The Head of Department Writes...

Welcome back to the Department after the festive season. I hope you have all come back refreshed and relaxed after enjoyable times with family and friends.

This term we welcome new members of staff to the Department. Jessica Baldock has joined us as an Academic Secretary and sits in Room 202. She will be working with a number of the academic staff and we very much look forward to her input. Zhao Wang has joined the Department to work with Omar Matar as a Project Administrator on large research programmes and is based in Room 301. The Student Online Lecturer Evaluation (SOLE) survey is used to gain feedback on our teaching from the taught students, and for last term I am pleased to report that we had a record participation rate of 87% – outstanding from our students, and I think a result of a lot of hard work by our Director of Course Operations, Andreas Kogelbauer. This term the 4th year MEng students will complete the all-important National Student Survey (NSS) and I look forward to achieving high participation rates on this as well. Finally, I want to let you know about some social events coming up. The Chem Eng Show will be held from 7pm on Tuesday 26th February in the Union and the Chem Eng Soc Annual Dinner will be held this year on Thursday 21st March. I look forward to enjoying these with those of you that can attend.

Felix Weinberg (1928-2012) - A Tribute

Following the sad news of the death of Emeritus Professor Felix Weinberg on the 5th December, close friends and colleagues Hans Michels and Rafael Kandiyoti pay tribute in the current issue of Reporter. You can read the piece on-line here.

Felix was also the subject of a profile as part of the College’s centenary celebrations in 2007, which you can read here.

Buy 30529: A Memoir, Felix's personal account of his remarkable life, is due to be published later this year.
Following the QCCSRC's appearance at the UN climate change conference in Qatar (featured in November's newsletter) a couple of local newspapers carried stories featuring Paul Fennell's talk about carbon capture and storage. Read the Gulf Times article here and the The Peninsular coverage here.

Klaus Hellgardt appears in the 29th January edition of New Scientist discussing the potential, and effects of, rust in solar hydrogen production. You can read the full article on-line here.

13th February - Molecular Design of Solid Catalysts, part of our Distinguished Seminar Series, with Prof. Avelino Corma, Polytechnic University of Valencia.

13th February - Newitt Lecture 2013, with the Rt. Hon. Edward Davey MP, Secretary of State for

A recent paper by Ben Goddard, Greg Pavliotis (Maths) and Serafim Kalliadasis on deriving a dynamic-density functional theory for colloidal fluids, published in SIAM Multiscale Modeling & Simulation became one of the top twenty most read articles in the journal's history. Dr. Goddard was also first author on another recent publication to garner quite a bit of interest, this time in the Journal of Physics: Condensed Matter, and the work was also featured in IOPselect, a special collection based on significant or novel research.

Nigel Wood is co-author on two articles to be published recently, both significant for different reasons. The first, A Numerical Study of Aortic Flow Stability and Comparison With In Vivo Flow Measurements, marks the first time Nigel has co-authored a paper with Tony Seed (Medicine) since the early 1970s, when they were both working on their PhDs and together discovered the presence of turbulence in the aorta. Also noteworthy is Initial findings and potential applicability of

PhD student Jan Marzinek, supervised by Stratos Pistikopoulos and Sakis Mantalaris, was awarded best presentation in his session at the AIChE annual meeting 2012 for his talk The Investigation of Green Tea Catechin Binding to Keratins by Molecular Dynamics and Experimental Validation.

Of ten new BP STEM scholarships awarded to Imperial students, an impressive three have been given to first year Chemical Engineering students. Congratulations to Emilie Lunddahl, Wai-Ming Yap and Shiladitya Ghosh.

The best poster prize at last month's CPSE consortium meeting went to UCL student Di Zhang (Fair Cost Distribution within Microgrid under Game Theory) with Chemical Engineering's Dionysios Xenos taking second prize (Optimisation of Industrial Compressor Stations with Centrifugal Compressors Employing Data-driven Models and Detailed Modelling)
Energy & Climate Change.

25th-26th March - Chemical Engineering Day 2013 - registration now open.

27th March - The Professor Dame Julia Higgins Lecture: Protein Analogous Micelles: Versatile, Modular Nanoparticles, with Prof. Matthew Tirrell, University of Chicago

Raffle Raises £800

At the very enjoyable Christmas party just before the end of last term, Chemical Engineers and guests from around the College raised an impressive £804.50 for the Muscular Dystrophy Campaign. Hats off to Susi Underwood for her indefatigable efforts in selling tickets. First prize of a Kindle went to Anna Dowden, pictured above with some of the other lucky winners.

Sorbet from a Fire Extinguisher

The theme was food and drink at the third Imperial Fringe event on the 13th December. Erich Müller entertained the crowd by creating a rather delicious sorbet from the CO₂ in a fire extinguisher. You can read more about the Fringe Event here and view a gallery of images taken on the night here.

