

# CHEMICAL ENGINEERING OCTOBER 2011 IN AUSTRALIA

## CHEMECA 2011

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## Chemical engineering on the move

The chemical engineering industry is experiencing a geographic shift from western countries to the Asia/Pacific region, Australia's premier conference for chemical engineers was told in September. "There is clearly a healthy level of activity in the sector overall, but the bulk of new projects is happening in the Asia/Pacific region," said Professor Sir Bill Wakeham, the current international president of the Institution of Chemical Engineers.

Speaking at the 2011 Chemeca conference in Sydney, which was attended by some 450 delegates, he pointed out that in the three months from February to April this year 77 new projects were started and seven existing facilities were permanently shut down.

Of the new projects 57% are in Asia/Pacific, 21% in Europe and 14% in North America. In addition, the projects in Asia/Pacific tend to be a lot bigger than in Europe. For instance, a new PVC plant and a hydrogen and synthesis gas plant in China are worth \$600 million and \$250 million respectively, compared with a \$25 million polychloroprene solid rubber facility in Germany.

Of the shut-down facilities, four were in Europe, one in North America and two in the Asia/Pacific region.

A consequence of this trend for his institution is that its membership is increasingly coming from outside Britain, which means the organisation must also increase its international outlook.

In addition to its geographic diversity, chemical engineering has also become more diverse in its fields of application, Wakeham said. This has resulted in tension between research and teaching at universities. Research is often in new fields at the periphery of traditional chemical engineering, for instance in areas where engineering and biology meet, whereas the course curriculum still needs to cover the core fundamentals of the discipline, he said.

This difference can become problematic



*Sir William Wakeham outlined the changing face of chemical engineering.*

PHOTO: LARRY PITT PHOTOGRAPHY

when recruiting staff who are supposed to work at the forefront of their field while at the same time being able to teach the core elements of classic chemical engineering.

Professor Max Lu, deputy vice-chancellor research at Queensland University, in his presentation outlined the new fields chemical engineering is increasingly involved in. He said the discipline has evolved from unit operations and material transport phenomena to systems engineering augmented by computing, biotechnology and nanotechnology. New applications of chemical engineering are in health, energy, food, environmental engineering and

biosystems such as biopharmaceuticals, biofuels and biopolymers.

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# CHEMICAL ENGINEERING

## OCTOBER 2011

### IN AUSTRALIA

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## CHEMECA 2011

He said chemical engineers have much to contribute in a world that is moving towards greater sustainability. "Indeed, our role is somewhat unique. We possess a detailed knowledge of process engineering coupled with understanding of novel science and technology across a broad range of disciplines," he said, quoting Dr Robin Batterham, president of the Academy of Technological Sciences and Engineering and past president of the IChemE.

At the conference Lu was presented with the 2011 Chemeca Medal, the most prestigious individual distinction in the chemical engineering profession in Australia and New Zealand.

Bill Hoyle, senior investigator for the US Chemical Safety Board, looked at the lessons to be learned from major accident investigations. He said our capacity as humans to do something technically is often not matched by our capacity to manage the associated risks.

Risk management should not be based just on official safety regulations, because those regulations not only usually lag behind the technical developments, but are also only one element of a proper risk assessment.



*Bill Hoyle ... Our capacity as humans to do something technically is often not matched by our capacity to manage the associated risks.*

Citing the BP Texas City oil refinery disaster in 2005, he pointed out that the office trailers were placed near the hazardous areas, quite in accordance with official guidelines, but ultimately fatal for those people in them when the disaster struck.

Hoyle described a novel approach to risk management called resilience engineering. In this approach everything is done to prevent and anticipate failures while



*Prof Max Lu ... Chemical engineers have much to contribute in a world that is moving towards greater sustainability.*

at the same time acknowledging that it is impossible to anticipate everything and that failures will still happen from time to time. Therefore, in addition to preventative measures, preparations must also be in place for recovery once a disaster has happened.

Hoyle stressed the critical importance of studying major incidents and learning from them.

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## CHEMECA AWARDS AWARDS

### Awards recognise engineering excellence



Queensland University vice-chancellor Prof Paul Greenfield (l) presented the Chemeca Medal to Prof Max Lu.

ALL CHEMECA AWARD PHOTOS BY LARRY PITT PHOTOGRAPHY.

Several industry and academic awards were presented at this year's Chemeca conference in Sydney.

