

## NEWSLETTER



Welcome to the Autumn Edition

Issue 13

October 2015

## Message from CPSE Director, Professor Nilay Shah



We have an exciting addition to our Industrial Consortium. It gives me great pleasure to welcome ExxonMobil, the largest publicly quoted international oil and gas company. Also I welcome Marc Deisenroth, who is the newest academic to join CPSE. Marc is a Lecturer in Statistical Machine Learning in the Department of Computing at Imperial College.

In other news, the Royal Academy of Engineering have elected Claire and me as Fellows. I would like to congratulate Claire for being one of four women of the 50 people elected! It is an honour to be elected along with my colleague. The celebrations for the National Women in Engineering Day were under way at CPSE, UCL and Imperial and gave us an opportunity to celebrate women in academia especially in engineering.

The 17th British-French-German Conference on Optimization was a great success. Congratulations to everyone that organized and participated in the conference. Before, I wrap up, I would like to highlight the events coming up which will be of interest to our members (please see on pages 6 and 7). The Annual Industrial Consortium Meeting will be held on 3rd - 4th December 2015. We will be having presentations from our distinguished company members P&G and Syngenta. I am looking forward to their presentations and to introducing ExxonMobil to members. A highlight will be the Twenty Second Professor Roger Sargent Lecture, which will be delivered by Professor Venkat Venkatasubramanian, Columbia University on 3rd December 2015. The newsletter comes with a technical article on Bridging the Gap: Computer-Aided Engineering for Energy Security and Environmental Protection by my Research Associate Dr Mahdi Sharifzadeh. As always, we welcome suggestions for technical topics from our Members.

## ExxonMobil Joins CPSE Consortium

ExxonMobil has become the latest company to join the CPSE Industrial Consortium. Ranked 5th in the Forbes Global Companies, ExxonMobil has traded for over 125 years. It has evolved from a regional marketer of kerosene in the U.S. to the largest publicly traded petroleum and petrochemical enterprises in the world. ExxonMobil holds a huge inventory of global oil and gas resources. Professor Shah, CPSE Director said: "We are delighted ExxonMobil is part of CPSE Consortium and we look forward to working with them." More on page 3.

## CPSE Academics are Elected Fellows of the Royal Academy of Engineering



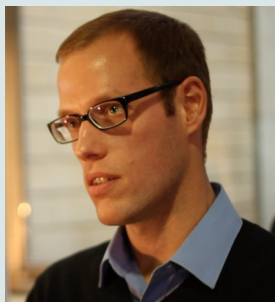
Professor Claire Adjiman

CPSE proudly congratulates Professor Nilay Shah and Professor Claire Adjiman for being elected Fellows of the Royal Academy of Engineering. The Academy's Fellowship represents "the nation's best engineering researchers, innovators, entrepreneurs, business and industry leaders." Election to the Academy is by invitation only. They are distinguished by the title Fellow of the Royal Academy of Engineering and the post-nominal FEng. Claire is among four women from the list of 50 to be elected as Fellows. <http://www.raeng.org.uk/about-us/people-council-committees/the-fellowship/new-fellows-2015>



Professor Nilay Shah

## Education



### CPSE Welcomes New CPSE Academic Dr Marc Deisenroth

CPSE is delighted to introduce the new academic Marc Deisenroth. Marc is Lecturer in Statistical Machine Learning in the Department of Computing at Imperial College London. Marc completed his PhD at the Karlsruhe Institute of Technology (Germany) in 2009. He conducted his PhD research at the Max Planck Institute for Biological Cybernetics (2006–2007) and at the University of Cambridge (2007–2009).

Prior to becoming a Lecturer, Marc was Research Fellow in the Department of Computing at Imperial College London from 2013 to 2015. From 2011 to 2013 he was a Senior Research Scientist & Group Leader (Learning for Control) at TU Darmstadt (Germany). From 2010 to December 2011, he was a full-time Research Associate at the University of Washington (Seattle). Marc's research interests centres around methodologies from modern Bayesian machine learning and their applications autonomous control and robotic systems. Marc's goal is to increase the level of autonomy in robotic and control systems by modeling and accounting for uncertainty in a principled way. Potential applications include intelligent prostheses, autonomous robots, and healthcare assistants.

