

cea

chemical engineering in australia

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PHOTO: QEPRIZE FOUNDATION

Chemical engineer wins 2015 Queen Elizabeth prize

The £1 million Queen Elizabeth Prize for Engineering (QEPrize) has been awarded to Prof Robert Langer in recognition of “his revolutionary advances and leadership in engineering at the interface with chemistry and medicine”, according to the QEPrize Foundation.

Langer was the first person to engineer polymers that were able to control the release into the body of drugs with a large molecular weight. Controlled release delivery allows for the reliable administration of regularly sized doses of a drug that may be toxic in larger quantities and ineffective in smaller ones. The work paved the way for drugs now used in the treatment of cancers, mental illnesses and diabetes, among other disorders.

Previously, controlled release methods had only been able to deliver small molecules. In the 1970s, Langer developed polymer micro- and nanoparticles that could support and release substances able to block angiogenesis, or the formation of new blood vessels, to restrict the growth of cancerous tumours.

“His unconventional thinking toppled the established view that controlled release drug delivery would not work for large molecules like proteins, which are very sensitive to their surroundings,” the Foundation stated.

According to the QEPrize Foundation, an early application of the controlled release technology was in polymer microspheres that delivered

Inside: Top 100 engineer leaves Nufarm

nanopeptide drugs over several months, now widely used to treat prostate cancer and endometriosis. Similar approaches have led to new treatments for schizophrenia, alcoholism, and drug addiction.

Langer has also worked in other areas of bioengineering, including tissue engineering, which led to the development of a new kind of artificial skin now approved for treatment for burn victims.

The Foundation said the drug-coated cardiovascular stents made possible by Langer's engineering work had alone benefited 10 million heart patients.

Langer, who received a chemical engineering degree from Cornell University in New York, is currently one of 11 Institute Professors at the Massachusetts Institute of Technology (MIT). He has over 1000 issued and pending patents, over 200 major prizes to his name, and he is the most cited engineer in history with 163,000 citations, according to *Science*.

Prof Alec Broers, chair of the QEPrize judging panel, said Langer "has made an immense contribution to healthcare and to numerous other fields by applying engineering systems thinking to biochemical problems".

IChemE president Geoff Maitland said the achievement demonstrated the importance of chemical engineering.

"His pioneering work in drug delivery, tissue engineering and nanotechnology has touched the lives of billions of people," Maitland said. "He has developed a field that, quite simply, didn't previously exist." ■



Robert Langer

PHOTO: QEPRIZE FOUNDATION



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Action needed on looming water crisis

IChemE is urging a coordinated global effort to reduce the amount of “hidden” water used in food production.

In a new policy report, *Water Management in the Food and Drink Industry*, IChemE recommends an investment of US\$800 billion per year in the construction of new capacity, infrastructure and appropriate technologies to improve global efficiency of water management.

The report states governments should set targets for reducing the amount of water used in food production worldwide by 20% by 2020. In addition, industry should improve the monitoring of agricultural water usage by using water footprinting.

The use of recycled water in food production

“

2000-5000 L of agricultural water is consumed every day by the average person – the equivalent of up to 1.8 million litres per year.

should also be increased through the creation, enforcement and promotion of rigorous international standards, according to the report.

UN Water estimates that 2000-5000 L of



agricultural water is consumed every day by the average person. This equates to up to 1.8 million litres, or roughly the volume of an Olympic swimming pool, per year.

Currently, around 90% of all freshwater is used by agriculture and industry, with agriculture alone accounting for 70%. Just 10% is used domestically.

Andy Furlong, IChemE director of policy, said estimates suggest the planet will need to produce 60% more food by 2050, and agriculture will need around 19% more water to produce that extra food.

“We have seen how difficult it has been to agree and set targets to manage issues like climate change.”

“It is clear that current production methods are unsustainable and there are genuine risks of food shortages, rising food prices, droughts and social unrest for future generations unless we make more efficient use of water,” Furlong said.

Although chemical engineers hold many of the skills needed to provide essentials like water to sustain a growing population, Furlong noted that “in recent years and decades,

we have seen how difficult it has been to agree and set targets to manage issues like climate change.

“Population growth will throw up similar challenges,” he said. “There are solutions, but these will require political will, major investment and lifestyle changes.”

Furlong suggested education

has a role to play, to ensure consumers understand how their food is produced and enable them to make informed choices.

