

Chemistry Update

Newsletter 288, 25th August 2017

Inside this Issue Professor David Smith Shortlisted for Gay **Times Honour** High Ranking in Nature Index 2017 Innovation Table Expert Reaction: Diesel and Petrol Car Ban Dr Glenn Hurst Elected Education Group Chair **Updated Online Department Suggestion Box New Starters** Mentoring Exploring Everyday Chemistry 6-7 **Outstanding 2017 NSS Results** Professor John Goodby Awarded Frederiks 8-9 Medal Chemistry & Industrial Biotechnology Showcase 2017 WACL Fieldwork in Beijing Green Chemistry for Australia 11-13 July in the Sun? 14-15 **Board of Studies - Calendar of Meetings** 15 Macmillan Coffee Morning

Calendar of Events

Research Seminar Speaker: Masaaki Fujii, Tokyo Institute of Technology Date: Tuesday 29 August Time: 11am-12pm Location: C/F/106 3rd EuCheMS Congress on Green and Sustainable Chemistry (EuGSC) Date: 3-6 September Location: Ron Cooke Hub **Green Chemistry Seminar** Speaker: Professor Andy Proctor, University of Arkansas Date: Thursday 7 September Time: 3.30pm-4.30pm Location: C/F/106 **Open Days** Date: 16 & 17 September Postdoc Poster Prize Winners' Seminar Speakers: Barby Procacci, Dan Raines, James Donald (all University of York) and Michelle Arkin (University of California, San Francisco) Date: Thursday 21 September Time: 1.30pm-4.30pm

Followed by a drinks reception in C/A/122

Location: C/A/101

Date of Next Issue: 29th September 2017

Professor David Smith Shortlisted for Gay Times Honour

Professor David Smith has been shortlisted in the inaugural Gay Times Honours for the Barbara Burford Award STEM Academics and Intellectuals.



On 27 July at the National Portrait Gallery, Gay Times launched the Gay Times Honours, which is a bold new initiative to honour those who have had a tremendous impact on what it means for LGBT+ people to live openly and freely in modern Britain.

2017 sees the LGBT+ community in the UK celebrate 50 years since the partial decriminalisation of male homosexuality in England and Wales.

Barbara Burford, after whom this award is named, was born in Jamaica and moved to London at the age of seven. After studying medicine, she championed equality through initiatives with the NHS and was central to several breakthroughs in heart and lung transplant surgery for infants and children. Barbara was active in feminist politics and was the Director of Equality & Diversity at the Department of Health from 1999 onwards. Her poems, short stories and plays are now a staple for studying in schools across the country.

David said: "It is a genuine honour to be nominated for this award, and really fantastic to see Gay Times recognising areas such as STEM, which have historically suffered from a lack of all types of diverse role models."

During the launch of these awards at the National Portrait Gallery, Gay Times magazine hosted a panel discussion to examine the progress made over the past 50 years and the hurdles still facing the LGBT+ community.

The final award winners will be announced at an event on Saturday 18 November.

High Ranking in Nature Index 2017 Innovation Table

The University of York has been ranked in the Top 100 in the world, and 7th in the UK, for its influence on industry and innovation.



(When breaking down the 'Lens' score by discipline, the University of York is ranked number 1 for Chemistry and Materials in the UK)

The Nature Index 2017 Innovation Table reports the 'Lens' ranking, which reflects how much of the University's research since 1980 has been cited in patents. This ranking uses the QUT In4M metric and indicates the extent to which industry is building on academic innovations.

The Department of Chemistry has been a major contributor to the University's success. More detailed analysis of the 'Lens' ranking demonstrates that the University was particularly influential in Biotechnology, pharmaceuticals and Organic Fine Chemistry sectors, with 21,423, 19,814 and 15,143 citing patent families respectively. All three of these industrial sectors have direct input from the Department of Chemistry.

Chemistry at York has a strong track record in fundamental research as reflected in the <u>'Research</u> <u>Power'</u> <u>ranking of 7th in the UK</u> (REF 2014). The Nature Innovation Index ranking demonstrates that fundamental innovations here in the Department also have a major impact on the outside world.

