a Faculty ceremony held on 15 June 2016.

# MOST READ PAPER OF NATURE CHEMISTRY - HIGHLIGHTED BY CHEMISTRY WORLD

Research from the department has been highlighted as the Most Read Paper in *Nature Chemistry*.

The article, *Incorporation of well-dispersed sub-5-nm graphitic pencil nanodots into ordered mesoporous frameworks*, by Bioa Kong, Cordelia Selomulya and colleagues from Shanghai and Singapore, was published in *Nature Chemistry* in December 2015.

In this new work, Cordelia Selomulya and colleagues produced nanoparticles about 3nm in diameter using ordinary pencils. The pencils' graphite was used as both the anode and cathode in an electrochemical device, with ethanolic sodium hydroxide as the electrolyte. Free radicals in solution exfoliated 3nm pencil nanodots covered in carboxyl and hydroxyl functional groups from the anode. The researchers then used polymer templates to construct mesoporous materials made out of a range of materials, including titanium

and silicon dioxide, and were able to get the nanodots to sit neatly within its pores thanks to hydrogen bonds between the dots and the structure. The current generated by titanium dioxide under simulated sunlight was enhanced by 36% with the addition of the nanoparticles, suggesting promise in solar energy applications.

Furthermore, the pencil leads' inherent porosities made them easy to dope. Nitrogen-doped nanodots, for example, could be produced by soaking the pencil leads in melamine. Nitrogen-doped pencil nanodots added to titanium dioxide performed even better than plain nanodots, enhancing photocurrent density by 183%. Using different precursors, the researchers also doped nanodots with boron, phosphorus and sulfur, all of which showed different optical properties.

The researchers are now investigating the potential uses of the nanodots in other areas, such

as biomedicine. 'A preliminary study indicated they showed low toxicity towards biological tissue and cells,' says Selomulya. 'However, more studies need to be done.'

*This article originally appeared in Chemistry World.*

*'This work represents a very interesting and important contribution to the chemistry of nanomaterials,' Mietek says. 'It shows a simple, feasible way to obtain graphitic nanodots from commercial graphite used in pencils, and to create a new class of nanomaterials for optical and other advanced applications by incorporating them into various ordered mesostructures.'*

*Mietek Jaroniec of Kent State University*

## PRESTIGIOUS NATURE INDEX PLACES MONASH SECOND IN AUSTRALIA

Monash University has climbed up the global rankings of the influential Nature Index, which measures universities' contribution to high-quality scientific research papers. The University ranked second in Australia and 93rd globally, according to the latest annual tables from the Nature Index, published recently by the Nature Publishing Group.

The Nature Index is based on an institution's contributions to the *Nature's* stable of journals, taking in about 60,000 high-quality papers each year. It counts both the number of papers, and the relative contribution of the authors.

The Nature Index shows Monash researchers contributed to 365 articles in 2015. The greatest contributions (42 per cent of all articles) were in chemistry-related research papers. Thirty percent of this contribution was to papers relating to life sciences. Monash University Vice-Provost (Research), Professor Pauline Nestor, said the University's impressive Nature Index ranking highlighted the significant contribution Monash academics were making to global scientific research.

"Our researchers continue to make important contributions to the world of scientific research. The impact of this research on industry and the lives of people around the world is both positive and far-reaching," Professor Nestor said.

# NEW GRANT PAVES THE WAY FOR VALUABLE DAIRY INDUSTRY RESEARCH

The Australian dairy industry is set to reap significant benefits from a new research partnership with China, thanks to a million dollar grant from the Australia-China Science and Research Fund (ACSRF).

The newly established *Monash Joint Research Centre in Future Dairy Manufacturing* will focus on seeking engineering solutions to practical problems in the dairy manufacturing sector. Research directions include the development of innovative, high-value dairy products such as probiotics and protein enriched products, as well as improving efficiencies in the industry. The centre will also promote links between Australian dairy product manufacturers and the large distribution network in China.

Professor Cordelia Selomulya will direct the Centre, which brings together the strongest dairy research teams in the Asia Pacific region.

“We will be working on a range of really exciting projects which will increase the Australian dairy

industry’s capacity for export earnings, while also optimising production processes,” Professor Selomulya said.

One of Professor Selomulya’s areas of research involves improving the spray-drying processes for milk powder, which could prevent the loss of several tonnes of product per hour.

