DEPARTMENT OF CHEMISTRY

UNIVERSITY OF OXFORD

Outreach newsletter: July 2021

Welcome to our July edition. We hope that you are enjoying this lovely sunny weather.

Please do pass this on to anyone who may be interested in receiving this bulletin. They are very welcome to subscribe using this link. If you wish to be removed, please email outreach@chem.ox.ac.uk.

With best wishes,

Dr Malcolm Stewart (Director of the Chemistry Teaching Laboratories), Saskia O'Sullivan (Educational Outreach Officer) and Matt Fifield (CTL Administrator)

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Upcoming events:

KS5 Virtual Schools' Chemistry Conference [UPDATE]

Our next Schools' Chemistry Conference will take place on **Thursday 30th September 16:00-18:00**. This is open to all KS5 students (16-19 yrs) and their teachers (of any age!) and will feature talks and Q&A on cutting-edge chemistry at Oxford. We're delighted to confirm talks from Professor Peter Edwards and Dr Marie Wong.

Peter Edwards is Professor of Inorganic Chemistry and Fellow of St Catherine's College, Oxford. He grew up in Toxteth, Liverpool, looked after by two older sisters and a widowed mother, who held down three jobs to support the family. Peter, who received free school meals until he was an early teenager, was the first in his family to attend university, reading Chemistry at Salford where he stayed on to complete his PhD, before going on to study at Cornell University, New York, via a Fulbright Scholarship. He returned to the UK afterwards, to Oxford, as a postdoctoral researcher with John Goodenough (winner of the 2019 Nobel Prize in Chemistry), then on to the universities of Cambridge and Birmingham, before returning to the University of Oxford in 2004, as Statutory Chair in Inorganic Chemistry and Head of Department.

Dr Marie Wong is currently working for an interdisciplinary commercial company, based in Cambridge. Originally from Malaysia, Marie completed her MChem and DPhil (PhD) at the University of Oxford, the latter in Prof. Ed Anderson's group. Her research focused on developing chemical methods for the synthesis of complex molecules, with applications in industries such as pharmaceuticals, agrochemicals and materials. During her undergraduate degree, Marie completed placements in the US at UC Berkeley focusing on palladium-catalysis with Prof. John Hartwig and at Yale University with Prof. Scott Miller, looking at peptide-catalysis. Marie's talk will focus on her career pathway and her DPhil research.

You can register for the event to attend by clicking the icon on the right.

Spanish 'Ask a Chemist' – Conversations around careers for chemists [NEW]

We are having our very first Spanish Ask a Chemist session on **12th October**, **1-2pm**, with **Dr Patricia Rodriguez Macia.** The session will be in Spanish, although with some English, and there'll be an opportunity to ask questions in both languages.

'I am currently a PDRA in the Vincent group and hold an E P A Cephalosporin JRF at Linacre College, Oxford. From next October 2021, I will be a Glasstone Fellow in Inorganic Chemistry at the Chemistry Department, University of Oxford.

My research interests lie in the Bioinorganic Chemistry area embracing a range of different fields such as biology, synthetic chemistry and physical chemistry. I am investigating energy converting enzymes to fully understand how, by using earth-abundant metals in their active site, they are able to perform key chemical reactions in a very efficient way. These reactions usually represent enormous challenges for chemists to carry out on a laboratory scale (e.g. reduction of nitrogen to ammonia, oxidation and production of hydrogen and reduction of CO2 to CO and formate).

My research focuses on particular classes of metalloenzymes (hydrogenases and CO dehydrogenases). I employ complementary spectroscopic techniques alongside electrochemistry to study the catalytic mechanism and the active site-protein matrix interplay in these fascinating enzymes. I am passionate about developing new techniques to be able to study all the intermediate states in the fast catalytic performance of these enzymes. The ultimate goal is to acquire insight from the natural enzymes into the requirements for developing novel green catalytic processes, new synthetic materials and more efficient catalysts.'

'Soy Patricia Rodriguez, estudié mi Licenciatura en Química en la Universidad de Alicante (España). Hice mi doctorado en Ciencias Naturales (Química y Bioquímica) en el Instituto Max Planck para la Conversión de Energía Química (Alemania) y actualmente soy investigadora postdoctoral en la Universidad de Oxford (UK). El próximo octubre empezaré con una beca de investigación en Química Inorgánica (Glasstone Research Fellowship in Science) en el Departamento de Química de la Universidad de Oxford.