Expert Reaction: Diesel and Petrol Car Ban

Professor Alastair Lewis, from the Department of Chemistry's National Centre for Atmospheric Science (NCAS), reacts to a new government report that suggests any new diesel and petrol cars could be banned from 2040.



Professor Lewis said: "Although air quality in the UK is clearly much better than some other parts of the world, the economic case to continue to improve it is overwhelming, even though technically this becomes more and more challenging.

"The costs to the economy, through lost productivity and costs to the NHS are measured in the billions of pounds per year, and could well increase further with an ageing population.

"Given the rate of improvement in battery and electric vehicle technology over the last ten years by 2040 small combustion engines in private cars could well have disappeared without any government intervention. Nonetheless this new announcement of a ban is highly symbolic since it signals to both the public and to manufacturers that there is no turning back from electrification. It will go down as significant milestone in the history of air pollution in the UK.

Roadside exposure

"Eliminating petrol and diesel engines from cities will have the most beneficial impact on reducing roadside exposure to NO_2 and fine particulate matter (PM), but the policy will not in isolation completely ensure good air quality for everyone.

"Electric vehicles have no direct tailpipe emissions but they are still a source of PM from brake and tyre wear and through agitating road dust. There still remain many other urban sources of pollution not only from transport, but also heating, construction, domestic emissions, and external sources of pollution that drift into cities from outside, most notably from the agricultural sector. Some other urban sources of pollution are even on an upwards trend, most notably from wood burning stoves.

"If we look forward five to 10 years it is highly likely that the current NO_2 problems in urban centres will have noticeably diminished, but it may leave us with PM and ozone as the two stubborn pollutants that prove hardest to reduce to the levels recommended by the World Health Organisation.

Complex chemistry

"Controlling NO_2 is relatively straightforward – if a molecule is removed from the tailpipe the amount in air responds proportionately. For PM and ozone much more complex chemistry occurs in the atmosphere, where controls on emissions do not always give one-to-one improvements in air quality.

"For some particles and for ozone very large reductions in their precursor emissions can be needed to generate sometimes only modest improvements in air quality."

Dr Glenn Hurst Elected Education Group Chair

Dr Glenn Hurst has been elected Chair of the Royal Society of Chemistry (RSC) Tertiary Education Group. Glenn will succeed Professor Simon Lancaster in this position (president elect of the Education Division Council).



This important membership group of the RSC aims to:

- Provide a forum for the fruitful discussion of the teaching and learning of chemistry at Higher Education level
- Support and promote the development, dissemination and wider use of effective teaching and learning activities
- Promote the wider recognition of good work in chemical education at this level

As Chair of the RSC Tertiary Education Group, Glenn aims to improve communication between and support for related RSC interest groups with the specific objective to enhance the link between secondary and tertiary chemistry education. Glenn hopes to also nurture existing and initiate new relationships with societies and industries internationally to develop and share best practice. In doing so, it is hoped this will contribute towards raising the profile of chemistry education with inclusivity and diversity at the forefront of these efforts.

Having joined the Department of Chemistry at the University of York in 2014 as an Associate Lecturer, Glenn was promoted to a Lectureship in 2017. His role includes developing innovative teaching and scholarship within the Department, the School of Natural Sciences and the University.

The Department of Chemistry is committed to teaching excellence and high quality research as demonstrated in our second place ranking in the 2018 Guardian League Table.

Updated Online Department Suggestion Box



The online Equality and Diversity suggestion box has been extended to be a suggestion box for the whole Department. You can submit your thoughts / suggestions / ideas for general Departmental matters as well as matters relating to Equality and Diversity. You can find the new Google form on the intranet homepage or at this <u>link</u>.

New Starters



Sue Dunkerley, HR Administrator (starting on Monday 4 September) Room: C/A121; Extension: 2716

Mentoring Exploring Everyday Chemistry

Our undergraduate students Caitlin Evans, Craig Hardy and Josie Rogers discuss their involvement in the second running of our MOOC, which, over the past year, has attracted around 8000 learners from over 100 countries.