Professor Selomulya stated that the centre’s research will enable the Australian dairy industry to go beyond the traditional production of cheese, butter and skim milk powder to the large-scale manufacture of products such as infant formula, which are in high demand in China.

The other partners involved in the initiative include Soochow University, COFCO NHR and Mengniu Dairy in China, along with Bega Cheese, Devondale Murray Goulburn, Fonterra, the Food Innovation Centre, the University of Queensland and the Gardiner Foundation in Australia. Dr Roya Khalil, the New Product Development Manager at Bega

Cheese, spoke about the potential of the partnership to facilitate strategic research and development, with a strong focus on the preferences of Chinese consumers.

“The joint research centre provides an opportunity to create a strategic partnership between the Australian and Chinese dairy industry, for a sustainable and long term commercial relationship. Bega Cheese Limited foresees that this collaboration will assist with increasing export volumes, thereby supporting Australian employment opportunities in regional dairy communities,” Dr Khalil said.

Demand is increasing in China for consumer-ready dairy products, and with the recent signing of the free trade agreement, the Australian dairy industry is well-positioned to grow its current share of the market.

The ACSRf supports strategic science, technology and innovation collaboration of mutual benefit to Australia and China. The Monash Joint Research Centre in Future Dairy Manufacturing is one of six funded nationally in 2016.



From left: Cordelia Selomulya (Monash University), Adrian Freckleton (Bega Cheese), Roya Khalil (Bega Cheese), Yong Wang (COFCO NHRI)

# MAKE YOUR MARK AS A FUTURE ENGINEERING LEADER IN JUST ONE OR TWO YEARS

Enrollments are now open for the new Monash Master of Advanced Engineering (MadvE). The degree is tailored to qualified engineers and can provide that key transition for engineers with leadership ambition.

In the program students explore a specialisation on an advanced level, which can boost confidence as a leader in a range of settings.

The course material, delivered by world-class academics, will deepen your understanding of a specific discipline, and two year-long engineering project units encourage innovative thinking and entrepreneurship.

The Monash Master of Advanced Engineering is the only degree in Australia designed for alignment with the Engineers Australia Stage

2 Competency Standards. It also accelerates progress for students towards the attainment of Chartered Status.

The course has seven core specialisations and two interdisciplinary specialisations.

Students also have the option to combine their studies with a fast tracked partner master program with an additional year of study. For example, first year Masters Advanced Engineering; second year Masters Business.

Full details, including core subjects, specialisations and how to enrol are available online.

[READ MORE HERE](#)

**In 2017 all Monash Alumni commencing Master of Advanced Engineering students will receive a one-off \$8,000 scholarship. Applications for semester 1 close 31 January 2017.**



## MASTER OF ADVANCED ENGINEERING

**The Master of Advanced Engineering is the key transitional stage in your career, transforming you into a global leader. Gain a depth of knowledge, mastering the crucial skills to become a leading contributor in your field.**

Customise your degree – the Master of Advanced Engineering offers flexibility to complete your Master degree in just one year, or you can choose a two-year option.

This course is designed to extend your knowledge in your chosen specialisation and advance your leadership and complex problem-solving skills in a cross cultural environment.

LEARN MORE AT [www.eng.monash.edu.au/masters](http://www.eng.monash.edu.au/masters)

# WENLONG CHENG RECEIVES THE CSJ LECTURESHIP AWARD

Professor Wenlong Cheng, who heads the NanoBionics Group withing the Department, has won this year's CSJ Lectureship Award.

The Chemical Society of Japan recently acknowledged work of Professor Cheng and presented him with the Distinguished Lectureship Award at its 96th Annual Meeting held in Kyoto, Japan in March 2016.

The Distinguished Lectureship Award is presented to eminent young scientists for outstanding research in any aspect of chemistry at the International Symposium of the annual flagship scientific meeting of the CSJ.

The purpose of the symposium is to promote ties between young chemists and to stimulate research collaborations.

Professor Cheng delivered the first keynote in the nanotechnology session.



# BEST POSTER AT THE INTERNATIONAL DAIRY FEDERATION CONFERENCE

## Best Poster Award for Research on Spray-drying of Milk Powder

More than 300,000 tonnes of spray-dried whole milk, skim milk and infant formula are produced every year in Australia, mainly for export to Asia and particularly to China.

PhD student Martin Foerster, supervised by Professor Cordelia Selomulya and Dr Meng Wai Woo, recently won the best poster award at the International Dairy Federation (IDF) Dairy Science & Technology Symposia 2016 in Dublin, Ireland, in April 2016.

