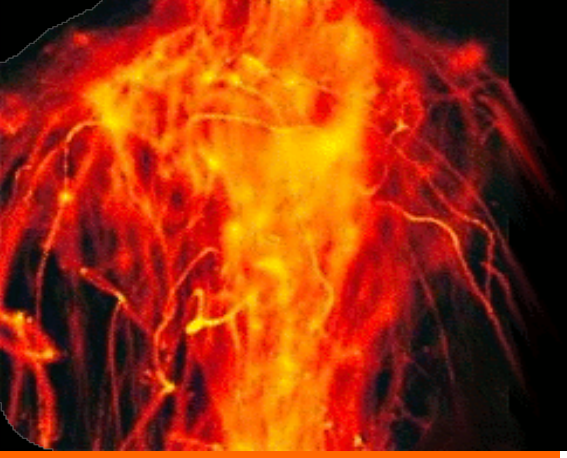


Chemistry Update

Newsletter 315, 29 November 2019

Inside this Issue

Calendar of Events

Chemistry at Christmas: Family demonstration lecture
Speaker: Prof Sir John Holman
Date: Tuesday 3 December
Time: 7pm—8.30pm
Location: C/A101

Inorganic Seminar
Speaker: Prof J.A. Gareth Williams, Durham University
Date: Wednesday 4 December
Time: 1pm—2pm
Location: C/B101

TechYork Xmas Treasure Hunt
Date: Monday 9 December
Time: 1pm—3pm
Location: Campus and C/A102

HEaTED Networking Regional Meeting
Date: Thursday 12 December
Time: 10am—4pm
Location: C/B101 & C/B102

Departmental Christmas Party
Date: Thursday 12 December
Location: Marriott Hotel, York

Robin Perutz 70th Birthday Symposium
Date: Friday 13 December
Time: 1pm—9pm
Location: C/A101 & C/A102

Chemistry All Staff Meeting
Date: Monday 16 December
Time: 2pm—4pm
Location: C/A101

Chemical Interactions Christmas Quiz
Date: Wednesday 18 December
Time: 3pm—5pm
Location: C/B101 & C/B102

A note from Chemical Interactions

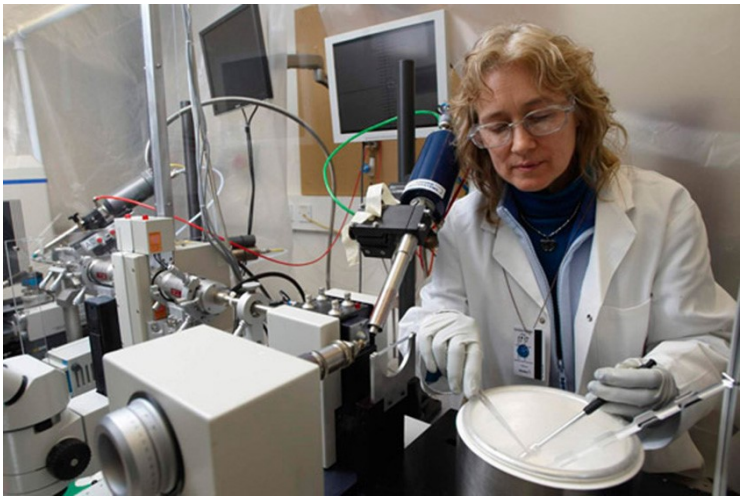
The **talk from Kevin Cowtan** (*Doing science from the intersection of colourblindness, autism and gender ambiguity)* originally scheduled for 3 December has been **postponed**.

A new date will be rearranged for the talk to take place in the Spring term.

Date of Next Issue: 18 December 2019

York laboratory awarded Queen's Anniversary Prize

The University of York's Structural Biology Laboratory (YSBL) in the Department of Chemistry has been awarded a prestigious Queen's Anniversary Prize.



The YSBL researchers study protein molecules: developing methods for looking at them, determining what the molecules look like and how they work, and how this knowledge can be exploited.