“None of this will be cheap or easy, but like the mitigation of climate change, it will be necessary to guarantee our quality of life,” he said. ■



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New! Natural Gas Processing on Onshore Facilities
Brisbane - 9-11 November

New! Natural Gas Processing on Offshore Facilities
Perth - 21-23 October

Control and Operation of Centrifugal Gas Compressors
Perth - 13-15 May

New! Operation of Centrifugal Compressors and their Drivers
Perth - 14-16 September

Mechanical Aspects of Centrifugal Gas Compressors
Brisbane - 10-11 September
Perth - 17-18 September

Design and Operation of FPSOs
Perth - 12-14 October

Coal Seam Gas Processing
Brisbane - 16-18 March

Control, Operation and Design of Reciprocating Gas Compressors
Brisbane - 23-24 March

Control and Operation of Centrifugal Gas Compressors
Melbourne - 2-4 September
Brisbane - 7-9 September

Please contact Daren Reid. 08 9355 5599. daren.reid@esd-simulation.com

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Top 100 engineer quits Nufarm

Doug Rathbone, chemical engineer and stalwart CEO of Nufarm, has decided to call it quits after 41 years.

The long standing chief executive of the agricultural chemical company has handed in his surprise resignation after 41 years amid speculation that he was not satisfied with the timing concerning his replacement.

Nufarm's chairman Donald McGauchie revealed Rathbone had stepped down and that a global search for his replacement had commenced. McGauchie said the group executive for commercial operations, Greg Hunt, had been appointed chief operating officer and would also be the acting chief executive.

McGauchie announced that the management team at Nufarm would pursue a \$100 million cost reduction and continuous improvement program that had been in planning since late



Doug Rathbone.

IMAGE: NUFARM

last year. This will be coupled with a separate program to aggressively reduce working capital to meet the company's target of 40% average net working capital to sales by the end of the 2016 financial year.

"Doug has shown an enormous commitment to Nufarm for the past 41 years, including his 15 years leading the company. He has helped build Nufarm from a regional agrichemical business into a global leader in crop protection and specialty seeds," McGauchie said.

Rathbone, a former *Engineers Australia* magazine Top 100 engineer, said he would leave Nufarm on a sound financial footing, with its international operations and seeds businesses well established.

McGauchie said Rathbone will receive a termination benefit of \$1.6 million plus his statutory entitlements. ■

New journal to focus on sustainability

A new IChemE journal focusing on sustainability will be introduced in 2015 and will be managed by Adisa Azapagic, a professor of sustainable chemical engineering at the University of Manchester in the UK.

The journal, *Sustainable Production and Consumption (SPC)*, published in partnership with Elsevier, will cover sectors ranging from transport, food, energy, construction and the chemical and process industries. Along with Azapagic, the editorial board will include experts from Denmark, Germany, Italy, Sweden, Switzerland, UK and the USA.

According to IChemE, *SPC* was established to provide a platform for publishing interdisciplinary papers on research and practice in the field of sustainable production and consumption. The interdisciplinary nature of the journal is unique,

according to Azapagic. She said the field of sustainable production has previously been largely confined to engineering and natural sciences, while sustainable consumption has mainly been in the realm of social sciences.

"The interdisciplinarity is particularly important," Azapagic said. "Sustainability issues associated with production and consumption are not purely engineering or social science problems – they are 'wicked' problems.

"Solving 'wicked' problems requires understanding both the technical complexity and social intricacy within wider environmental, economic and political frameworks."

All five of IChemE's journals, including *SPC*, are available in print format and online from ScienceDirect, Elsevier's online full text scientific database. ■

IChemE Australasian training & events 2015

February

Human Factors (Module 3)
4 - 5 February, Perth, WA

HAZOP Study for Team Leaders & Team Members
24 - 26 February, Brisbane, QLD

April

Fundamentals of Process Safety
13 - 17 April, Perth, WA

Layer of Protection Analysis
21 - 22 April, New Plymouth, NZ

May

Human Factors (Module 4)
13 - 14 May, Perth, WA

Hazards Australasia 2015
26 - 27 May, Brisbane, QLD

June

Human Factors (Module 1)
10 - 11 June, Melbourne, VIC

Layer of Protection Analysis
15 - 16 June, Melbourne, VIC
18 - 19 June, Adelaide, SA