The poster titled *Impact of Atomisation on Surface Fat Coverage in Spray Dried Milk Droplets* provided new insights into the mechanisms responsible for fat accumulation on the surface of milk particles. The presence of surface fat impairs the functional properties of milk powders for the end-users and for further processing, as it reduces water solubility, oxidative stability, and flowability.



"We therefore seek to gain a better understanding of the drying process of milk particles, their physical kinetics and chemical surface development," Martin said. "This brings better controllability of the resulting product powder's properties, which can be transformed into a more economic and sustainable production on industrial scale." The work was selected out of 150 posters presented on concentration and dried milk products at the conference.

# DEPARTMENT ALUMNUS STEVEN KHOO EARNs AWARD FROM THE MALAYSIAN GOVERNMENT



Steven Khoo, Department of Chemical Engineering Alumnus is currently a Lean Six Sigma Black Belt Senior Executive at Sime Darby Berhad in Kuala Lumpur, Malaysia. He was recently awarded the Productivity Champion certificate "in appreciation of his valuable contribution as a productivity practitioner" by the Malaysian Minister of International Trade and Industry, Dato' Sri Mustapa

Mohamed at a Malaysian Productivity Corporation (MPC) event in May 2016.

In early 2016, Steven developed and led a global 100-day programme to drive rapid action and immediate results with a bottom line impact across the company. The programme is estimated to deliver more than RM 163 million (AUD 55.6 million) and 1.3 million work hours of LSS benefit potentially within the next 12 months at Sime Darby

Steven is a graduate of the Monash Chemical Engineering degree (December 2014) and a Certified Six Sigma Black Belt by the American Society of Quality (ASQ). He has been at Sime Darby Berhad, Kuala Lumpur, Malaysia since July 2011

## About Lean Six Sigma

Lean Six Sigma (LSS) is a powerful data driven methodology for achieving process efficiency and effectiveness,

which results in enhanced customer satisfaction and improved bottom line results. It is focused on reducing waste in business processes. The LSS programme aims to develop high-calibre graduates with an in-depth understanding of strategic, tactical and operational issues.

Students partaking in the program learn state-of-the-art concepts, methods, principles, tools and techniques relating to quality and process improvement for a broad range of organisations, such as manufacturing, service, public sector and third sector, set within a global context.

To achieve Black Belt certification students must undertake a Black Belt project, which involves working with a company to resolve a live issue.

# GOVERNOR GENERAL ADDRESSES ENGINEERING GRADUATES

Monash students graduating from Engineering were addressed by the Governor General Sir Peter Cosgrove in a ceremony in May. In his address, the Governor General congratulated the graduates and encouraged them to *"join their fellow engineering alumni, to emulate them, guide them and lead them in the never-ending task of creating social wealth."*

Sir Peter Cosgrove holds a Doctor of Laws (honoris causa) from Monash University.



# KATHERYN SILVESTER WINS OZWater YOUNG PROFESSIONAL OF THE YEAR



*Kathryn Silvester receiving her award during the Ozwater conference*

Department of Chemical Engineering Alumna Kathryn Silvester was awarded the title of *Young Water Professional of the Year* at the 2016 Australian Water Association's prestigious National Water Awards, presented during the Ozwater conference in Melbourne last month.

Kathryn is a chemical engineer for Sydney Water, where her work has provided a strong foundation for water and wastewater treatment. She is also involved with the Australian Water Association, the International Water Association and Engineers Without Borders.

Kathryn believes that the water industry needs to continue to support young professionals to ensure their input and contribution is valued.

"I find young people so inspiring. They have such a large part to play in providing the drive to do bigger and better things," Silvester said.

"We need to stop thinking about young professionals as just leaders of the future, but as an indispensable resource that we can utilise to help inform the decisions of today."

The 2016 National Water Awards seek to recognise leaders of innovation across a number of fields within the water industry, including advocacy, research, infrastructure, programs and safety.

Australian Water Association CEO, Jonathan McKeown, said the awards were the highest accolade the Association can bestow, and that the 2016 recipients were some of the leading individuals and organisations in Australia ensuring a safe and sustainable water supply to build a prosperous Australia.

"The awards are an acknowledgment of the significant achievements and contributions that these water leaders have made. The recipients are widely respected by their peers

nationally and internationally, and these awards give us the opportunity to reflect on their considerable body of work and the impact they have had on securing the water future for both Australia and overseas", Mr McKeown said.