### Qatar Energy R&D ORYX GTL Student Award



Ibrahim Daher

PhD student Ibrahim Daher, (co-supervised by Professor Geoff Maitland and Dr John Crawshaw) won the Qatar Energy R&D ORYX GTL Student Award for Post Graduate Education. Ibrahim was recognised as a rising star in the gulf state of Qatar winning an award for his outstanding research which is believed could have a major impact on industry in Qatar. Professor Geoff Maitland said: "I am delighted and very proud of his achievements. Ibrahim's research should have a significant impact on the design of carbon dioxide injection processes into carbonate reservoirs and aquifers and is preparing him well for his technical leadership role when he returns to Qatar from Imperial."

### Philanthropic Support from Alumni



Izzati Mohd Noor is the first Marit Mohn PhD Scholar

Izzati Mohd Noor (supervisor Professor Nina Thornhill) is the first student to have received the Marit Mohn PhD Scholarship. The generous gift from Alumni Mrs Marit Mohn (Chemical Engineering, Imperial College 1973) supports candidates of any nationality, and provides tuition fees, maintenance allowance and a bursary for travel. The scholarship was extended to allow two more PhD students. Professor Jeff Magee, Dean of the Faculty of Engineering said: "Philanthropic support for scholarships is hugely important. It gives us the flexibility to recruit the very best candidates in priority research areas, or in important fields that are relatively underfunded by public money."

### All Time Greats



Professor George Jackson

A paper co-authored by Professor George Jackson (W. G. Chapman, K. E. Gubbins, and M. Radosz) on the Statistical Associating Fluid Theory (SAFT), was selected as one of the 'All Time Greats' in the history of *Industry & Engineering Chemistry Research (I&ECR)*. I&ECR

has been publishing applied chemistry and chemical engineering research for over 100 years. The first issue was published in 1909 and today it is the largest and most-cited journal in chemical engineering. Given I&ECR's international reputation, and global reach, the paper by Professor Jackson and his co-authors titled 'New Reference Equation of State for Associating Liquids W. G. Chapman, K. E. Gubbins, G. Jackson, and M. Radosz (1990) indicates how influential it is. The paper describes an approach which permits scientists to make precise predictions about the behaviour for a broad range of liquids including solutions of polymers and surfactants.

Dr Nouri Samsatli, Dr Sheila Samsatli and Professor Nilay Shah developed a mathematical model for the Energy Technologies Institute (ETI) that can help determine the best strategy for satisfying energy demands through biomass. The model was published in *Applied Energy*. <http://www.sciencedirect.com/science/article/pii/S0306261915001142>

### Thank You And Goodbye!



Professor Geoffrey Maitland

Professor Geoffrey Maitland has stepped down as the 74th President of IChemE. Since he began his Presidency, Professor Maitland launched the *ChemEng365* blog. The blog catalogues 365 chemical engineering successes and achievements.

Before his departure, Professor Maitland recorded a farewell video and blog. You can see the video and subscribe to the blog: <http://ichemeblog.org/2015/05/28/thank-you-and-goodbye>

*Continuing from page 1.* Professor Costas Pantelides will be ExxonMobil's academic 'Friend' (the contact in CPSE). ExxonMobil joins our other high profile Multinational Company Members which include: ABB Corporate Research, AkzoNobel, BP, Petrobras, Praxair, PSE, Procter & Gamble, Shell Research & Technology and Syngenta.