#### CHEMECA MEDAL

The Chemeca Medal is the most prestigious award in the chemical engineering profession in Australia and New Zealand. It is awarded to a prominent Australian or New Zealand chemical engineer who has made an outstanding contribution to the practice of chemical engineering and continues to serve the profession.

**Winner: Max Lu**

Prof Max Lu is the deputy vice-chancellor (research) at the University of Queensland. He was a foundation director of the ARC Centre of Excellence for Functional Nanomaterials from 2003 to 2009. He is the immediate past chair of the IChemE Australia Board and a

former director of the Australian Academy of Technological Sciences and Engineering.

His research expertise is in materials chemistry and nanotechnology. He is known for his work on nanoparticles and nanoporous materials for clean energy and environmental technologies.



Caltex CEO Julian Segal (l) presented the Caltex Award to Prof Ian Cameron.

#### CALTEX TEACHING AWARD

This award recognises outstanding achievement in the teaching of chemical engineers or industrial chemists.

**Winner: Ian Cameron**

Prof Ian Cameron is the former head of Queensland University's School of Chemical Engineering. He has held visiting appointments at universities in the UK and Denmark. In 2003 he won the Australian Award for University Teaching in Physical Sciences and the Prime Minister's Award for University Teacher of the Year. He continues advising universities in Australia and overseas in curriculum issues, as well as theological colleges on pedagogy.

# CHEMICAL ENGINEERING OCTOBER 2011 IN AUSTRALIA

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## CHEMECA AWARDS

### EXXONMOBIL AWARD

This award recognises ongoing contributions to chemical engineering or industrial chemistry through innovations or a series of related publications over a number of years.

**Winner: Suresh Bhargava**

Prof Suresh Bhargava is the leader of advanced materials and industrial chemistry in the School of Applied Sciences at RMIT and deputy vice-chancellor (international) in the College of Science, Engineering and Technology at RMIT. His research has provided improvements in fields as diverse as the removal of organics from the Bayer process in alumina refining, mercury detection and removal from industrial processes, and rejuvenation of car



Prof Suresh Bhargava received the ExxonMobil Award from Esso Australia chairman John Dashwood.

exhaust catalysts. He has developed partnerships with industry which have resulted in a large number of collaborative industrial research grants.

### FLUOR AWARD

This award recognises exceptional management and leadership talent that has directly resulted in a sustained corporate success over a significant period.

**Winner: Russell Scott**

Russell Scott was appointed CEO of Uhde Oil & Gas in May, after holding the position of managing director of Uhde Asia Pacific for three years. In that role he was responsible for all the Uhde companies operating in the Asia-Pacific region.

He was chair of IChemE in Australia in 2008 and is currently deputy president of IChemE International, taking over the presidency next year.



Steven van Wagenveld, director of process engineering – Energy & Chemicals at Fluor Australia (l), presented the Fluor Award to Russell Scott.

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Control & Operation of Centrifugal Gas Compressors  
Perth – 21<sup>st</sup> – 23<sup>rd</sup> March  
Brisbane – 28<sup>th</sup> – 30<sup>th</sup> March

Advanced Process Control  
Perth 30<sup>th</sup> April – 2<sup>nd</sup> May

Practical Aspects of Compressor Control using the CCC System  
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# CHEMICAL ENGINEERING IN AUSTRALIA

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### CHEMECA AWARDS AWARDS



*Prof John Zhu (r) received his award from Freehill partner Brett Connor.*

#### FREEHILL AWARD

This award recognises innovation in product design or development, or service delivery.

**Winner: John Zhu**

Dr John Zhu is a professor at Queensland University's School of Chemical Engineering. His research interests and expertise include advanced catalysis, gas adsorption and separation, carbon nanotube membranes and direct carbon fuel cells. He has raised



*Melanie Cook received the Uhde Shedden Medal from the company's managing director Ron van der Schalk.*



*Somalingeswara Rao Atmuri received the Rio Tinto Award from Dr Grant Wellwood, manager – recovery, technology and innovation at Rio Tinto (Bundooora).*

some \$9 million in funding for research projects. His group has developed a series of novel technologies for hydrogen production from natural gas.

#### RIO TINTO AWARD

This award recognises outstanding applied chemical engineering or industrial chemistry in minerals processing.

**Winner: Somalingeswara Rao Atmuri**

Somalingeswara Rao Atmuri is a chief process engineer with WorleyParsons. During his career he has executed different phases of design projects covering feasibility, process technology selection, front end engineering and detailed design. At present he is leading a large ammonium nitrate project.