ANZ are the National Water Awards sponsor and Managing Director of Loans and Specialised Finance, Christina Tonkin, congratulated the recipients on this recognition.

As a young leader in the industry, Kathryn dedicates herself both professionally and voluntarily to contribute to the future direction of the water sector. Her work at Sydney Water has provided a strong foundation in both water and wastewater treatment. Furthermore her involvement with the Australian Water Association, the International Water Association and Engineers without Borders has allowed her to make an impact beyond her nine to five job.

***"We need to stop thinking about young professionals as just leaders of the future, but as an indispensable resource that we can utilise to help inform the decisions of today."***

# MONASH CHEMICAL ENGINEERS GRANT SUCCESS

A large strategic grant, plus four linkages is a great achievement of the Department of Chemical Engineering in one year.

This reflects great links with industry and a tremendous amount of effort by all of the staff listed to the right. All found the right industry partner, the right project, and the right pitch for the grant reviewers.

These linkage grants come on top of Cordelia Selomulya's million dollar ACSRF Australia-China grant on dairy manufacturing in collaboration with Dong Chen in Soochow, and several dairy companies (MG, Bega, Fonterra, and Gardiner Foundation in Australia plus COFCO and Mengniu Dairy in China).

- » Prof Wenlong Cheng; Dr Andrew Tonkin; A/Prof Bing Wang; Prof Geoffrey Webb; Dr Stephen Wang; Prof David Kaye; Dr Yijia Li; Mr Paul Carboon  
*Electronic Skin Nanopatches for Continuous Blood Pressure Monitoring*
- » Prof Gil Garnier; Dr Rico Tabor; Prof Wei Shen  
*Novel concepts to engineer low cost blood diagnostics*
- » Prof Aibing Yu; Dr Sing-Ki Choi; Dr Shibo Kuang; Dr Zongyan Zhou  
*Particle-scale modelling of particle-fluid flows in gas and oil extraction*
- » Dr Yansong Shen; A/Prof Runyu Yang  
*Preparation and use of lignite-iron ore composite briquettes for ironmaking*

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## STUDENTS WIN 11TH CHEM-E-CAR COMPETITION

Engineering students from Monash University's Malaysia campus were crowned Grand Champion at the 11th Malaysia ChemE Car Competition held in April 2016 in UTM (University Teknologi Malaysia). The team won a cash prize of RM3,000 and a Perpetual Trophy.

This year's competition attracted 62 student teams from universities across Malaysia and Indonesia. In this competition, students demonstrated their ability to design and construct a shoebox-sized chemical powered car that is able to complete a set of challenges, including carry a specified load, hit a target, stop autonomously.

Team Grandiose, consisting of students from Chemical Engineering and Electrical Engineering, outperformed all other teams, being the only team that was successful in hitting the target (bowling pins), and stopping the car within the set distance.



Engineering students winning the 11th Malaysia ChemE Car Competition (from left to right: Tan Ju Kheng (CHE), Lim Zhen En (ECSE), Ong Pei Ling (CHE), and Ho Mun Chon (ECSE), and organisers.

# CHINESE GOVERNMENT AWARD FOR OUTSTANDING SELF- FINANCED STUDENTS ABROAD

The China Scholarship Council is the Chinese Ministry of Education's non-profit organisation that provides student financial aid to Chinese citizens and foreigners to study abroad or in China.

Developed in 2003, the awards are based on academic merit and encourage international students to achieve first-class results during their studies. Awardees receive \$6000US to further develop or finance their studies. The award further encourages international students to return to China for work or to serve the country in other channels after receiving their degree abroad.

This year, a total of 500 awards were given worldwide, with 45 Chinese students in Australia receiving awards. Of the 45 students in Australia, four are engaged with studies at Monash University and three are studying Chemical Engineering with the Faculty of Engineering.

Congratulations to Baiqian Dai, Liyun Guan and Lizi Li for their outstanding achievements.

To be eligible for the Chinese Government award for outstanding self-financed students abroad, the student must be studying a PhD degree, be under the age of 40 and self-financed.



