

NEWSLETTER



Welcome to the Spring Edition

Issue 12

May 2015

Message from the Director of CPSE, Professor Nilay Shah



December was an occasion for the Centre and loyal supporters to get together and celebrate CPSE's 25th Anniversary. I would like to thank Roger and our many Industrial Members for marking this milestone with us. It was a good time to reflect on CPSE's achievements and to look forward to future successes. I would like to thank the PhD students who gave poster presentations and also George, Erich, Eva, Ruth, Nina, and Vivek. In particular Nina's students Dionysis and Izzati for presenting the Focus Talk...no mean feat for students to talk 30 minutes in front of experts. Thank you also Stratos for giving the Roger Sargent Lecture before leaving for Texas A&M Engineering. You will be missed! While CPSE celebrated its anniversary with founding father Roger Sargent, IChemE were at the same time honouring Roger's contributions by creating a new medal in his name. Roger, congratulations for a well deserved recognition! Congratulations also to George and Niall for winning IChemE awards and Eva for getting the Chemistry & Physics Award.

I had the pleasure of meeting the President of the Republic of Singapore, Tony Tan Keng Yam and gave him a tour of the Carbon Capture Pilot. The President only had a short window of stay in the UK and so it was an honour that he spent time visiting us. I would like to highlight some events coming up which will be of interest to our Members on page 6, in particular the optimisation conference. The newsletter also comes with a technical article on "Expanding the applicability of the SAFT-g group contribution equation of state" written by Claire Adjiman. As always, we welcome suggestions for technical topics from our Industrial Members.

Professor Shah and President of the Republic of Singapore



Professor Nilay Shah, President of the Republic of Singapore, Tony Tan Keng Yam and Professor Alice Gast, Imperial President during his tour of the Carbon Capture Pilot Plant, Friday 24th October 2014. *More on page 3.*

CPSE 25th Anniversary



Professor Shah, CPSE 25th Anniversary Dinner

IChemE Names New Medal after Professor Roger Sargent



IChemE has created the Sargent Medal for research in computer aided product and process engineering in honour of CPSE's founding father Professor Roger Sargent. The medals are designed to recognise the work of members of the chemical engineering academic community, who have contributed significantly to the advancement of the profession and society... *More on page 3.*

Chemistry & Physics Award

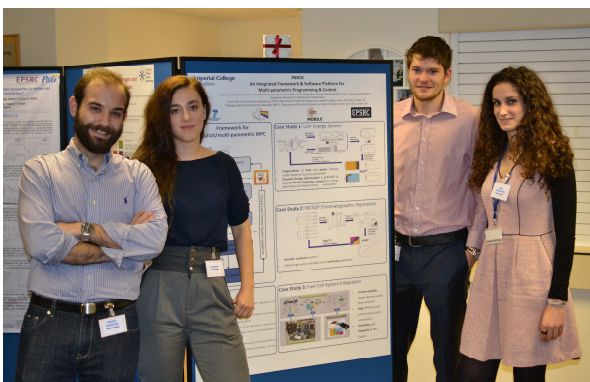


Professor Andrzej Górak, Editor of *Chemical Engineering and Processing: Process Intensification* and Professor Eva Sorensen, Editor in Chief of *Chemical Engineering Research and Design* as well as their co-authors (Hartmut Schoenmakers and Zarko Olujic) won the Chemistry & Physics Award for their book "*Distillation: 1. Fundamentals and Principles, 2. Operations and Applications, 3. Equipment and Processes.*" This was announced at the Association of American Publishers' (AAP) Professional and Scholarly Publishing (PSP) Annual Conference in Washington, DC. The award is given for

From left to right: Profs. A. Górak, E. Sorensen, Ž. Olujic and H. Schoenmakers

the best in professional and scholarly publishing, as judged by peer publishers, librarians, academics and medical professionals. This year's competition attracted 540 entries of books, reference works, journals and electronic products in more than 40 categories: <http://www.journals.elsevier.com/chemical-engineering-research-and-design/>

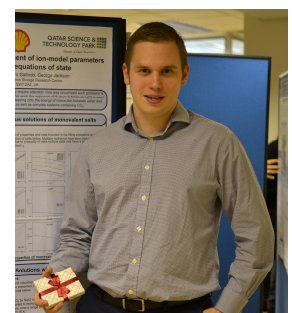
CPSE 25th Anniversary



1st Prize £150 - Maria Papathanasiou, Amit Manthanwar, Ioana Nascu, Nikolaos A. Diangelakis, Richard Oberdieck, Muxin Sun and Styliana Avraamidou