Meet the Researcher

This month we talk to Dr. Koen van Dam about his background and work for the Digital City Exchange project.
Tell us about your journey to Imperial
Probably safest to start by admitting that I am not a Chemical Engineer by training! I was born in Delft, grew up in Almere and moved to nearby Amsterdam to study Artificial Intelligence. After completing my MSc I ended up back in Delft to do a PhD at the department of Technology, Policy and Management of the Delft University of Technology on agent-based modelling of socio-technical infrastructures. It was during my PhD that I got in touch with the world of chemical engineering because application domains such as energy systems and supply chains are studied extensively in the field. I spent a term as a visitor in the department of Chemical Engineering of the National University of Singapore to work on an oil refinery supply chain and then completed my thesis in 2009. I was lucky to get the opportunity to come to this department at Imperial College as an academic visitor afterwards and when a suitable post-doc position was advertised about a year ago I didn't hesitate to apply!

What does your research involve?
When I first came to the College it was to join the BP Urban Energy Systems project, but now I work full-time on the EPSRC Digital City Exchange project for which Nilay Shah is one of the co-investigators. My work focuses on the development of simulation models of city infrastructure systems to study the link between various subsystems such as energy, transport, water and healthcare. The plan is that using sensor networks as well as open-data from, for example, the local government or organisations such as TFL, we can predict future states of the system and design and test interventions that can help make efficient use of infrastructures. Modelling and optimisation techniques from process systems engineering are directly applicable to such problems.

I create bottom-up models in which the activities of various actors within a city are represented and the results of their actions lead to emergent behaviour. To use a recent example, if more people start using electric vehicles, this will have a huge impact on the electricity infrastructure because the batteries will need to be recharged. I worked on a model of drivers who go about their day and the results of their travels can be used as a prediction of the spatial as well as temporal loads on the power network. This output is fed into a model which simulates and optimises the flows on the power network, producing battery charging strategies under various scenarios.

The project is particularly exciting for me because it is a cooperation between the faculty of Engineering and the Business School. Not only do we work closely with researchers in Electrical Engineering, Civil Engineering and Computing -- essential to successfully capture all aspects of city infrastructures -- but the link with the Business School means we can also address the impact on companies.

And life outside of the College?
I am learning to play the electric guitar, I love going to gigs and am keen on travelling, but such activities have been put on the back burner a bit since the birth of my son, now 18 months old. Being a dad does not leave me with much spare time. It is still the best thing that happened to me though!

What do you particularly enjoy about life in London?
Since my first visit I knew I would one day move here. It took ten years, but here I am. Every day I walk through Kensington Gardens from the tube to my office and it still hits me when I catch a glimpse of yet another landmark: I am actually living in this amazing city now.

Finally, what do you consider your proudest achievement?
I just published my first book, and I am still really happy with that major milestone. Hopefully it
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will be useful to people new to agent-based modelling and its applications.

If you are a Chemical Engineering researcher and want to feature in this section, please get in touch.

Departmental Publications Digest

Every quarter a list of recent publications involving Departmental researchers will appear in the newsletter. Data taken from Symplectic

- Berrueco, C., Alvarez, P., Diez, N., Granda, M., Menendez, R., Blanco, C., Santamaria, R. & Millan, M., Characterisation and feasibility as carbon fibre precursors of isotropic pitches derived from anthracene oil, *FUEL* (link)
- Bismarck A., Editorial corner – a personal view. Hype about High Internal Phase Emulsion templating: Adding particles makes all the difference, *eXPRESS Polymer Letters* (link)
- Garcia-Gallastegui A, Iuretagoyena D, Gouvea V, Mokhtar M, Asiri AM, Basahel SN, Al-Thabaiti SA, Alyoubi AO, Chadwick D & Shaffer MSP, Graphene Oxide as Support for
Layered Double Hydroxides: Enhancing the CO₂ Adsorption Capacity, *Chemistry of Materials* (link)

- Solomon MFJ, Bhole Y & Livingston AG, High flux membranes for organic solvent nanofiltration (OSN)—Interfacial polymerization with solvent activation, *Journal of Membrane Science* (link)
- Kwek JW, Jeyabalasingam M, Ng WK, Heng JYY & Tan RBH, Comparative Study of the Triboelectric Charging Behavior of Powders Using a Nonintrusive Approach, *Industrial & Engineering Chemistry Research* (link)
- Pistikopoulos, E., From multi-parametric programming theory to MPC-on-a-chip multi-scale systems applications. *Computers & Chemical Engineering* (link)
- Llovel F, Mac Dowell N, Bias FJ, Galindo A & Jackson G, Application of the SAFT-VR density functional theory to the prediction of the interfacial properties of mixtures of relevance to reservoir engineering, *Fluid Phase Equilibria* (link)
- Chan KL & Kazarian SG, Correcting the Effect of Refraction and Dispersion of Light in FT-IR Spectroscopic Imaging in Transmission through Thick Infrared Windows, *Analytical Chemistry* (link)
- Hou S-X, Maitland GC & Trusler JPM, Measurement and modeling of the phase behavior of the (carbon dioxide + water) mixture at temperatures from 298.15 K to 448.15 K, *The Journal of Supercritical Fluids* (link)
- Stawikowska J & Livingston AG, Assessment of atomic force microscopy for characterisation of nanofiltration membranes, *Journal of Membrane Science* (link)
- Goddard BD, Nold A, Savva N, Yatsyshin P & Kalliadasis S, Unification of dynamic density functional theory for colloidal fluids to include inertia and hydrodynamic

Feedback about this newsletter? We'd love to hear from you.