*Chinese Government Award for Outstanding Self-financed Students Abroad. Three students from the department won the award, Baiqian Dai, Liyun Guan and Lizi Li. Professor Wei Shen also attended this ceremony.*

## STUDENT BEN LEE RECEIVES AusIMM AWARD

Department of Chemical Engineering student Ben Lee has received a AusIMM Awards for Academic Achievement (AAA), which recognises high achieving students in the minerals professions. The Education Endowment Fund (EEF) Awards for Academic Achievement (AAA) are awarded annually to the student who achieves the highest annual examination results in each year of an AusIMM-recognised undergraduate course.

Winners of the AusIMM EEF AAA receive a certificate and student membership of The AusIMM.

# YEAR 8 CHALLENGE: EXPERIENCE 3 DAYS OF ENGINEERING THESE HOLIDAYS

Dive into the wonderful world of engineering with six exciting workshops run by Monash experts across a range of engineering disciplines.

## WORKSHOPS INCLUDE

### **Chemical & Environmental Engineering**

Can crushing experiments, energy measurements and greenhouse gas emission testing.

### **Civil Engineering**

Design, build and test small-scale bridges.

### **Electrical & Computer Systems Engineering**

Construct your very own electrical gadget to take home.

### **Materials Science & Engineering**

Learn how new materials will change our world.

### **Mechanical & Aerospace Engineering**

Motorsports, unmanned aerial systems and bipedal robot demonstrations and more.

### **Resources Engineering**

Learn how energy is produced and used.



## **Year 8 Challenge**

**Date:** 27th - 29th June 2016

**Time:** 9:00am - 3:45pm daily

**Venue:** Monash University Clayton Campus

**Award ceremony - Parents welcome**

Wednesday 29th June 2016, 3:30pm - 4:30pm

Register [here](#)

**Cost:** \$200 per student (GST Inc.)

**Last day to register:** Friday 24th June

**LIMITED PLACES LEFT!**

**Further information:** <http://eng.monash.edu/challenge/>

## PHD OPPORTUNITY

Graduate Research Interdisciplinary Program (GRIP) for a Globally Competitive Australian Dairy and Food Industry

The GRIP for a Globally Competitive Australian Dairy and Food Industry aims to drive innovation and develop a pipeline of research talent for the sector. The interdisciplinary program will involve researchers from Engineering, Science, Medicine (Nutritional Science and Dietetics), and Information Technology.

The PhD research projects within a GRIP are shaped by industry, and include internship opportunities for PhD candidates in the partner companies. It is an excellent opportunity to develop your research capability while exploring opportunities for future careers in the food and dairy industry.

The GRIP program will be launched in early 2017.

Applicants must have H1 equivalent academic record and eligible to apply for Monash University's scholarships. Applicants must show excellent communication and inter-personal skills, willingness to travel (including regular site visits and industry internship during the course of their projects), and are interested to explore future careers in the food manufacturing industry.

**Please send your CV to Ms Lilyanne Price ([lilyanne.price@monash.edu](mailto:lilyanne.price@monash.edu))**

# UPULIE DIVISKERA JOINS DIGNITARIES AT KIRRIBILLI HOUSE



Department of Chemical Engineering PhD student Upulie Diviskera joined other representatives from Australia's Sri Lankan community at a special luncheon hosted by the Hon Julie Bishop, Foreign Minister of Australia.

The lunch was held in honour of the visit of the Sri Lankan Foreign Minister to Australia for various talks and attended by the Sri Lankan High Commissioner, Assistant High Commissioner, diplomats from the Australian and Sri Lankan foreign services, Australian MPs and Senators, and representatives from the Sri Lankan community in Australia, including business and community leaders.

During the lunch the Ministers gave speeches and discussed bilateral relations between the two countries and political progress in Sri Lanka.

Upulie, who attended in her capacity as a Monash University student, is currently pursuing her PhD in Chemical Engineering. Throughout her research career, Upulie has worked in cancer research, materials science, developmental biology and cancer immunotherapies. Her doctoral work is in nanotechnology research, looking at ways in which we can make bespoke nanoparticles for drug delivery.

Upulie is also co-founder of the very successful rotational twitter account @realscientists, which aims to make science accessible to the public.

# IN SILICO MATERIALS CHEMISTRY

## DISTINGUISHED GUEST SEMINAR

### CO-HOSTED BY CSIRO AND THE DEPARTMENT OF CHEMICAL ENGINEERING, MONASH UNIVERSITY

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#### Abstract:

Function is key to development of new materials and chemistry. To design a material for a specific function, one needs to account for interaction, energetics, and dynamics to simulate the process. Modern computational software and hardware now allow us to design materials, predict structures, and simulate function for some well-defined systems, indicating the great potential of materials design for complex systems in the near future. In this talk, I will discuss our recent efforts in understanding the atomically precise, ligand-protected gold nanoclusters; controlling the phase stability of 2D materials by chemical functionalization; elucidating the identity of nitrogen dopants in carbon materials and their role in capacitive energy storage. In each of the studies, one will see a close interplay between computation and experiment, demonstrating that computation or an experiment *in silico* is now a valuable tool to drive advances in materials chemistry.