Dr Niall Mac Dowell and Dr Paul Fennell were involved in the production of *Bridging the gap: improving the economic and policy framework for carbon capture and storage in the European Union*, a joint report by the Grantham Research Institute (LSE) and the Grantham Institute. <http://www.imperial.ac.uk/grantham/publications/bridging-the-gap-improving-the-economic-and-policy-framework-for-carbon-capture-and-storage-in-the-european-union.php>

### Women@Imperial Exhibition and Women@CPSE

The Women@Imperial exhibition formed part of a wider Women's celebration which ran February – June 2015. It included a series of postdoc briefings by female alumni. In addition the public exhibition of photographs and archive material celebrates the work of female staff and students at Imperial past and present. CPSE is proud to have joined in the celebration of leading women researchers. The number of women in CPSE have increased every year and we are working hard to continue recruiting more women and getting involved in outreach projects to encourage girls to take up engineering as a career. Below are the female academics of CPSE, we celebrate their achievements and those of our students and post docs. On *page 5*, read how University College London and Imperial College London marked the National Women in Engineering Day.





## Blogs

Research Associate, **Dr Christoph Mazur** has written a blog for the Energy Futures Lab on 'Making City Districts Work Efficiently'. <http://goo.gl/BdhgIZ>

PhD student, **Clara Heuberger** wrote a blog on 'Combining Engineering and Economics to Understand Our Future Electricity Supply.' <http://goo.gl/d0xsKs>

Research Associate, **Dr Miao Chen** has written a blog on 'Modelling the UK's Bioenergy Supply Chains, a Whole Systems Approach.' <http://goo.gl/U9iEZf>

**Professor Maitland** wrote his last blog for the *ChemEng365* blog. The blog catalogues 365 chemical engineering successes and achievement. <http://ichemeblog.org/2015/05/28/thank-you-and-goodbye>

## 17th British-French-German Conference

The 17th British-French-German Conference on Optimization was a great success. The conference was 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 was jointly organized with Britain and took place at Imperial College London. The conference consisted of invited plenary talks, parallel invited and contributed sessions. The conference was organised by the Department of Computing, the Centre for Process Systems Engineering, Imperial College London and the Imperial College Business School.

Research developed by Dr Mahdi Sharifzadeh, Dr Lei Wang and Professor Nilay Shah published two new studies that demonstrate how to reduce harmful carbon dioxide emissions from bio-refineries. You can read the full articles:

[http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news\\_1-5-2015-10-54-46](http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news_1-5-2015-10-54-46)

## Our Energy Future: The Next 50 Years

Professor Geoffrey Maitland and Dr Iain MacDonald gave a talk at the Pint of Science Festival at the Bolton pub in May. They talked about fracking, rising carbon emissions, climate change, and renewable energy. Professor Maitland took them on a journey through the current energy landscape and how it will change in the near future. Dr MacDonald explained how chemical engineers can relieve the pressing problem of climate change by developing ground-breaking technologies to capture and store carbon dioxide. The Pint of Science Festival aims to deliver interesting, fun, relevant talks on the latest science research in an accessible format to the public – all in the pub!

<https://pintofscience.co.uk/about/>

A paper written by Professor Claire Adjiman and Dimitrios Nerantzis was selected as one of the 12 most notable papers, out of 425 papers, published in the proceedings of the 12th International Symposium on Process Systems Engineering held in Copenhagen in June. "Deterministic global optimization and transition states", 12th Int. Symp. On Process Systems Eng. and 25th Eur. Symp. On Comp. Aided Process Eng., Computer-Aided Process Engineering, vol. 37, Part A, Gernaey, K.V., Huusom J.K, Gani, R. (Eds), Elsevier, Amsterdam, 2015, 851-856.

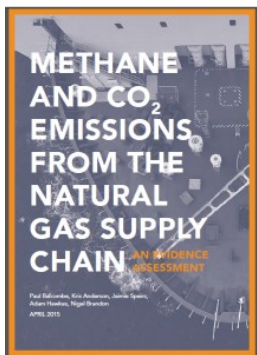
Dr Niall Mac Dowell gave his "expert reaction to the Drax decision to stop investing in CCS." Energy company Drax had announced their abandonment of the White Rose Carbon Capture and Storage (CCS) scheme, blaming the recent cuts in renewable energy subsidies for the decision. His comments were picked up by **the Engineer** and **the Science Media Centre**.