When we started, we knew that our job was to help others learn, but we had no idea how much we would learn ourselves. We learned about things that affect our daily lives and explored areas of chemistry that we had never given a second thought to. The fact that the topics were relevant to everyday life was fantastic as it meant that participants always had things from their own experience to contribute, adding a level of diversity and a human element to the course.

The course is so varied; we never knew what questions participants would send in for us to answer. Answering such a wide variety of questions allowed us to use both our experiences studying at York and our experience of the wider world, to apply all sorts of aspects of life in a chemistry context. Often we were unable to answer questions off the tops of our heads, which meant we got to research things that we never thought we would have to research. From horse behaviour to doping in sport: the range of topics covered was vast!

Another area that showed huge amounts of variability was the range of people taking part. The sheer amount of people from different countries, backgrounds, and levels of education was just so awesome to see, as it allowed the course to become incredibly diverse as people shared their own personal experiences adding depth to certain subjects that were discussed. This allowed us to see things from a variety of different points of views, broadening our knowledge and bringing a new slant to things we thought we already knew.

One of the tasks we always found enjoyable was researching articles for weekly videos. This allowed us to get a better idea of all the exciting, innovative things that are currently going on in the world of science. It also encouraged us to continue to take a wider look at news stories and gain a more indepth knowledge of what is going in the world today. We also loved taking part in the experiments and seeing what the participants had been up to at home. The experiments were so varied and interesting, but also very easy to do, which allowed so many people to take part. It was great to see what the participants had been doing and even better to hear their positive feedback!

As mentors, we have gained and developed a wide range of skills. We have had the opportunity to improve essential skills as well as developing confidence through weekly videos and mentoring. Some key skills we developed included supporting people of mixed abilities through the course, creating and providing learning resources as well as aiding people by answering both general and chemistry related questions. Working within a team has been very successful and entertaining. We have enjoyed working together to think of new ideas and doing take after take of our 'in the news' videos.

All in all, being MOOC mentors has been an entertaining and enlightening experience. The thing that has made it the most enjoyable is the variety and diversity within all aspects of the course and the work we have been doing. We would all love the opportunity to take part in something similar in the future if the opportunity arose.

Outstanding 2017 NSS Results

With an overall student satisfaction rating of 95% and outstanding other results in the National Student Survey, York has confirmed its reputation as one of the very best places to study chemistry in the UK.



Amongst its research-intensive Russell Group competitor departments, York Chemistry achieved first place in a remarkable 7 of the 9 sections of the survey - leading the way in Teaching on my Course (94%), Learning Opportunities (91%), Assessment and Feedback (80%), Academic Support (89%), Organisation and Management (91%), Learning Resources (96%) and Learning Community (89%).

Alongside previously recognised areas of teaching excellence, the Department was particularly delighted to come first in the Russell Group in the new NSS categories of Learning Opportunities and Learning Community. We believe these reflect how we challenge our students to demonstrate and apply their knowledge of chemistry in a wide range of different ways and the way in which we enable student learning as part of a supportive community, with a strong emphasis on small group tutorial teaching and teamwork.

Head of Department, Professor Duncan Bruce said: "These very pleasing NSS results reflect the strength of Departmental teaching across the board and the unique York atmosphere in which our academic staff work hard to encourage all students to achieve their true potential."

The Department of Chemistry at York places a strong emphasis on teaching excellence, with three Royal Society of Chemistry Higher Education Award winners amongst the professorial staff and was also ranked second in the UK for Chemistry in the 2018 Guardian League Table.

Professor John Goodby Awarded Frederiks Medal

Professor John Goodby was recently awarded the Frederiks Medal of the Russian Liquid Crystal Society for his outstanding results in the field of Liquid Crystal Chemistry. The award was made at the European Liquid Crystal Conference, which was held at Lomonosov Moscow State University in July.



John receives the Frederiks medal from Scientific Secretary, Professor Sofia Torgova



Participants of the European Liquid Crystal Conference



The Main building of the Lomonosov Moscow State University, 30 floors above ground and eight below.