#### UHDE SHEDDEN MEDAL

This award recognises early career services to the profession. Achievements may be in technical, marketing or management fields.

**Winner: Melanie Cook**

Melanie Cook is operations technical subsurface manager at Esso Australia. Her team provides geoscience, reservoir and subsurface engineering for Gippsland Basin operations. Cook was responsible for design and execution of Gippsland Operation's Safety Climate Survey for 1300 people to help drive safety improvements through enhances personal accountability and safety leadership.

# CHEMICAL ENGINEERING IN AUSTRALIA

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### CHEMECA AWARDS



Lindsay Wheeler (l), WorleyParsons director engineering corporate, presented the WorleyParsons Award to Gordon Keen.

#### WORLEYPARSONS AWARD

This award recognises personal commitment and leadership in safety or the environment.

**Winner: Gordon Keen**

Gordon Keen is currently responsible for managing ExxonMobil's response to issues relating to greenhouse gas emissions and associated regulatory changes for all the company's business units in Australia and New Zealand. He joined Esso in 1989 and has been



Emeritus Prof Chris Fell presented the Best Student Paper Award to Wenjie Liu.

a consistent champion for process safety and environmental performance.

#### BEST STUDENT PAPER AWARD

This award recognises the best student paper presented at the conference.

**Winner: Wenjie Liu**

Wenjie Liu from Monash University won the award for her paper "Single step assembly of uniform core-shell hybrid microparticles", co-authored by Winston Wu, Cordelia Selomulya and Dong Chen.

#### DAVID TRIMM CATALYSIS AWARD

This new award is in the memory of the late Prof David Trimm, a leading contributor to catalysis and chemical engineering in general. It is awarded to the best student contribution to catalysis at Chemeca.

**Winner: Marina Belkina**

Marina Belkina from the University of Western Sydney won the award for her paper "Direct low temperature synthesis of carbon nanotubes on Si/SiO<sub>2</sub> substrates without using a metal catalyst", co-authored by Kamali Kannangara and Adriyan Milev.



Marina Belkina received the David Trimm Award from the judges Jens Rostrup Nielsen (l) and Emeritus Prof Mark Wainwright.

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## CHEMECA AWARDS



*Dr Stephen Grocott (r) received the R K Murphy Medal from RACI president Prof David Wood.*

### R K MURPHY MEDAL

This medal is the most prestigious award presented by the Royal Australian Chemical Institute's Industrial Chemistry Division. It is awarded for outstanding achievement in process chemistry, chemical engineering or related areas in the chemical industry.



*IChemE president Sir William Wakeham (l) presented the ICHEM Medal to Dr Max Kennedy.*

### Winner: Stephen Grocott

Dr Stephen Grocott is currently the chief adviser for process development at Rio Tinto Mineral Technology Services. He is also an adjunct professor in applied science at RMIT University.

### ICHEME COUNCIL MEDAL

The ICHEM Council Medal recognises exceptional service to a special project.

#### Winner: Max Kennedy

Dr Max Kennedy is the national manager for biological industries at the NZ Ministry of Science and Innovation. As the inaugural chair of ICHEM's New Zealand branch he oversaw the formal establishment and expansion of ICHEM into New Zealand.

### JOHN BRODIE MEDAL

This Medal, awarded by Engineers Australia's Chemical College, recognises the best paper at Chemeca which shows practical usefulness with an immediate application to the science, art and practice of chemical engineering.

#### Winner: Michael Chapman, Robert Nightingale and Brian Monaghan

Dr Michael Chapman and Robert Nightingale are from BlueScope Steel and Brian Monaghan from the University of Wollongong. They won the Medal for their paper "Influence of coke ash on blast hearth behaviour".



*Dr Michael Chapman (r) received the John Brodie Medal from Assoc Prof Brian O'Neill, chair of Engineers Australia's Chemical College.*

# CHEMICAL ENGINEERING OCTOBER 2011 IN AUSTRALIA

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## CHEMECA AWARDS



Jacqui Meadows from Jacobs (l) presented the Jacobs Design Prize to Alexandra Rodriguez and David Bradford representing the winning team from Monash University.

### JACOBS DESIGN PRIZE

This award recognises an outstanding final year student design project.

