Yo U r C He m M Ag

92 238.0289 $5f^3\ 6d^1\ 7s^2$ Uranium

2 4.0026 $1s^2$ Helium

47 107.8682 $4d^{10}\ 5s^1$ Silver

Newsletter of the UEA School of Chemistry

CONTENTS

Welcome!

How time flies – we're already approaching the middle of the Semester. It's been really fun to meet with new and returning students at a series of morning social events over the past few weeks. Aside from helping to build a sense of cohort, and perhaps to prove that staff are, after all, human, these are opportunities for students to ask questions in an informal setting, and to tell us what they're enjoying or not enjoying.

With the weather turning miserable, it's easy to forget that summer happened since the last newsletter! Graduation was great (if you were able to dodge the showers, soggy if not) and there were the usual opportunities for staff to focus on research/scholarship and to get out and about to conferences and, of course, to have a holiday. Just to point out, these are separate events, conference does not equal holiday, despite what my family thinks!

We ran our School Internship Scheme once again, funding a number of middle year undergraduates to undertake a 6-week internship in one of the School's research labs. This is alongside national Internship schemes such as that offered by the RSC, which our students also participate in. These are really valuable opportunities for students who are interested in gaining an appreciation of what it's like to do research.

Check out page 13 of this issue and the School's Instagram and X feeds to hear more about these (page 17). As always, read on to learn much more about the activities of the School! - **Prof. Nick Le Brun**

We wish you a very happy autumn/winter semester, and look forward to bringing you more news in the New Year!

Dr Rianne Lord (acting Director of Admissions)
Dr Tameryn Stringer (Outreach Officer)
Dr Garth Jones (Director of Admissions)
Miss Rachel Smith (Magazine Design)

Professor Nick Le Brun

WELCOMES & FAREWELLS

Students, staff and visitors

We welcome the following people into CHE and PHY:

- Dr **Dale Green** who is a newly appointed Lecturer in Physics that will start with us in January 2024.
- New postgraduate students: **Amirah Aldawsari**, **Rachel Chiu**, **Callum Eke**, **Miaomiao Gao**, **Natalia Gray**, **Joshua Kinslow**, **Adele Knapp**, **Ivan Lopez Poves**, **Ford Neal Fagan**, **Kier Whiting**, **Naomi Hennah**, **Fawziah Alotaibi** - we wish you all the best of luck in your studies.
- **Emmanuel Diez** from the group of Dr Jesús Campos Manzano (Institute for Chemical Research (IIQ) CSIC-University of Sevilla), who is a visiting PhD student in the Lord group.
- **Cristina Adrover Jaume** from the Health Research Institute of the Balearic Islands (Spain), who is a visiting PhD in the Marín group until the end of December.

We also had various visitors to UEA this year to give talks including Prof. Graham Worth (UCL), Dr Rebecca Ingle (UCL), Prof. Emma Raven (Bristol University), Dr Karrera Djoko (Durham University), Prof. Karen Faulds (University of Strathclyde), Dr Amanda Jarvis (University of Edinburgh), Dr Clare Megarity (University of Manchester), Prof. Michael Wasielewski (Northwestern University), Dr Robert Cameron (University of Strathclyde), Dr Tom Oliver (University of Bristol), Prof. Maxim S. Pshenichnikov (University of Groningen) and Prof. Rodolphe Clérac (University of Bordeaux).

Farewells

The School sadly says farewell to Prof. David Andrews, Prof. Andrew Mayes, Dr Nigel Clayden, Dr Phil Wilson, Dr Martin Loftus, Dr Ed Macauly and Mr Paul Disdle. We wish you all the very best!


Dr Nigel Clayden


Dr Martin Loftus


Mr Paul Disdle


Dr Ed Macaulay


Prof. David Andrews


Dr Phil Wilson


Prof. Andrew Mayes

"What stands out for me, is the wide-ranging interdisciplinary work I have done during my 24 years at UEA. This has exposed me to great colleagues across departments and faculties, the NRP institutes and the wider region, as well as many national and international collaborators. It has constantly challenged my knowledge and perceptions, and kept me on a lifelong learning journey, both in teaching and research. While my formal retirement has ended my teaching work, I am still finishing off research projects and maintaining some involvement with my high impact work on microplastics, so I will still be seen around the School on a more or less regular basis, once I have enjoyed a little break to recharge my batteries.