Process Safety Awareness
23 - 24 June, Perth, WA

Heat Integration
30 June - 2 July, Melbourne, VIC

July

HAZOP Study for Team Leaders & Team Members
7 - 9 July, Melbourne, VIC

Fundamentals of Process Safety
13 - 17 July, Brisbane, QLD

Powder Handling & Processing
21 - 23 July, Melbourne, VIC

August

Energy Cost Reduction
4 August, Brisbane, QLD

Process Safety & the Board
5 August, Melbourne, VIC

Human Factors Analysis Tools
18 - 19 August, Melbourne, VIC

Fundamentals of Process Safety
24 - 28 August, New Plymouth, NZ

September

Human Factors (Module 2)
16 - 17 September, Melbourne, VIC

APCCHE 2015 Congress
27 Sept - 1 Oct, Melbourne, VIC

October

Fundamentals of Process Safety
12 - 16 October, Melbourne, VIC

HAZOP Study for Team Leaders & Team Members
20 - 22 October, Perth, WA

November

HAZOP Awareness
10 November, Brisbane, QLD

Chemical Engineering for Non-Chemical Engineers
18 - 20 November, Perth, WA

Establishing & Maintaining a Safety Culture
24 - 26 November, Brisbane, QLD

In-company training

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HIMA to partner Hazards conference

Safety systems engineering firm HIMA Australia will partner with IChemE's premier process safety symposium, Hazards Australasia 2015, which takes place in Brisbane on 26-27 May.

IChemE's director in Australia, Peter Slane, believes that HIMA's support provides a win-win for both parties.

"It is essential that operating companies in the high hazard industries ensure that safety standards don't plummet along with oil prices," Slane said, echoing recent comments made by IChemE Past President and chair of the British Health and Safety Executive, Judith Hackitt. "Process safety training must not be a casualty of budget constraints."

Kurt Martin, HIMA sales manager in Australasia, said the aim of Hazards Australasia 2015 is to drive knowledge sharing and best practice offers a close fit with HIMA's strategic objectives around safety.

"As cost pressures increase, increased vigilance is needed to ensure that safety is not compromised," Martin said. "We are passionate about safety and our mission is to help companies achieve their safety goals."

The conference has attracted a line-up of safety experts who will examine the process safety

challenge from an Australasian perspective. Speakers include Dr Sam Mannan from the Mary Kay O'Connor Process Safety Centre in the US, Stephen Angus from Inmarsat Aviation, BHP Billiton's Andrew Lewin and Melbourne based crisis communication expert Allan Briggs.

Topics to be covered in the Hazards Australasia 2015 program include lessons learned from major hazard incidents; management of abnormal operations; process safety design and inherently safer design; regulatory compliance and legislation; human factors; asset integrity and extending the operation lifespan of infrastructure; safety management systems; education and training; and process safety key performance indicators.

"Hazards Australasia 2015 is a must-attend event for everyone in the region who is serious about process safety," Slane said. He suggested that those involved with process safety and risk management in the high hazard industries, particularly in the resources sector, will benefit from attending.

"There are still a range of [sponsorship and exhibition](#) opportunities available for organisations who want to join HIMA in showcasing their products and services in Brisbane in May," he added. ■

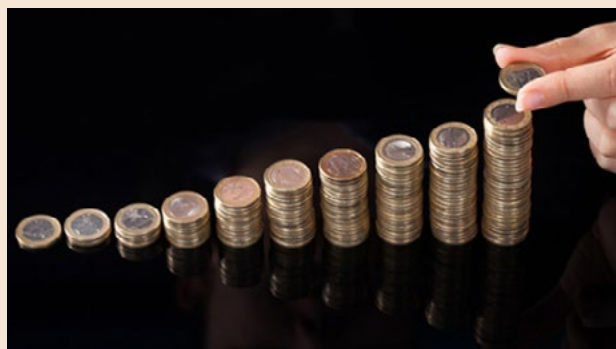
Does it pay to be a chemical engineer?

The 2015 IChemE Salary and Member Satisfaction Survey is now live and will close on 27 February. All eligible members should have received survey details via email. If you haven't but would like to take part, please contact Trish Dwyer (tdwyer@icheme.org).

Later this year, you can use our fully updated salary calculator to benchmark your package by sector, age and level of responsibility.