<http://www.theengineer.co.uk/energy/news/drax-pulls-out-of-white-rose-ccs-project/1021127.article>  
<http://goo.gl/zoSdB0>

CPSE Director, Professor Nilay Shah has been invited to join the Manufacturing Commission, the independent in-depth research arm of the All-Party Parliamentary Manufacturing Group.

CPSE has had two academic promotions. Dr Benoît Chachuat has been promoted to Reader and Dr Peter DiMaggio to Senior Lecturer. We congratulate both Peter and Benoît!

### SG Launches White Paper



The Sustainable Gas Institute launched its first White Paper. The paper is a comprehensive evidence-based review of the available data on both methane and carbon dioxide emissions from the natural supply chain. It is a review of 250 current papers on the topic in order to

assess our current knowledge of emissions globally and to identify where there are gaps in our understanding. The paper provides recommendations with the aim of assessing and improving climate mitigation potential at each stage in the chain. <http://www.sustainablegasinstitute.org/publications/white-paper-1/>

### President's Medal



Professor Costas Pantelides

Professor Costas Pantelides has been awarded President's Medal for Excellence in Innovation and Entrepreneurship. The President's Awards for Excellence recognise staff achievement. Professor Alice P. Gast President said:

"Congratulations and thank you to this year's President's Awards winners for their outstanding contributions to the College. It is very gratifying to be able to recognize them all for their truly remarkable work."

### National Women in Engineering Day at UCL and Imperial

Continuing from page 3. To Celebrate the National Women in Engineering Day on 23rd June, the Faculty of Engineering at University College London invited young people and their teachers to UCL at Bloomsbury Campus. The event was packed with budding future engineers keen to interact with present engineers. The celebrations at Imperial College were aimed at encouraging more young women to consider engineering as a career. Imperial organized for their female staff and students to take part in a photo-led campaign showcasing their work by, holding a message answering the question 'What do you do?' You can see some of the photos from both events below.



## Dates For Your Diary!

### CPSE Industrial Consortium Members and their Academic Friends

**ABB Corporate Research - Professor Nina Thornhill**

**AkzoNobel - Professor George Jackson**

**BP- Professor Nilay Shah**

**ExxonMobil - Professor Costas Pantelides**

**Petrobras -Professor David Bogle**

**Praxair - Dr Benoit Chachuat**

**PSE - Professor Costas Pantelides**

**Procter & Gamble - Professor Erich Muller**

**Shell Research & Technology - Professor Geoffrey Maitland**

**Syngenta - Professor Claire Adjiman**

Companies and organisations wishing to learn more about the CPSE Consortium membership should contact CPSE Director, Professor Nilay Shah at [n.shah@imperial.ac.uk](mailto:n.shah@imperial.ac.uk)

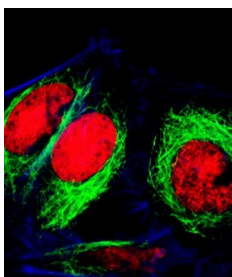
**CPSE's Annual Consortium Meeting** will take place on **3rd and 4th December 2015**. This is strictly for Consortium Member Companies. To register, please contact Miss Senait Selassie: [s.selassie@imperial.ac.uk](mailto:s.selassie@imperial.ac.uk)

### Events at Imperial



#### **Energy Futures Lab's Annual EDF Lecture 3 Nov 2015, 18:30 – 21:00**

Vincent de Rivaz of EDF Energy will discuss what is at stake at the Paris Climate Summit and the responsibility of business in tackling climate change.



#### **The story of a molecule 16<sup>th</sup> Nov, 18:00 to 19:00**

Discover how we are able to see a single molecule and what that means for our understanding of biological processes at the 2015 Ernst Chain lecture.