Andrew Mayes wrote to us from Sardinia, where "I am happy to report some beaches have almost no visible plastic waste - I just can't quite let it go...".
Prof. Andrew Mayes

Meet our new lecturer

Dr Dale Green
Lecturer in Physics
dale.green@uea.ac.uk
@DrDaleGreen

Hello, I'm **Dr Dale Green**, a new Lecturer in Physics (starting January 2024) and previously a postdoctoral research associate in quantum dynamics and ultrafast spectroscopy working with Dr Garth Jones. I completed my MChem and PhD in Chemical Physics in the School of Chemistry at UEA with Dr Jones, graduating in 2020. After a few months doing computational Chemistry for Professor Steve Meech at UEA and a stint teaching Science and Maths in a secondary school as part of the National Tutoring Programme during the pandemic, I consider myself very fortunate to have been able to return to UEA in 2021 and continue to develop the research and software I started during my PhD modelling 2D electronic spectroscopy (2DES).

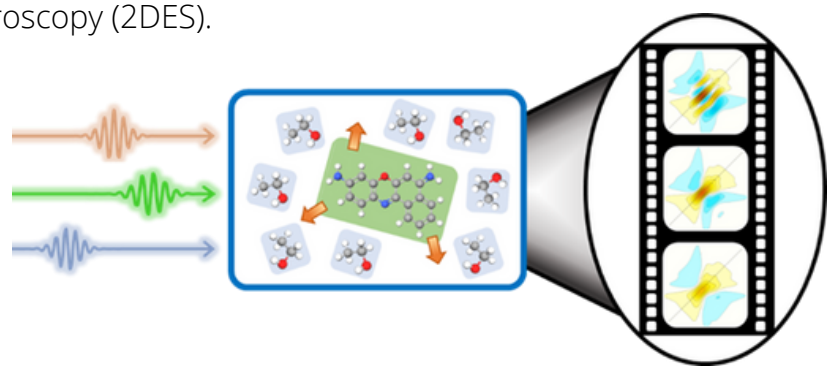


Figure 1: Making molecular movies modelling 2D electronic spectroscopy.

The absorption of light by molecules starts a race between a host of competing processes representing the relaxation/transfer of energy and rearrangement of atoms. Typically this race is over within a few nanoseconds (10^{-9} s), but can be watched using ultrafast laser pulses. 2DES uses a series of pulses to track chemical reactions, recording an image every few femtoseconds (10^{-15} s). The set of these snapshot spectra generate a movie (**Figure 1**) from which we can learn about the electronic structure and vibrational motion of molecules, as well as the rates of relaxation and energy flow within and between molecules.

I am then tasked with modelling this experiment to confirm and enhance our interpretation of the rich yet complicated results. My simulations combine quantum mechanics and thermodynamics to capture the flow of energy and entropy between the chemical system and its environment. Each experiment requires hundreds of processors working in harmony to crunch through GBs of calculations for weeks on end.

Our current project, together with UEA experimentalists Professor Meech and Dr Giovanni Bressan, concerns coherences in ultrabroadband 2DES. Coherences involve superpositions, simultaneous population of multiple quantum states, which identify electronic/vibrational couplings within molecules. By extending the range of wavelengths available, we can access higher energy excited states and find more coherences, gaining new insight and greater control of photochemical reactions and energy harvesting technologies.

My research bridges Chemistry, Physics, Mathematics and Computing, requiring a broad range of skills and knowledge which enable me to enjoy being involved in too many projects. Beyond 2DES, current collaborations within UEA include applying our models to quantum optics with Dr Magnus Borgh and Ben Humphries (PGR) and exploring properties of optical vortices with Dr Kayn Forbes. Links to all my publications, posters and talks are available at **drdalegreen.wordpress.com** and **the-jones-group.co.uk**.

SUCCESSES & NEWS

School Successes!