The data gathered will be collated to compile the Salary and Member Satisfaction Survey Report and to update the Australian online salary calculator.

A detailed analysis highlighting key trends will be published in the June edition of *tce* magazine.



Hazards Australasia 2015 technical program now available

The technical program for IChemE's premier process safety conference, Hazards Australasia, is now available for download.

This event follows on from the successful 2013 inaugural event and will take place in Brisbane on 26-27 May 2015.

Covering every aspect of process safety with a particular focus on the Australasian chemical and process industries, the event will feature a mix of invited speakers, conference dinner, oral and poster presentations and a trade exhibition of process safety related products and services.

The conference themes will cover:

- lessons learned from major hazard incidents
- management of abnormal operations
- process safety design and inherently safer design

- regulatory compliance and legislation
- human factors
- asset integrity and extending the operation lifespan of infrastructure
- safety management systems
- education and training
- process safety key performance indicators.

There are also varying levels of corporate sponsorship available that provide the opportunity to promote your company and or products. Take advantage of the benefits to showcase your products and services to key players in the Australasian process safety field by sponsoring or exhibiting at the event.

Visit the [event website](#) to [register](#), to view the [technical program](#) or to download a [sponsorship prospectus](#). ■

New conference to focus on the future of engineering in era of IoT

The second annual ACI Connect [conference](#) and exhibition, to be held in Sydney on 22-23 April, will address the challenges and opportunities that the Internet of Things and a connected future present for the Australian automation, control and instrumentation sector.

The event features keynotes on 'Smart Manufacturing' and the 'IoT and Your Industry'. There will also be technical and management focused MiniLabs from industry educator IDC Technologies, leadership panels and a live theatre on the exhibition floor displaying the latest technology and applications from leading vendors. The event is a must-attend for engineering professionals across all industry sectors.

This year ACI Connect also features the inaugural [Future Networks Forum](#). The forum

will include presentations from local and international experts representing four of the leading network protocols – PROFINET/Profibus, FieldComm Group (formerly Foundation Fieldbus and HART Wireless), ODVA and EtherCAT Technology Group.

The event will be supported and promoted by IChemE Australia, the Institute of Instrumentation Control and Automation, and Engineers Australia, in addition to the above industrial networking groups. Media support will come from Westwick-Farrow's range of industrial and technology media, including *What's New in Process Technology* and www.ProcessOnline.com.au.

Registrations are now open, with early bird discounts available until the end of March. Visit www.ACIconnect.com.au. ■



APCChE 2015 Congress – abstracts deadline 31 March

There is still time to submit papers for this year's 16th Asian Pacific Confederation of Chemical Engineering Congress (APCChE) on 27 September–1 October 2015.

APCChE is the bi-annual conference for the Asia Pacific region and the 2015 event will incorporate three conferences in one: APCChE, Chemeca 2015 and for the first time the International Conference of Coal Science and Technology 2015 (ICCS&T).

The congress will provide a unique opportunity to learn of the latest advances and best practices in industry and academia.

Abstracts will cover four main themes:

- industry developments and directions (including industry best practice)
- Asia Pacific site operations (project case studies and multinational management

approaches)

- research and innovation (new directions from across the Asia Pacific region, including coal science and technology as part of ICCS&T)
- professional development and education (including professional training 'taster' workshops).

APCChE 2015 is hosted by the Australian and New Zealand Federation of Chemical Engineers (ANZChE), comprising the Royal Australian Chemical Institute (RACI), the Institution of Chemical Engineers (IChemE), Engineers Australia (EA) and the Institution of Professional Engineers New Zealand (IPENZ).

To submit abstracts visit the [event website](#) or contact [April Hinde](#) for further information. ■

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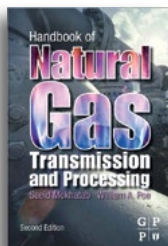
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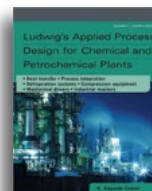
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to this edition are expanded chapters on heat transfer; chapters on the design of shell and tube heat exchangers, double pipe heat exchangers, and air coolers; and batch heating and cooling of process fluids.





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IoT and Industry — perfect match or perfect storm?

Michael Freyny — Executive General Manager, Digital Factory / Process Industries and Drives, Siemens

Future Networks Forum:

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