The Centre for Process Systems Engineering was inaugurated in August 1989 and has since been an innovative research Centre. On 4th and 5th December, we celebrated 25 years with the Centre's founding Director Professor Roger Sargent. When CPSE was established with an EPSRC grant, over a hundred Centres were created at the same time. Out of these, only two Centres have remained: CPSE being one and the other Southampton University Optoelectronics Research Centre. CPSE has faced many

challenges and yet continues to be a Centre of Excellence because of the hard work and dedication of its academics, researchers and students. It was fitting therefore to celebrate 25 years of distinction in the Centre's subtle fashion. There were many events, which included Student Poster Presentations, Roger Sargent Lecture, Consortium Meeting and Dinner. You can see the pictures of the Student Posters Presentation Winners. Presentations from the Annual Meeting are available on the 'Members Only' section of the website.



2nd £100 - Daniel Eriksen



3rd £50 - Cristian Triana

CPSE Research Party - 13th February



Thank you Mark Allenby and Maria Papathanasiou for organising the first CPSE Research Party at Floripa on 13th February (Valentine's Eve). Everyone had a blast and Professor Shah is looking forward to funding the next party.

IChemE Creates New Sargent Medal



Professor Roger Sargent

Continuing from page 1. Professor Sargent is one of 8 people to have a medal named after him. The timing coincided with CPSE's 25th Anniversary. Professor Sargent who founded the Centre is considered the "Pioneer of Process Systems Engineering." The first person to win the Sargent Medal is Roger's former student Professor Ignacio Grossmann, Carnegie Mellon University. While Roger's other student Professor Ken Morison, Canterbury University, New Zealand won the Council Medal.

"We are very pleased to announce the names behind our new medals and celebrate some of their iconic achievements and contributions stretching back nearly a hundred years...IChemE is looking forward to celebrating their historic achievements and perpetuating their names in the future by awarding their medals to the next generations of chemical engineers for decades to come." Claudia Flavell-While, IChemE Director of Publications.

Winners of 2014 IChemE Medals



Professor George Jackson

IChemE



Dr Niall Mac Dowell

Two CPSE academics were amongst the 2014 IChemE winners. Professor George Jackson won the Guggenheim Medal for research excellence in thermodynamics and/or complex fluids. Dr Niall Mac Dowell won the Nicklin Medal for exceptional contribution to the process sciences by an author who has graduated within the last ten years. Congratulations George and Niall!

President of the Republic of Singapore

Continuing from page 1. The President of the Republic of Singapore, Tony Tan Keng Yam paid a State Visit to the United Kingdom as the guest of Her Majesty The Queen. During his stay, he visited Imperial College and was met by Professor Nilay Shah and shown around the Carbon Capture Pilot Plant. Professor Shah said "it was an honour to meet President Tony Tan Keng Yam. There was a huge delegation of people wanting to see him so it was a privilege to spend time with him and discuss the research we are doing." The President then went on to hear about Imperial's joint medical school with Nanyang Technological University, Singapore, phenome research that builds on the London 2012 Olympic legacy, big data technology, cybersecurity and the new campus, Imperial West.

New Ways for Emission Control

Dr Mahdi Sharifzadeh, Dr Lei Wang, and Professor Nilay Shah have carried out a study that demonstrates how to reduce harmful CO₂ emissions from bio-refineries. The team developed a new bio-refinery process which they suggest could reduce CO₂ emissions to less than six per cent of the original carbon content of the biomass. The team also developed a new process for producing chemicals called Olefins could decarbonise the process by up to 44 per cent. In their study, they show how manufacturers of Olefins, an essential chemical used to make plastics, can reduce CO₂ emissions without affecting their competitiveness. You will be able to read more on this fascinating research in the next edition of the CPSE Technical Article.

Making and Healing Blood

Professor Sakis Mantalaris and his BioBlood Team Biological Systems Laboratory (BSEL) were involved in the Imperial Festival Contribution.



Joana Dos Santos and Iliana Fauzi (Lia) had a stall called "Making and Healing Blood" where they showcased some of their research. The team are looking into the fabrication, design, and modelling of human blood culture systems for cell therapy, disease modelling, and blood production. This includes the study of cell growth in leukemic and healthy bone marrow, umbilical cord, and peripheral blood in more natural, 3D culture systems.