### CPSE Seminar Series 2016

**Dr. Thomas Vetter (The University of Manchester)**  
10 February 2016, 4pm

**Dr. Claudia D'Ambrosio (LIX École Polytechnique)**  
24 February 2016, 4pm, \*Huxley 311, DoC\*

**Dr. Pietro Belotti (FICO)**  
9 March 2016, 4pm

**Dr. Carl Laird (Purdue University)**  
TBC, 4pm

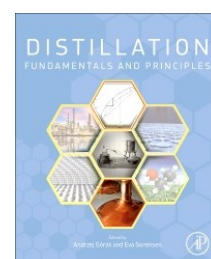
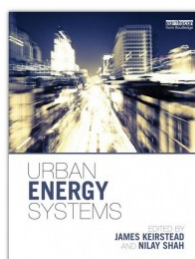
**Dr. André Bardow (RWTH Aachen)**  
4 May 2016, 4pm

**Dr. Mariano Martín (Universidad de Salamanca)**  
11 May 2016, 4pm

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

### Energy Futures Lab 10th Anniversary

CPSE have been invited to exhibit at the **Energy Futures Lab 10th Anniversary celebrations**. Professor Nilay Shah and his team will be there on **Tuesday 17th November 2015**. We wish the Energy Futures Lab a great anniversary and look forward to seeing them in November. The actual event will consist of: An exhibition starting at 17:00 in the Great Hall and a talk at 18:00. <https://www.imperial.ac.uk/energy-futures-lab/>



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](mailto:s.selassie@imperial.ac.uk).

## Centre for Process Systems Engineering - Annual Industrial Consortium Meeting 3rd - 4th December 2015

### Day 1 - Thursday 3rd December 2015

AM	Informal meetings between representatives of CPSE Industrial Consortium member companies and academic staff. To be arranged as required	
12:00	<i>Lunch</i>	
13:15	Student Research Presentations	Chair: Dr Niall Mac Dowell
14:45	Student Poster Session and Student Recruitment Session	
16:15	Results of Best Student Poster Competition	
16:30	<i>Professor Roger Sargent Lecture Reception in Common Room (Room 228), Department of Chemical Engineering</i>	
17:30	<b>22<sup>nd</sup> Professor Roger Sargent Lecture:</b>  Process Systems Engineering at Crossroads: Challenges and Opportunities in the Era of Watson	Professor Venkat Venkatasubramanian, Columbia University
18:30 – 22:00	<i>Dinner at 170 Queen's Gate</i>	

### Day 2 - Friday 4th December 2015

09:45	Registration	
10:00	Welcome and Introduction to CPSE and Update on Progress Since Last Meeting	Professor Nilay Shah
10:15	Industrial Technical Challenge Presentations	
	Industrial Reflections on Modelling of Fine Chemicals and Seeds Process/Product Design	Dr Patrick Piccione, Syn-genta
	Overview of Process Systems Modelling in P&G	Dr Zayeed Alam, P&G
11:15	<i>Break</i>	
11:30	CPSE Major Research Programmes and Proposals:	Dr Benoît Chachuat
	Towards isothermal refining using membranes cascades	Professor George Jackson
	Molecular Systems Engineering	Professor Lazaros Papageorgiou
	Supply chains of the future	
12:30	CPSE Consortium Company Member's Meeting (1 or 2 representatives from each company to meet over lunch in the Queen's Award Suite)	Companies to nominate 2-3 representatives for the afternoon Panel discussion
13:30	Feedback from Company Members and CPSE Plans for 2016	All
14:00	Urban Energy Systems	Professor Nilay Shah
14:45	<i>Break</i>	
15:00	CPSE Research Programme Overview : Panel Discussion	Professor Paul Rutter (Moderator), Professor David Bogle and Dr Cleo Kontoravdi
16:00 – 16:15	Final Comments and Meeting Close	

### The Twenty Second Professor Roger W.H.

#### Sargent Lecture

Thursday 3rd December 2015 · 17:30

**Process Systems Engineering at Crossroads:  
Challenges and Opportunities in the Era of Watson**

**Professor Venkat Venkatasubramanian**  
Columbia University