The methods developed at York are used by thousands of scientists around the world across many areas of science and industry.

Studies of individual proteins in YSBL have revolutionised understanding of fundamental living processes. These insights can directly contribute in the development of new medicines, such as modified insulins for treating diabetes, and also be used in industrial processes to improve sustainability and food security.

Recipients of the Queen's Anniversary Prizes (2018 to 2020) were announced on 21 November at a ceremony at St James's Palace in London.

The prizes are the highest national honour awarded in UK further and higher education and are granted by the Queen every two years.

Vice-Chancellor Professor Charlie Jeffery said: "This award is a fantastic achievement and richly deserved. It recognises the excellence and dedication of the YSBL team over more than 40 years.

"The Laboratory's work has had far-reaching impact: the benefits it brings to the global research community include not only its world-renowned methods and discoveries but also the outstanding scientists it has trained.

"To wider society this research contributes to the development of new medicines and also the development of new approaches in the search for novel drugs and therapies in medicine.

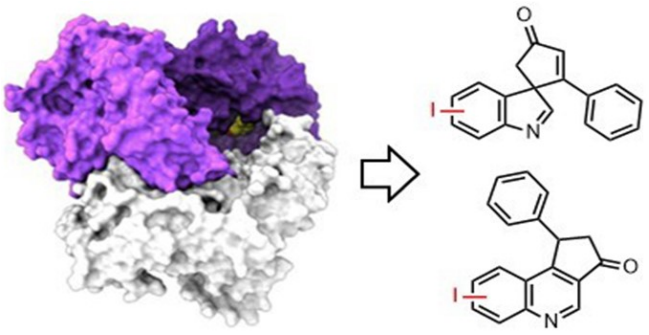
"The prize announced today adds to the five previous Queen's Anniversary Prizes, providing further recognition of the quality and relevance of research carried out at York."

Professor Tony Wilkinson, current leader of YSBL said: "YSBL works at the intersection of many different disciplines, harnessing the synergy of physics, computing and chemistry to answer questions about biological processes.

"This prize recognises the quality of the work of the many hundreds of scientists who have passed through the Laboratory over the past four decades and benefitted from the collaborative and flexible culture we have sustained. The Laboratory continues to evolve with new initiatives in advanced imaging methods and developing chemistry to study the role of the sugar molecules that are vital to living organisms."

Marine viruses inspire synthetic chemistry

Researchers from the Department of Chemistry have contributed to the discovery of a remarkable new enzyme from a marine virus that is capable of adding iodine atoms to a diverse array of small organic molecules.



Oceanic cyanobacteria are the most abundant oxygen-generating organisms on Planet Earth and are therefore extremely important to all life.

These organisms can be infected by viruses that play a part in a host of important biological processes, including photosynthesis.

In this new research, it has been found that enzymes isolated and repurposed from these viruses can also be used to add iodine atoms to of a diverse range of important organic molecules with remarkable selectivity.

The discovery that important iodine-containing molecules can be made using these enzymes is expected to have numerous implications in the many fields that rely upon their synthesis. Halogenated compounds are widespread in the pharmaceutical and agrochemical industries. However, the reagents used to make them can produce hazardous waste and mixtures of compounds. Enzymes can provide a milder, more specific route to halogenated compounds, but so far the options for adding iodine have been very limited.

This ground-breaking research programme, largely funded by the ERC, Syngenta, and CRITICAT, has been led by Professor Rebecca Goss from the University of St Andrews, with Danai Gotski leading the bioinformatics and enzymology, Sunil Sharma driving forward the isolation and characterisation of the reactive products and Hannes Ludewig carrying out much of the structural Biology under the guidance of Jim Naismith.

Describing the discovery, Professor Goss said:

“We were absolutely blown away when we saw that far and away the preference was for iodination,” Goss says. “And it wasn’t iodinating just one or two substrates. It was iodinating a really broad sweep of structurally very diverse compounds, but in a highly selective manner.”