Chemistry & Industrial Biotechnology Showcase 2017

20 - 21 September, York

KTN is hosting a unique two-day <u>conference and exhibition</u> on 20-21 September 2017 in York, to showcase how the UK chemistry and industrial biotechnology (IB) sectors are helping to enable growth in key UK supply chains through innovation. From medicines to low carbon fuels, from personal care to batteries - innovations in chemistry and IB have numerous applications across a wide range of sectors.

Hear from some of the UK's leading innovators in a <u>conference programme</u> that is designed to showcase cutting-edge innovation across key supply chains and through different sectors. From senior representatives of government, major investors, top industry players and senior scientists to start-up companies and brilliant early career researchers, the showcase will attract a diverse audience from a range of disciplines and market sectors.

This event includes an opportunity to attend a BioVale sponsored <u>Networking Breakfast</u> on Value from Unavoidable Food Waste and to take a <u>tour</u> of the Biorenewables Development Centre. The social programme features a Drinks Reception (sponsored by Biocatalysts) and <u>Conference Dinner</u> (sponsored by the University of York) with <u>Entertainment</u> at the award winning <u>National Railway</u> <u>Museum</u>.

Find out more and register at <u>http://ib-showcase2017.meeting-mojo.com</u>.

WACL Fieldwork in Beijing

Staff and students from WACL (Wolfson Atmospheric Chemistry Laboratories) have just arrived back from fieldwork in Beijing. This was the second of two intensive field campaigns to the centre of Beijing to measure a range of atmospheric pollutants. The first campaign took place in November-December 2016 and the second during May-June 2017, allowing seasonal differences in air quality to be investigated. WACL was just one part of a huge team working in China, joining up with researchers from over ten institutes from the UK and scientists from China.

Measurements were taken at the Institute of Atmospheric Physics, Chinese Academy of Science in central Beijing which is home to a 300 m tower (seen below disappearing into the Chinese winter haze!).



Researchers at WACL were studying and making measurements of nitrogen oxides (NOx), tropospheric ozone, volatile organic compounds (VOCs) and particulate matter (PM), all of which can be damaging to human health and impact climate. The substances are particularly prone to induce respiratory disease, cardiovascular disease, and pre-mature mortality.

These measurements are being conducted at both ground and elevated altitudes, specifically at 102m to investigate the vertical distribution of emissions and calculate emission flux. Off-line time resolved filter samples were also taken and are currently being processed in WACL. These filter samples will be used to characterise and quantify different harmful species in particulate matter and will also give an indication of the secondary chemistry occurring in the atmosphere as well as primary emission sources.

China is a rapidly developing country and its air quality problems are well publicised. It is hoped that the research done over these two field campaigns will advance understanding of the air quality problems in China and guide abatement strategy. Within the next two years, China will also be undergoing some drastic policy changing with regards to air pollution for which the papers produced from this campaign will influence. For now though, those involved have a lot of data to work through!

Green Chemistry for Australia



Australia has delivered a great deal of chemical innovation, from the invention of the plastic disposable syringe and the discovery of long-wearing contact lenses to today's proliferation of research institutes and chemical manufacturers. This history has set the stage for adoption of sustainable chemistry practices—and indeed, where green chemistry is concerned, Australia has been involved from the beginning. Additional evidence for the high-level of interest of Australia in green and sustainable chemistry are:

- high number of green chemistry conferences in Australia
- considerable support of industrial companies such as Norske Skog and Circa in a shift to green and sustainable technology



The Global Green Chemistry Centres (G2C2) symposium took place on 27-28 July at the University of Melbourne. The first day of the symposium evidenced the growing global interest in transitioning to a bio-economy, with presenters sharing their recent research in green chemistry and ideas to push forward green science. Keynote speaker Dr Warwick Raverty, the Chief Scientist of Circa Group Ltd., set the stage with the concept for a platform molecule levoglucosenone

and its hydrogenated form – novel bio-solvent CyreneTM that promises to be the world's first economically viable thermochemical process for converting a vast under-utilised renewable carbon source into a range of chiral chemical intermediates and chiral specialty solvents. The highest volume use for Cyrene[™] is likely to be as a polar aprotic solvent used to facilitate the formation of new carbon-carbon bonds in the pharmaceutical industry. The low toxicity, lack of mutagenicity, water miscibility and complete biodegradability of Cyrene[™] make it an attractive alternative to more toxic conventional solvents in this class. This talk reviewed the discoveries concerning the chemistry of levoglucosenone, Cyrene[™] and related compounds over the last 3 years and some of the wider potential applications of these compounds in organic synthesis and materials science.