Mi línea de investigación se centra en la bioinorgánica, abarcando diferentes áreas como la biocatálisis, la síntesis inorgánica, la espectroscopía y la química física en general. Mi investigación consiste en estudiar enzimas capaces de llevar a cabo transformaciones químicas esenciales para la producción de la energía limpia. Si queremos pensar en posibles aplicaciones biotecnológicas para esta clase de enzimas, es crucial comprender sus

mecanismos de catálisis y de degradación. En mi investigación, utilizo diferentes técnicas esprectroscópicas y electroquímicas para estudiar dichas enzimas e investigar no solo sus posibles aplicaciones biotecnológicas, si no también su potencial como fuente de inspiración para desarrollar catalizadores y materiales para la generación de energía limpia. Entre los grupos de enzimas que estudio están las hidrogenasas, (las cuales catalizan la conversión de protones y electrones en moléculas de hidrógeno, cuya combustión libera energía que puede ser utilizada en pilas de combustible), las nitrogenasas (enzimas fijadoras de nitrógeno atmosférico, las cuales rompen el nitrógeno molecular atmosférico y lo combinan con para formar amonio) y las CO dehidrogenasas (las cuales transforman el dióxido de carbono atmosférico en monóxido de carbono, el cual puede ser empleado en multitud de reacciones químicas industriales). Mi objetivo es adquirir suficientes conocimientos sobre como las enzimas naturales funcionan para saber los requisitos indispensables para desarrollar catalizadores para la generación de energía limpia y nuevos procesos catalíticos verdes.'

SIGN UP

These sessions are open to all interested students of any age, and teaching staff who are invited to submit questions in advance or during the session. Sign up to receive reminders and updates about this series.

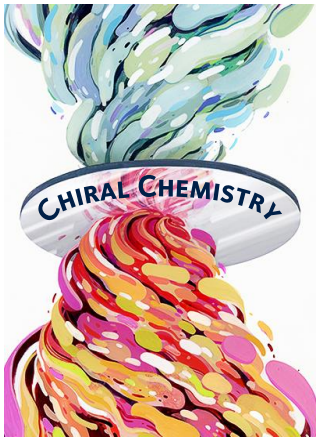
KS5 Chiral Chemistry Workshops [REPEAT]

Our Chiral Chemistry workshops will continue in the Autumn term of the 2021-2022 academic year. This is our online workshop for UK state school KS5 Chemistry students and teachers, which is delivered by our Department Ambassadors. Dates and times have been designed to avoid interruption of lessons. The session focuses on 3D shapes, chirality, the role of chirality in biological systems and the resources available to research chemists looking at proteins, such as the main protease in SARS-CoV-2, the latter being an active area of research in our Department. There is also an opportunity to ask our Ambassadors questions about their research and their academic careers to date.

REQUEST A SPACE

Students may attend without a teacher, provided we have a teacher contact.

The workshop will be delivered on the following dates/times:



Tuesday 12th October 2021	16:00-17:00
Wednesday 10th November 2021	16:00-17:00
Thursday 2nd December 2021	16:00-17:00
Tuesday 11th January 2022	16:00-17:00
Wednesday 9th February 2022	16:00-17:00
Monday 14th March 2022	16:00-17:00
Thursday 28th April 2022	16:00-17:00

Please note, places are limited to students from state schools in the UK, Isle of Man and Channel Islands, and where we are oversubscribed, we will prioritise places for students who meet our widening participation and access criteria. Further information about this can be found at https://www.ox.ac.uk/about/increasing-access

Explore Chemistry – A super-curricular series [UPDATE]

KS5 UK state school students and their teachers are invited to sign up for this series of talks and Q&As. There will be a week to watch a pre-recorded talk (posted online), reflect and note any questions before joining a 45-minute online live Q&A session with the researcher presenting the talk.

Our next talk and Q&A will be in October 2021, and features DPhil Wojciech Stawski (Harry Anderson Group) with a talk on molecular cages. The talk will be released on **14th October**, with the **Q&A** on the **21st October**.

Following on from this, we will have a talk from DPhil Jack Ren (Ben Davis Group) on chemical biology and proteins. The talk will be released on **11th November** with the **Q&A** following on the **18th November**.

Please note, places are limited to students from state schools in the UK, Isle of Man and Channel Islands, and where we are oversubscribed, we will prioritise places for students who meet our widening participation and access criteria. Further information about this can be found at https://www.ox.ac.uk/about/increasing-access

SIGN UP TO THE SERIES

Chemistry Teaching Laboratory (CTL) Workshops [REPEAT]

Despite an easing of lockdown restrictions, we now do not anticipate a return to CTL visits until **Jan 2022**. As soon as availability is confirmed, dates will be posted on our website and publicised through the usual channels.

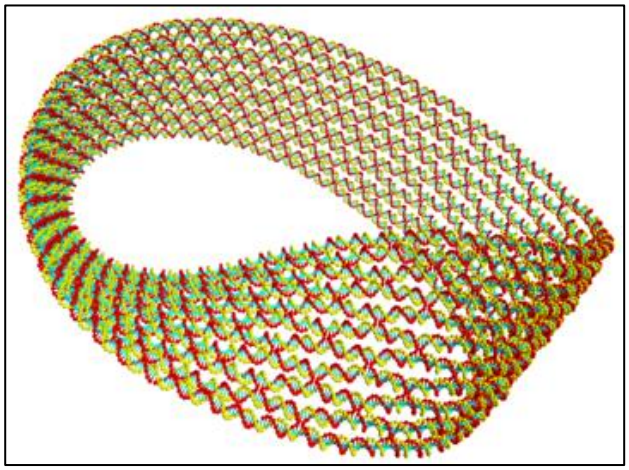
School / Community / Oxford College Workshops [REPEAT]

All our face-to-face outreach is suspended at present and, regrettably, we are unable to accommodate requests for visits. We expect a further update in September 2021.