The York contribution to this project was to prepare some of the key organic molecules used to challenge the enzyme throughout this study. It was vital to test the enzyme against the widest possible range of diverse substrates, including our sterically demading spirocyclic compounds in order to demonstrate it could be an effective tool for late-stage diversification.

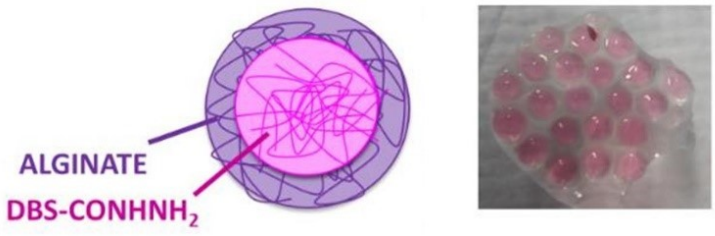
Dr Will Unsworth and Professor Richard Taylor said:

"We are delighted to have contributed to the success of this truly ground-breaking work in biocatalysis. It is wonderful to see how well the diverse molecules made here in York are tolerated by this remarkable enzyme."

This work has been published in *Nature Chemistry*.

Core-shell gel bead 'doughnuts'

New research from the Smith group has discovered an innovative way of formulating functional soft gels by encapsulating them within a shell, rather like the jam filling in a doughnut.



CORE-SHELL GEL BEADS

Gels are fascinating materials that combine the properties of liquids and solids, and have a wide range of applications. As well as their well-known uses in household and personal care products, they have many potential high-tech applications.

The research group of Professor David Smith has great experience in developing gels based on the self-assembly of small molecules into an extended solid-like network that can immobilise a liquid-like phase. With funding from Engineering and Physical Sciences Research Council (EPSRC), his research team are developing such gels for applications ranging from environmental clean-up (where they can help remove pollutants from the environment) to regenerative medicine (where they can act as scaffolds for growing cellular tissue).

However, one key problem with self-assembled gels of this type is that they are often weak materials and cannot easily maintain the well-defined shapes that would be desirable for many uses.

In order to provide a solution to this shaping problem, Dr Carmen Piras, working in the lab of Professor Smith, decided to assemble the gels within a pre-formed shell. She reasoned that the more robust crosslinked polymer gel shell, based on the seaweed extract calcium alginate, would act as a mould and constrain the weaker self-assembled gel within the core – hence imposing shape and structure onto the gels. Although such shells have often been filled with different ingredients, they have never previously been filled with a self-assembling gel.

In this way, Dr Piras found that core-shell gel beads could easily and reproducibly be manufactured. Rather like a tiny doughnut filled with jam, the end result is a firm shell filled with a soft gel. Importantly, the unique properties of the gel filling give the core-shell gel beads their unique properties and characteristics, just like doughnuts.

To demonstrate that the self-assembled gel filling kept its properties, Dr Petr Slavik demonstrated that within the beads, the filling retained its unique ability to reduce precious metal ions into precious metal nanoparticles. In this way, the core-shell gel beads could remove waste palladium(II) ions from water and convert them into palladium nanoparticles, which could then catalyse Suzuki Miyaura cross-coupling reactions. Indeed, one single palladium-loaded bead could be used five times to catalyse a Suzuki reactions.

In the absence of the self-assembled gel filling, the calcium alginate shells were just not capable of effective palladium binding and catalysis. In the absence of the calcium alginate shell, the self-assembled filling was too soft to be effectively dosed into Suzuki reactions or recycled. In this way, the two components of these core-shell gel beads both play a vital role, just as in doughnuts, the shell and the jam filling cooperate to make a sweet treat that is more than the sum of its individual parts.

Professor Smith said: “The best thing about this approach is that, in principle, we can fill these shells with all kinds of different self-assembled gels in order to shape them and hence better harness their unique functions, rather like filling a standard doughnut shell with various jams, curds, butters and custards. In the lab, we are therefore currently using this fabrication technique to make a wide range of core-shell gel beads for different high-tech applications.”

This research was funded by EPSRC and is published in *Angewandte Chemie*.