The other work researched by G2C2 centres reflect the global nature of the network to push forward green chemistry. In New Zealand, Professor James Wright makes water purification processes via flow chemistry and oxidation catalysts. As well, he described two new Green Chemistry courses established at the beginning of 2016 in the University of Auckland. The courses include new types of assignments / projects such as group presentations and debates, making YouTube presentations, and an interdisciplinary project involving the students applying their knowledge on a sustainability issue and to both teach and learn from students from another discipline (such as psychology).

Representing ACS, Mary Kirchhoff described the role of ACS Green Chemistry Institute in catalysing the integration of sustainable and green chemistry and engineering in the global chemistry enterprise. An executive director of Berkley Centre for Green Chemistry, Thomas McKeag gave a remote presentation to review the successes of their centre in bio-based materials synthesis and recent

collaborations with NWGC and UCSF. Professor Philip Jessop who runs the Green Centre Canada talked about alternative pathways for the commercialisation of academic green chemistry technologies. He opened a discussion about difficulties to establish new green technologies, which are currently not sufficiently optimised in comparison to optimised incumbent technology. Researchers and professors from across Asia including Rakesh Sharma, Shicheng Zhang, Xindong Mu and Changwei Hu presented their solutions for turning cellulose and other biomass into high-value products and biofuels, using biological conversion, mechanical pretreatment, catalytic liquefaction, and chemical modification. The diversity of methods under investigation attests to the necessity of interdisciplinary research in a circular economy. Chemistry and biology are joining forces to process waste that is pretreated by engineering methods, and studying any one of these disciplines in isolation closes off useful avenues of investigation. The last presentation of the day was given by Prof Dr Klaus Kummerer of the University of Lüneburg in Germany who spoke about sustainable research with respect to environmental chemistry.

The 2nd day was opened by the 2016 Young Research Award Winner from Canada – Jean-Philip Lumb. His presentation 'Driving Synthesis by Oxidation' started with the history of Australia - Canada interactions and shifted to the role of oxygen in organic synthesis. In the end, he presented some theoretical base for his research using molecular orbital theory. Dr Robin White, the Head of Sustainable Catalytic Materials at the Fraunhofer University, works on scaling-up green technologies in the context of electricity production. The aim is to replace fossil carbon sources with renewable raw materials plant biomass, with the products referred to as "biobased products" and fuels as "bioenergy molecules" - leading to the implementation of "biorefineries", to generate as new, analogous production facilities to replace the petroleum-based refineries. In Aston University, Professor Karen Wilson designs catalysts for the bio-refinery. She reviewed methods for rational design of new materials to catalytic biomass processing and highlighted recent successes in the design of heterogeneous catalysts facilitated by advances in nanotechnology and the synthesis of templated porous materials to generate bifunctional solid acid/base materials or tune hydrophobicity. Dr Felipe Cerino from Mexico reported about rational usage of coffee waste. He has found that it can be sufficiently effective for removal of carmine acid from aqueous solution by adsorption on activated carbon prepared from coffee waste. Representing the University of Ghent, Professor Christian Stevens spoke on topics including microreactors for flow chemistry to produce hypobromide with subsequent synthesis of tribromomethylsulfones and -methanesulfonates, as well as solketal from glycerol. The most energetic discussion of the day was not about research, however, but about how best to train the next generation of green chemists and responsibilities of science in front of society.