Education

CPSE Says *Au Revoir* to Professor Pistikopoulos

Professor Stratos Pistikopoulos

Former CPSE Director, Professor Stratos Pistikopoulos left Imperial in January to work for Texas A&M Engineering. Professor Pistikopoulos was a great supporter of CPSE, having led the Centre for 7 years (2002-2009). Before his departure, he delivered the 21st Professor Roger Sargent Lecture, titled "Multi-Parametric Programming & Control, 25 years later: what is next?"

Prof Pistikopoulos obtained a Diploma in Chemical Engineering, Aristotle University of Thessaloniki, Greece. He then graduated with a PhD in Chemical Engineering, Carnegie Mellon University, USA. He worked with Shell Chemicals in Amsterdam before joining Imperial in 1991. He has authored/co-authored over 350 major research publications, 10 books and 2 patents. A Fellow of the Institution of Chemical Engineers, and Editor and Co-Editor of many books and journals, Professor Pistikopoulos has been a co-founder/non-executive director of Process Systems Enterprise (PSE) Ltd and a founder/director of Parametric Optimization Solutions (ParOS) Ltd. In 2007, Professor Pistikopoulos was a co-recipient of the prestigious MacRobert Award from the Royal Academy of Engineering; in 2008, he received an Advanced Investigator Award from the European Research Council; in 2009, He was the recipient of the title of *Doctor Honoris Causa*, the highest honorary distinction of the University Politehnica of Bucharest. In 2012, he was the recipient of the Computing in Chemical Engineering Award of the Computing and Systems Technology (CAST) Division of the American Institute of Chemical Engineers (AIChE) - only the second person to receive it from the UK (after Professor Roger Sargent himself in 1990). In 2013, he was elected Fellow of the Royal Academy of Engineering. At Texas A&M, Professor Pistikopoulos will continue his research in developing fundamental theory and optimization based methodologies and computational tools, in particular multi-parametric programming and explicit model predictive control with applications in energy systems and personalized healthcare engineering. We are pleased that he will continue to be a member of CPSE as Visiting Professor. We asked Professor Pistikopoulos what he will miss about CPSE:

"CPSE has been the reason why I came to London and Imperial – it has been my intellectual home for over twenty-three years, the place where I have 'grown up' as a person, researcher and scholar. It will always have a very special place in my heart."

ESD & Energy Smart Ops



Professor Nina Thornhill



Sara Budinis

Professor Nina Thornhill and her Student Sara Budinis recorded an interview on the collaboration between Imperial College and ESD Simulation Training within the Energy SmartOps project. The interview is now live and you can watch it on: <http://vimeo.com/116281783>

CPSE Students Win Anglo-Thai Awards

Two CPSE PhD students: Thapanar Suwanmaj (supervisor Dr Krishnan) and Pongsathorn Dechatiwongse (supervisor Professor Maitland) won a highly commend-



P Dechatiwongse (right)

ed Award in the 2014 Anglo-Thai Education Awards in the Engineering/Technology category. The Award for Excellence is given to Thai students studying in the UK, with exceptional academic achievements of Thai post-graduate scholars in the UK.

New CPSE Optimisation Courses

CPSE held two new Optimisation Courses in April 2015. Professor Claire Adjiman is the Director of the courses which included: Professor Nilay Shah, Dr Benoît Chachuat, Dr Ruth Misener and Dr Remigijus Paulavicius. The courses which were created specifically to address Industrial needs were attended by some of our Industrial Members and students. They were so successful, the College has officially endorsed them and is providing Imperial College certificates. CPSE will run the courses annually for the public (CPSE Industrial Consortium Members will be able to enrol up to two employees for free). **The Introduction to Optimisation Course** provided an introduction to concepts in problem formulation and solution methods for linear, nonlinear and mixed-integer problems, focusing on local optimisation methods, with a brief introduction to global optimisation. **The Advanced Optimisation Course** built on the introductory course and focused on concepts in global optimisation, bilevel optimisation, dynamic optimisation, optimisation under uncertainty. The dates for the next courses will be out soon.

PhD student Susie Sou (supervisor Dr Kontoravdi) won the prize for best oral presentation at the UK meeting of the European Society for Animal Cell Technology.

Dr Mahdi Sharifzadeh (supervisor Professor Shah) won Best Presentation" of "Design of CO₂ Capture Systems" session in the AIChE Annual Meeting 2014.