Dr Glenn Hurst delivers keynote lecture in Nicosia, Cyprus

At the start of November, Dr Glenn Hurst was invited to deliver a keynote lecture at the 13th Cyprus-Greece Chemistry Conference at the University of Nicosia in Cyprus. This is a biannual chemistry conference organised by the chemical societies of Greece and Cyprus and there were approximately 300 delegates. The conference was dedicated to the periodic table with a strong emphasis on chemistry education, particularly at the secondary level. Glenn delivered his keynote lecture on ‘Innovative and Transferrable Practice in Chemistry Education’. Through this lecture, Glenn discussed his work on using systems thinking as a platform for interdisciplinary learning with green chemistry to contextualise this. Particular emphasis was placed on laboratory work, game-based learning and children’s books for outreach.

Dr Glenn Hurst with Elias Sp. Elia (Vice President of the Pancyprian Union of Chemists)

Glenn was also given a tour of a local high school in Cyprus, Dasoupolis Lyceum, by the Education Minister for Cyprus, Chrystalla Koukouma. This experience was really insightful and helped Glenn ahead of delivering a training workshop to school teachers and lecturers on innovative teaching. As part of this, Glenn outlined existing inspirational work in the Department such as team-based learning techniques and use of YouTube by Professor David Smith together with integrating Twitter with the Exploring Everyday Chemistry MOOC by Professor Andy Parsons. With this base, Glenn then discussed his work using technology-enhanced learning in chemistry education together with facilitating effective environments for group work.

As part of the conference, Glenn was given a walking tour of Nicosia together with being taken to Athienou where he visited a unit to make traditional Halloumi cheese. Glenn met the mayor of the town who gave him a museum tour, demonstrating local town history to include Halloumi cheese and lace production. As a treat, Glenn was also taken to watch Anothosis Farmagusta play Olympiakos in the Cypriot First Division while in Larnaca. A 4:0 win provided plenty of cause to celebrate and a refreshing change from visiting St James’ Park.

UKCGE Research Supervision Recognition

An academic from the Department of Chemistry is among the first in the UK to be recognised by a national Research Supervision Recognition Programme.

The UKCGE (UK Council for Graduate Education) Research Supervision Recognition Programme and associated framework of ten criteria enable graduate supervisors to reflect on their practice and, if they wish, to apply for formal recognition through the scheme. The University of York took part in the pilot of the scheme in 2019 and Dr Jason Lynam was one of three members of academic staff across the university to receive recognition for their approach to graduate supervision.

Supervisors play a critical role in influencing graduate students' chances of completing on time, in determining the quality of their final outputs and, most crucially of all, in shaping their experiences as early career researchers. The importance of good research supervision is, therefore, hard to overstate.

At the same time, research supervision is an increasingly complex activity, in which supervisors are having to respond to the growth, diversification, and welfare of the postgraduate research candidate population.

The Research Supervision Recognition Programme is underpinned by a Good Practice Framework which sets out – for the first time at a national level – the wide-ranging, highly complex and demanding set of roles that modern research supervisors must undertake to perform the role effectively.

The framework is designed to set expectations for all research supervisors, to support supervisor training and development programmes, and to inform institutional policies so that the demanding nature of modern research supervision is properly recognised.

Dr Lynam said: "It was a great honour to be able to participate in this pilot scheme. It allowed me to realise that the supervisor/supervisee relationship works best as a mutually respectful partnership in which, as supervisor, I hope to inspire my research students to do great research and provide them with a framework for scientific and personal development."

Professor Tom Stoneham, Dean of the Graduate School said: "York takes research supervision very seriously and these colleagues have demonstrated through their time and commitment to the student experience and to their own professional development that excellent supervision makes a difference to student outcomes and research culture."

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 Google form on the intranet homepage or at this link.