**Winner:** Sue Yeen Charlene Wee, Alexandra Rodriguez, Daniel Yong, David Bradford, Mohd Ariff Mohammad Diah and Mingda Wang

The students from Monash University received the award for their design project “Timoleo Gas and LNG Plant”.

### GRAEME JAMESON AWARD

This award is offered by the Australasian Particle Technology Society for the best paper in particle technology presented at Chemeca by a postgraduate student.

**Winner:** Li Wang

Li Wang from the University of Queensland won the award for her

paper “Nanotubular structured material supported Ru nanoparticles for preferential CO oxidation in H<sub>2</sub>-rich stream”, co-authored by Jiuling Chen, Zhonghua Zhu and Victor Rudolph.

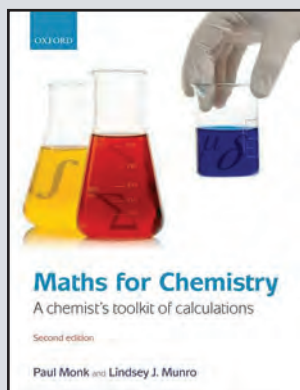


Assoc Prof George Franks from the University of Melbourne presented the Graeme Jameson Award to Li Wang.

## EA BOOKS

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Paul Monk, Lindsey Munro

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This book addresses the challenges faced by many in acquiring the maths skills necessary to gain a full understanding of chemistry. It contains chemical examples throughout in order to demonstrate the relevance of mathematical concepts to the

study of chemistry and is enhanced by definitions of all key terms, self-check questions, and extensive end-of-chapter problems.

[www.eabooks.com.au](http://www.eabooks.com.au)

## CHEM-E-CARS E-CARS

### Temperature sensitive device produces a winner

A team of chemical engineering students from the University of NSW won this year's Chem-E-Car student competition, held in Sydney on 19 September as part of the 2011 Chemeca conference.

The team competed against four other teams from the University of Auckland, NZ, the University of Sydney, another team from UNSW and one from Pendle Hill High School in Sydney.

In the competition small model vehicles no larger than a shoe box are required to travel a certain distance, or as close as possible to it, carrying a specified load.

Both distance and load are given to the teams only shortly before the event. This year the distance was 11.3m with no extra load.

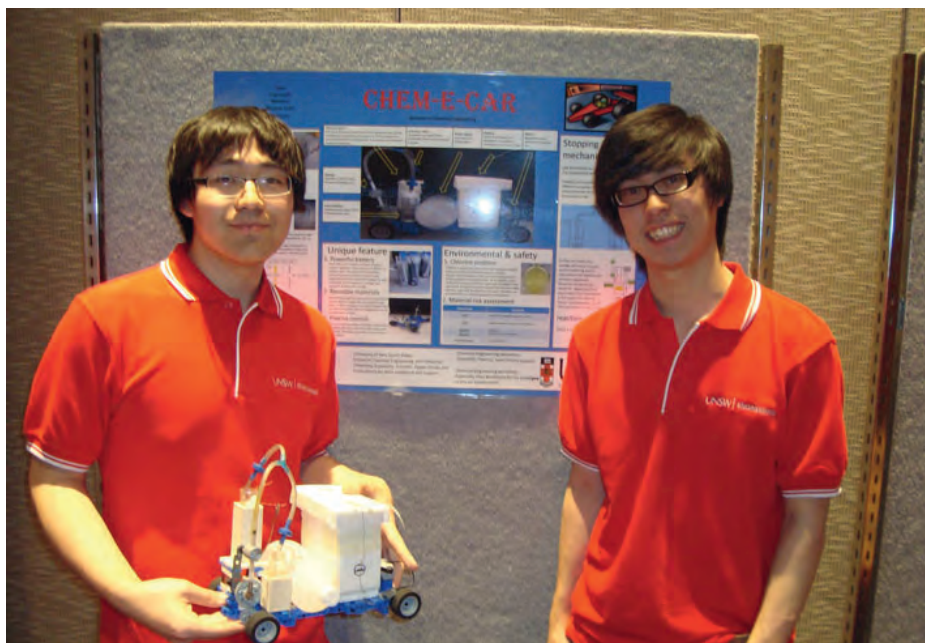
The challenge of the competition is to devise a chemical reaction that propels the car and another mechanism that makes it stop at the required distance. As the distance and load are not known in advance, each team has to run a series of tests to determine a correlation between the parameters of their propulsion and braking mechanism and the distance travelled.