In Singapore, Professor Ning Yan converts chitin from seafood shells into usable chemicals, also partnering with the famous restaurant industry to turn waste grease and oil into biodiesel. Dr Alice Fan from the University of York provided a review of recent works of the Green Chemistry Centre of Excellence (GCCE) in the areas of renewable materials, platform molecules synthesis, alternative solvents and microwave technology. The alternative solvents section included recent results about Cyrene[™] properties and

applications; however, it was noted that the research is still on-going, but reveals a great potential. Alice reported the method to produce glucose by MW-hydrolysis technology, as well as great potential of MW assisted low temperature pyrolysis to convert lignin to valuable chemicals such as levoglucosenone. To finish the presentation for the day, Alisa Doroshenko was invited to make a short presentation about her PhD research. Alisa is working under the supervision of Professor James Clark and reported about bentonite as an efficient catalyst for conventional and MW-assisted cellulose pyrolysis to chemicals.



Professor James Clark, director of the GCCE, performed the AGM sessions for G2C2 members only and made an overview about the G2C2 membership list, the network legal status, the finances flow, as well as congratulating Dr Robin White as the 2018 Young Research Award Winner. He asked participants for ideas for the best place to carry out the next G2C2 workshop. At the end of the conference, enthusiasm was so high and suggestions were flying for where to host next year's G2C2

symposium. Christian Stevens and Felipe Cerino made presentations to promote Ghent University in Belgium and Universidad Autónoma de Nuevo León in Monterrey respectively.

It is clear that the G2C2 has grown a great deal in five years, inspiring sharing of knowledge among institutes with diverse approaches to green chemical research.



July in the Sun?

Whilst July is often the time that academics take a summer break to recover from the stress of a year's teaching and exam marking, this year July was a busy conference month for Professor Michael North. At the start of September he travelled to Ciudad Real in Spain to deliver a plenary lecture at the 10th International School on Organometallic Chemistry (Marcial Moreno Manas). The organisers had promised temperatures in the high 30s and zero chance of rain, but the weather delivered a thunderstorm and torrential downpour. However, the quality of the science presented by young (and not so young) scientists and the food and wine made up for any minor weather problems.



Questions at the end of the plenary lecture at the 10th International School on Organometallic Chemistry

After a brief four days back in the UK to dry out it was off to Shanghai for the 15th International Conference on Carbon Dioxide Utilisation (15 ICCDU). Having helped to organise the 14th conference in Sheffield last year, this year's event was highly enjoyable, though the above 40°C temperatures and over 70% humidity were hardly relaxing! In addition to delivering a lecture at the ICCDU, Professor North took the opportunity to visit and deliver seminars at both East China University of Science and Technology (ECUST) and Fudan University. One of the highlights of the social events was a reception at the British Consulate General's official residence, the penthouse of an apartment block close to the city centre. This provided an excellent opportunity to network with UK government and British Council staff based in China to discuss future collaboration opportunities whilst watching the sun set over Shanghai and the city light up. Next year's ICCDU promises to be just as rewarding as it will be held in Rio de Janeiro.





A seminar at ECUST

Michael North with Peter Styring (Sheffield University) and chairman Mao at the campus of Fudan University

Board of Studies

Calendar of Meetings 2017-2018

Term	Week	Date	Day/Time	Room
2017				
Autumn	SV13	20 September	Wednesday 14:00	A102
	7	8 November	Wednesday 14:00	A102
2018				
Spring	5	7 February	Wednesday 14:00	A102
	4	9 May	Wednesday 14:00	A102
	9	13 June +	Wednesday 09:30	A102
Summer	10	20 June *	Wednesday 13:30	A102
	10	21 June *	Thursday 13:30	A102
	SV2	4 July	Wednesday 14:00	A102

+ Internal Examiners Meeting – Wed 13 June 2018

* Provisional dates for Extraordinary meetings for Examinations results

Graduation Ceremony Dates (provisional):

Friday 19 and Saturday 20 January 2018 Wednesday 25 - Saturday 28 July 2018



For further information please contact myself Tamara Mielke (YSBL/Biology) or Helen Burrell (Chemistry).





3rd EuGSC

3rd EuCheMS Congress on Green and Sustainable Chemistry

3-6 September 2017, University of York

www.york.ac.uk/3EUGSC