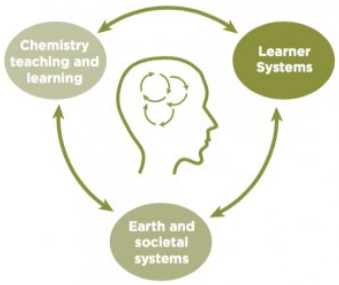
American Chemical Society education award

Dr Glenn Hurst has been recognised with one of the 2020 American Chemical Society's Committee on Environmental Improvement awards.

The award program seeks to recognize those individuals and organizations that have made exemplary contributions to the incorporation of sustainability into chemical education.

Dr Glenn Hurst has been recognised for his work "*Systems thinking approaches to teaching green and sustainable chemistry in alignment with the United Nations Sustainable Development Goals*". As part of the award, he will be expected to present invited talks on his work as part of a symposium at the Spring 2020 National Meeting to be held March 2020 in Philadelphia, USA.

In his presentation, Dr Hurst will explain how 'systems thinking' enables students to study the interdependence of components in dynamic systems allowing them to transition from a fragmented and reductionist knowledge of subject matter to a more integrated and lateral understanding of concepts, resulting in deeper learning.



Dr Hurst explained: "Green chemistry is well suited to a systems thinking approach as the 12 fundamental principles all depend on the reliance of reactions and processes on each other and with both local and global systems."

This work is part of the international IUPAC project on Systems Thinking In Chemistry Education, led by Peter Mahaffy and Stephen Matlin.

Digital Tools for Staff

Monday 9 December • C/B101 • 14:00-15:00 (Session 1) /
Tuesday 17 December • C/B101 • 14:00-15:00 (Session 2)

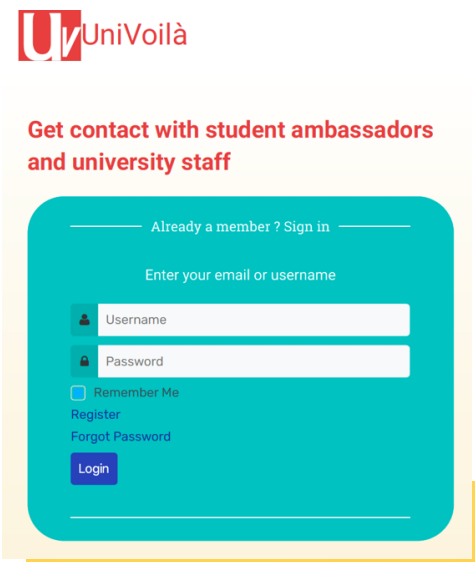
Message from HoD's Office: The following session will be given by Siobhan Dunlop (IT Services - Teaching and Learning Team). Although primarily aimed at Chemistry Professional Support Staff, all staff are welcome to attend. Please note you only need to attend either Monday 9 December (Session 1) or Tuesday 17 December (Session 2) as they will repeat the same material.

You don't know what you don't know! In this session we'll give a quick overview of key digital tools that will help you in your work (including using Google for collaboration and communication, managing time and projects, and choosing the right tool for the job) and offer you the chance to ask questions about using and choosing these tools.

If you are not a Professional Support Staff member and haven't received a calendar invitation please add your name to the sign up sheet.

WACL postdoc launches free platform for studying abroad

Atallah Elzein, a PDRA in the Wolfson Atmospheric Chemistry Laboratories (WACL), has recently launched a free platform, www.univoila.com, which allows members looking to study abroad to get contact with other students and postdocs around the world. This website gives students the opportunity to find out more information about their destination and prepare their future student life. The Facebook page has now more than 2,000 followers.



On Univoila you can join groups and receive notifications related to PhD and job offers, you can also follow calls for university fellowships. Multiple forums are also available to discuss the education system and lifestyle in different countries. Anyone can post questions and get answers from local students. Atallah is collaborating with students and postdocs in France and the UK to help answering all student's inquiries. If you wish to participate and share your studying or work experiences with other members, you can join the community and if you have any questions, do not hesitate contact Atallah at atallah.elzein@york.ac.uk.