The winning team of Boyne Lian and Wilson Njohana selected a standard battery to drive their car. Their stopping mechanism was based on an exothermic acid reaction which heated up the solution. Once the temperature reached 60°C, the electric propulsion circuit would be broken.

This system proved somewhat fickle but in one of the three runs the team managed to get its car to stop only 1cm from the finish line.

The runner-up was the team from Sydney University of Norhaslina Hamzah, Mingzi Hong, Misheel Jargalsaikhan, Jasmine Martinez and Peter Phuah. Their car proved to be the most consistent achieving virtually the same distance in all three runs, stopping 23cm from the finish line.

Their car was propelled by a zinc-air battery and the braking mechanism was based on a chemical reaction and a light-sensitive circuit breaker. The chemical reac-



*The vehicle of Boyne Lian (l) and Wilson Njohana from UNSW produced the best run in the competition.*



*The Sydney University team of (l-r) Norhaslina Hamzah, Mingzi Hong, Misheel Jargalsaikhan, Jasmine Martinez and Peter Phuah came a close second.*

tion caused a solution to go purple cutting out the circuit breaker once it had reached a certain darkness.

The Chem-E-Car competition was first introduced at Chemeca 2001 and has since become an integral part of the conference.

# CHEMICAL ENGINEERING IN AUSTRALIA

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## NEWS

### Record number of Australian entries shortlisted for IChemE awards

A record number of 10 Australia-based entries has been shortlisted in the 2011 IChemE awards program. The awards will be presented in 13 categories at a gala function on 3 November in Birmingham, UK.

The shortlisted Australian entries are:

**Water award:** Qenos – Recycled water supply to Qenos Olefins

**Education award:** RMIT University – Teaching sustainability in the chemical engineering design project

**Energy award:** Orica mining services and the University of Sydney – Mineral carbonation and industrial symbiosis

**Engineering product award:** University of Newcastle – The

Jameson Flotation Cell

**Sustainable technology award:** CSIRO – MagSonic™ Carbo-thermal Magnesium technology

**Engineering project award:** ABB Australia – Cryogenic sulfur hexafluoride recycling plant

**Innovator award:** Prof John Zhu, University of Queensland

**Young chemical engineer of the year award:** Nathan Moloney, senior process development engineer, BP Australia; and Matthew Gregora, hydrocracking complex operations superintendent, BP Australia.

For more information on the awards go to [www.icheme.org/awards](http://www.icheme.org/awards).

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## CALENDAR

The **Society for Sustainability and Environmental Engineering** is holding its **International Conference** on 24-26 Oct in Brisbane. Inquiries: [www.ssee2011conference.com](http://www.ssee2011conference.com), email [ssee2011@icms.com.au](mailto:ssee2011@icms.com.au) or phone: +61 7 3844 1138.

The **IChemE's 2011 awards** function will be held on 3 Nov in Birmingham, UK. Inquiries: [nigel.stephens@mainlinemedia.co.uk](mailto:nigel.stephens@mainlinemedia.co.uk) or go to [www.icheme.org/awards](http://www.icheme.org/awards).

The **Humanitarian Engineering Conference 2011**, organised by Engineers Australia, Engineers Without Borders and RedR, will be held on 30 Nov–2 Dec in Melbourne. For inquiries contact Nick Byrne at [n.byrne@ewb.org.au](mailto:n.byrne@ewb.org.au). To register visit [www.engineersaustralia.org.au](http://www.engineersaustralia.org.au), and click on Events.

An **Engineering Leadership Residential** – Leadership for Preferred Futures will be held on 5-10 Nov on the Sunshine Coast. Inquiries: [www.eeust.com.au](http://www.eeust.com.au)

The **2012 Engineering Leadership Conference** will be held on 30 May–2 Jun 2012 in Adelaide. Inquiries: [www.elc2012.org](http://www.elc2012.org).

**ACHEMA 2012**, the 30th international exhibition and congress on chemical engineering, will be held on 18-22 Jun in Frankfurt am Main in Germany. For information on ACHEMA go to [www.achema.de](http://www.achema.de), email [achema@dechema.de](mailto:achema@dechema.de). For further information contact [lecture@achema.de](mailto:lecture@achema.de) or phone +49 69 7564 254.

**CHEMECA 2012** will be held on 23-26 Sep in Wellington, New Zealand. Inquiries: [www.chemeca2012.com](http://www.chemeca2012.com). Abstracts due 10 Feb 2012.