Most accessed articles

The Molecular Systems Engineering group article has been listed as one of the most accessed articles in 2014 from *The Journal of Chemical Physics*. The article "Accurate statistical associating fluid theory for chain molecules formed from Mie segments" Thomas Lafitte, Anastasia Apostolakou, Carlos Avendaño, Amparo Galindo, Claire S. Adjiman, Erich A. Müller, George Jackson. *J. Chem. Phys.* 139, 154504 (2013)

The 2013 Best Paper from the Journal of Global Optimization (out of 223 papers) was awarded to R. Misener and C. A. Floudas, GloMIQO: Global mixed-integer quadratic optimizer. *Journal of Global Optimization*, 57: (1)3-50, 2013. JoGO is a top journal for nonconvex nonlinear optimization. The announcement was only recently made as it takes time for the committee to consider heavy mathematical manuscripts.

In March 2015, the Women@Imperial Exhibition was launched. The public exhibition of photographs and archive material celebrated the work of female staff and students at Imperial past and present. Women in CPSE has increased every year, both from Imperial and UCL. Today women make up 35% in CPSE.

PhD Students: Nasim Elahi (supervisor Professor Shah) and Stamatina Zavitsanou (supervisor Professor Pistikopoulos) successfully defended their theses. Congratulations Dr Elahi and Dr Zavitsanou!



Roger Sargent Lecture - Stratos, Berc, Wolfram and Costas



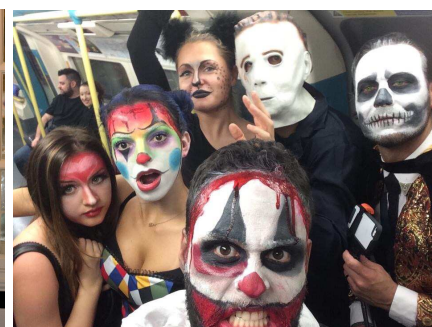
CAST Dinner - Benoit, Stratos and Ruth



CPSE Research Party - Valentine's Eve



25th Anniversary - Stratos, Roger and Nilay



Halloween - Dionysis (M. Myers) & Friends

Dates For Your Diary!

The Twenty Second Professor Roger W.H. Sargent Lecture

Thursday 3 December 2015 · 17:30

**Process Systems Engineering at Crossroads:
Challenges and Opportunities in the Era of Watson**
Professor Venkat Venkatasubramanian
Columbia University

To register, please contact Miss Senait Selassie:
s.selassie@imperial.ac.uk

CPSE Seminar Series 2015

September 2015, TBC

Professor Kim Chuan Toh, National University of Singapore

Expertise: Algorithms, Applications, and Theory for Matrix
Optimisation; Large-scale Semidefinite Optimisation

[http://www.nus.edu.sg/uawards/2003/winners/
toh_kim.html](http://www.nus.edu.sg/uawards/2003/winners/toh_kim.html)

All seminars will be held in: CPSE Seminar Room, Roderic
Hill C615, Department of Chemical Engineering, South Ken-
sington Campus, London, England SW7 2AZ, UK

For our Events, please check:

[www3.imperial.ac.uk/centreforprocesssystemsengineering/
newsandevents](http://www3.imperial.ac.uk/centreforprocesssystemsengineering/newsandevents)



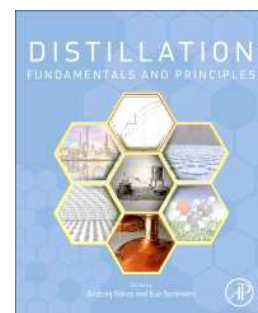
Optimisation Conference

The 17th British-French-German Conference on Optimization is the 17th of the series of French-German meetings which started in Oberwolfach, Germany in 1980. Since 1998, the conference has been organized under the participation of a third European country. This time it is jointly organized with Britain, and takes place at Imperial College London. The conference will consist of invited plenary talks, parallel invited and contributed sessions.

The conference will address all aspects of optimization and its applications, including:

- optimization theory and algorithm design
- robust and stochastic optimization
- variational inequalities and convex analysis
- control theory
- applications in image processing, finance, energy, operations management and engineering

The conference is organised Department of Computing, Imperial College London, and Centre for Process Systems Engineering, Imperial College London, and Imperial College Business School. For more information, please visit the conference website: <http://optimisation.doc.ic.ac.uk/bfg2015/>



We are preparing the agenda for the next CPSE Annual Consortium Meeting. We are happy to receive feedback and input from our industrial members regarding the agenda. If there is a topic you would like included, or, if you would like to make a presentation please contact your company's Academic Friend before 15 June 2015.

The CPSE Newsletter aims to keep members of the Industrial Consortium, Staff and Students updated on Centre activities. If you have any comments, or would like to add to the next issue, please email: Miss Senait Selassie: s.selassie@imperial.ac.uk.