New starters

Dr Peter Ivatt, Postdoctoral Research Associate (line managed by Professor Mat Evans)
Room: G/116; Ext: 4759; Email: peter.ivatt@york.ac.uk

A note about last month's new starters:

Katy Holmes' line manager was listed as MAB in the October issue. Just to clarify, this referred to Matthew Badham and not Martin Bates. Line manager names will be spelt out in full going forward.

Green Chemistry news

Green Chemists in China

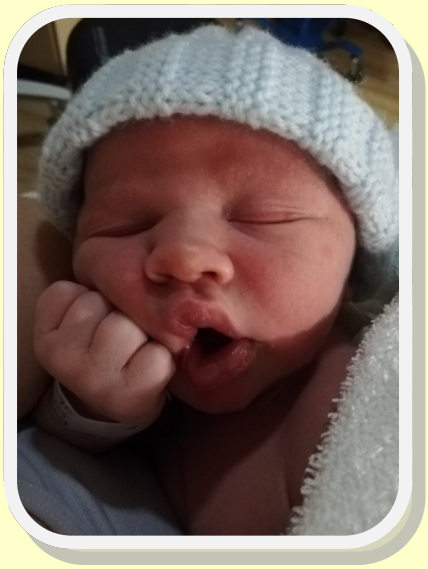
Professor James Clark and Dr Alice Fan from York's Green Chemistry Centre of Excellence (GCCE) attended Green China 2019 in Beijing on 17-19 October, which was the first international conference on green and sustainable chemistry to be held in China. James Clark gave a plenary lecture on moving towards a circular economy using green chemistry, and Alice Fan gave an invited lecture on microwave activation of biomass. The conference attracted over 600 delegates from 52 countries and regions. James and Alice have now set up new collaborations with the people they met, with the initial research discussion meetings haven taken place already.

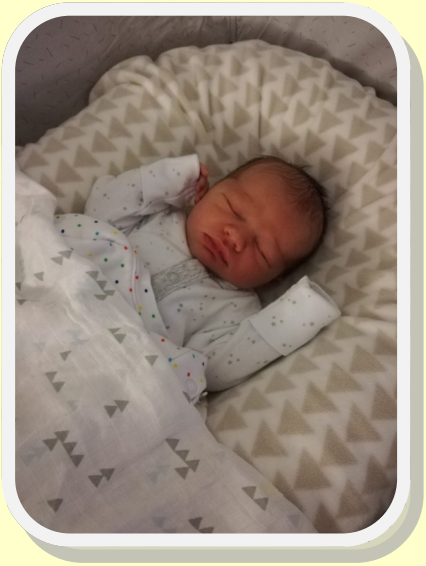
Graduate of Green Chemistry MSc gives talk at conference in Athens

Green Chemistry MSc graduate, Katerina Vriza, was invited to give a talk on her MSc project at the 6th Panhellenic Symposium with International Participation, which took place on 18-20 October in Athens. The conference aims to bring together Greek researchers working in universities across the country or abroad, to discuss the key role that green chemistry can play in Greek education, sustainability and society. Katerina gave a 10m presentation on her final MSc project, and shared her experience of being part of a research centre that is the forefront of 'greener' research. Katerina graduated from the MSc in Green Chemistry and Sustainable Industrial Technology in 2018.

New arrival

Gregg Addicott (Undergraduate Teaching Laboratories Assistant) and wife Jenni are delighted to announce the birth of their baby boy, Rowan Oliver Addicott. Rowan was welcomed into the world on Sunday 10 November, weighing a healthy 8lb 12.5oz. All are doing well.





Chemistry Christmas Quiz

Sponsored by Chemical *Inter*Actions

Hosted by Jason Lynam

Everyone is Welcome!

Wednesday 18th December
3-5 pm
Hosted in B101/102

Food and drinks will be provided!

Please sign up your quiz teams (max. 6 members) using the Google form:

Web-link: https://bit.ly/2OlMo2J

ROYAL SOCIETY OF CHEMISTRY

We ask for a small donation to St. Leonard's Hospice in memory of Robin Virgo. There will be donation boxes at the event or you can donate online using this link: https://bit.ly/2QVq3L3