Learning Resources

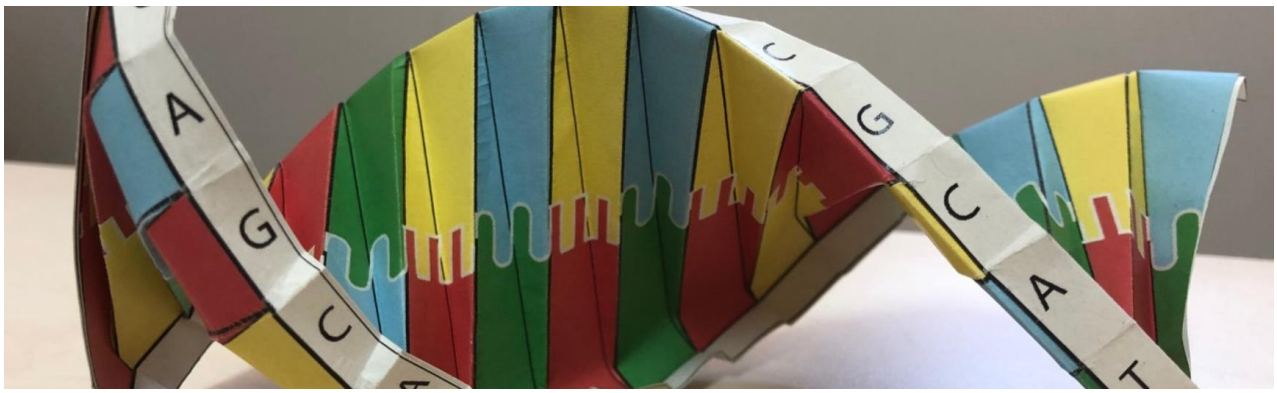
Featured resource: Folding (and then stapling) DNA Origami [NEW]

This month, we would like to draw your attention to a recent article by one of our DPhil students Hannah Fowler on Folding (and then stapling) DNA Origami. This resource will suit students of A-Level and GCSE Chemistry and Biology.



Our colleagues at the Museum of Natural History have a paper origami resource for DNA that you might enjoy making:

https://oumnh.ox.ac.uk/activity-dna-origami



If you are aware of resources that have been beneficial and would like us to include these in our future mailings, please do get in touch with us at outreach@chem.ox.ac.uk.

Museum of Natural History

RSC Women in Chemistry: Making the Difference [UPDATE]

This project includes a number of engaging practical challenges suitable for after-school, classroom and home use, as well as resources around the research behind the challenges and the female chemists involved. These will be available throughout 2021-2022, with more to come.

Power UP! - Set by a team at Oxford Chemistry, the first challenge highlights the importance of battery technology and the quest for safer, longer-lasting, efficient and more powerful portable energy stores.

Dig it UP! - Set by Wolverhampton University, this involves investigating the degradation of "biodegradable" plastic and paper bags supplied from popular supermarkets. It provides an opportunity to explore control variables, and observe any visible degradation between the bags, comparing which look to have degraded more within the time period. The research showcases the Green Chemistry agenda at Wolverhampton and the pioneering work being done to repurpose plastic waste into high-value materials in agriculture, medicine and household items.

Light UP! - Set by the University of Warwick: a chance to investigate the Chemistry of Light! Participants make their very own Camera Obscura, view light diffraction, observe LED lights flickering faster than the eye can see alone, and investigate the UV protecting qualities of sunscreens.

Link UP! – Set by the University of Durham, exploring the fascinating process of gelation. Gels are formed when molecules link together to form networks, producing materials with interesting and useful properties. Participants make their own gels which mimic those produced by some strains of bacteria, and explore the use of (wo)man-made gels in healthcare applications, such as the delivery of drugs.

Proteam UP! - Set by Imperial College London and exploring the importance of proteins in our lives: what proteins are, the atoms of which they are made, how to extract proteins from biological matter and to visualise real proteins with the power of computational chemistry.

Look UP! Set by the Atmospheric Chemistry Research Group (ACRG) at the School of Chemistry, University of Bristol, exploring air quality and its importance in our lives: air quality, examining real air quality data and create a research presentation.

Please do share the website link as you see fit. The challenges, resources and events are designed for girls aged approx. 10-14 years (Upper KS2-KS3) and their supporters of any age!

https://makingthedifference.web.ox.ac.uk/home