#### About Assistant Professor De-en Jiang's Research

My overall research goal is to achieve knowledge-based design of functional materials for a sustainable society. Meeting the increasing energy demand for an ever growing population requires new materials that can lead to breakthroughs in energy efficiency, conversion, and storage and at the same time mitigate or minimize the undesirable environmental impact to our air and water. Beyond the conventional trial-and-error approach, materials by design in the spirit of the White House's Materials Genome Initiative promises to greatly accelerate the speed of materials discovery. The fast advances in computing hardware in the past two decades provide chemists an invaluable and essential tool to understand and discover new chemistry by computation. And my primary research interest lies in using state-of-the-art computational methods to understand fundamental materials chemistry and to design new materials.

Nanomaterials play an important role in many energy-critical processes, such as heterogeneous catalysis, fuel cells, and photocatalysis. My first research interest is to understand what makes a nanomaterial nano. More specifically, why are certain-shaped or -sized nanomaterials made? What is their growth mechanism? Atomically precise, monolayer-protected clusters, especially thiolate-protected gold nanoclusters, have now offered such a well-defined system for one to understand the detailed formation mechanism, as many intermediate structures have been identified. By working closely with our experimental collaborators, we will elucidate the detailed elementary steps leading to evolution of the so-called magic clusters based on quantum chemical methods such as density functional theory.

## DISTINGUISHED GUEST SEMINAR

Co-hosted by CSIRO and the Department of Chemical Engineering, Monash University

*In silico Materials Chemistry*

*Assistant Professor De-en Jiang*

*Department of Chemistry, University of California, Riverside USA*

FRIDAY 8 JULY 2016, 10:00 - 11:30 am

E7 lecture theatre, 14 Alliance Lane Clayton Campus

# SMUCE IS PROUD TO PRESENT THE SMUCE BALL 2016: FIRE & ICE!!!



SMUCE is proud to present the  
SMUCE BALL 'FIRE & ICE'  
**THURSDAY 18TH AUGUST 7PM**  
**BOOK TICKETS HERE**

If you're thinking that's a little earlier than past SMUCE Balls, then you'd be right on the money. This year we've changed the date. By having it earlier in the semester there's fewer assessments on everyone's calendar,

there's no clash with science ball and there are no design project interviews the next day, we're winning all round! The date is not the only thing that's changing. This year the ball will be happening in all its glory at the San Remo Ballroom, 365 Nicholson St, Carlton North. Closer to the city means easier transport, and closer after party, AT PERSA!!!!

If this isn't quite enough to make you feel so lucky you must impulse buy a Tatts ticket, this next detail will. We're going to sell tickets online & offer early bird pricing-YOU BEAUTY! If you purchase your tickets before Vac Work Game (20th July) tickets will cost \$80 for members, and \$90 for non-members. This golden ticket gets you into the SMUCE event of the year, it also gets you unlimited beer & wine, a 3-course meal and entry to the after party. Winner, winner chicken dinner! Surely you're now feeling the Tatts lotto urge.

Tickets are on sale now. Spread the word about the ball, lock down your tickets and invite all your buddies too! The more people that join us the bigger and better the conga line will be. Assuming there is a conga line, but seriously, the more the merrier!!



## SOCIETY OF MONASH UNIVERSITY CHEMICAL ENGINEERS

### Linking students with industry

**CONTACT** [smuce@monashclubs.org](mailto:smuce@monashclubs.org)  
to organise your opportunity to connect with the  
Chemical Engineering students at  
Monash University

## CONTACT MONASH CHEMICAL ENGINEERING

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### WOULD YOUR COMPANY LIKE TO OFFER ANY OF THE FOLLOWING?

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

Would you like to receive future issues of ChemEng Focus? If so, please email [lilyanne.price@monash.edu](mailto:lilyanne.price@monash.edu) and we will add you to our newsletter mailing list.

DEPARTMENT OF  
CHEMICAL ENGINEERING  
MONASH UNIVERSITY

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