- Many congratulations to **Gaia Fancellu** who passed her MPhil by Research viva (Marín, 1st supervisor), Dr **Pedro J. Hernando** who passed his PhD viva and was based at Iceni Glycosciences Ltd (Marín, 2nd supervisor) and **Budur Alanazi** who passed her viva (Cammidge).
- As a school we have won several research grants and published our work in a number of high impact journals (see pages 10-12).
- Many of our staff and students have presented their research at national and international conferences over the last year, including the Dalton 2023 (University of Warwick), ISBOMC23 (Braunschweig, Germany), EuChemS (Vienna, Austria) and the Metals in Biology GRC (USA) (See highlights on next page).
- Dr **María Marín** was awarded a best poster prize for her contribution at the RSC Chemical Biology Symposium that took place in London on the 15th May. Title: "Two-photon fluorescent (nano)probes for a versatile intracellular detection and quantification of nitric oxide".
- PhD student **Hassan Boudjelal** (Marín) won a Best poster prize at the RSC Chemical Biology and Bioorganic Group Forum, Belfast, on the 13th January.
- PhD student **Liam Tucker** (Marín) won best poster prize at the Microbes in Norwich 2023 meeting on the 9th February.

Equality and Diversity

Dr Tharin Blumenschein
Director of EDI

Networking Breakfasts

The School of Chemistry took part in the IUPAC Global Women's Breakfast, held in conjunction with the U.N. Day of Women and Girls in Science on 14th February. **Dr Tharin Blumenschein** organised a networking breakfast for women working in Chemistry across UEA, and had women from different departments meet and chat over bacon (or vegetarian) sandwiches, tea, coffee and pastries.

It was definitely an opportunity to meet new people! The goal of the GWB series is to establish an active network of people of all genders to overcome the barriers to gender equality in science. The theme for 2023 was "Breaking Barriers in Science".

This was followed by a networking breakfast jointly organised with the School of Pharmacy on International Women's Day, on the 8th March. It was great to have another opportunity to catch up with our women colleagues in both Schools.

Athena SWAN

We are also beginning to prepare for the renewal of our Athena SWAN Bronze award. The Athena SWAN Charter is a framework to support and transform gender equality in higher education. While the deadline is almost 2 years away, now is the time to start gathering data to analyse the progress since our last award.

CONFERENCE CONTRIBUTIONS

Members of the School of Chemistry have presented their work at numerous conferences and seminars over the last year. Here are some highlights.

Conference Presentations

Many of our staff and students attended the Dalton 2023 conference at the University of Warwick (18-20th April 2023), which was co-organised by **Dr Joseph Wright**, and they gave the following oral presentations.

Elizabeth Gray - Stabilisation of the RirA [4Fe-4S] cluster results in loss of iron-sensing function
Dr Justin Bradley - How universal is the role of tyrosine in oxygen activation by ferritin
Oliver King - Biological evaluation of homoleptic bimetallic silver(I) N-heterocyclic carbene complexes
Dr Rianne Lord - Exploring the antimicrobial activity of cobalt(II) picolinamide complexes
Zinnia Bugg - Iron Oxidation and Detoxification in Human Mitochondrial Ferritin

Drs **María Marín** and **Rianne Lord** gave invited talks at the Norwich Cancer Research Network Symposium (5th June). Rianne also gave an oral contribution at the International Symposium of Bioorganometallic Chemistry (ISBOMC) 2023 in Braunschweig, Germany (18th-21st September), in which she was awarded a Biochemical Society travel grant to attend.

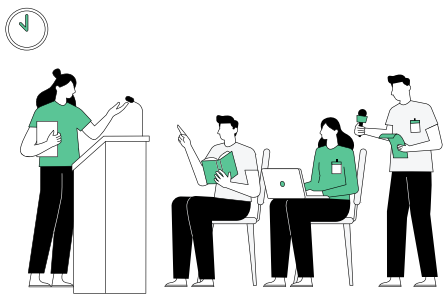
Dr María Marín gave an invited talk "Two-photon Fluorescent (nano)probes for a Versatile Intracellular Detection and Quantification of Nitric Oxide" at Future Materials – 4th International Conference on Materials Science & Nanotechnology in Valencia, Spain. She was awarded an RSC Development Grant and an RSC Grant for Carers to attend this event.

Prof. **Manfred Bochmann** gave an invited plenary lecture on "Gold(III) Chemistry: Surprise, Intrigue, Mechanisms" at the 25th European Conference on Organometallic Chemistry (EuCOMC XXV), University of Alcala, Madrid, Spain.

Prof. Manfred Bochmann (left) with Profs Patrick McGowan (Leeds, centre) and Polly Arnold (Berkley, right)

Our staff and students have also given poster presentations at several conferences.

Alexander Sutton-Cook: Biophotoelectrochemistry Workshop, University of Cambridge, UK
Dr Benjamin Hofmann: Dalton 2023 & 6th EuChemS Inorganic Chemistry Conference, Vienna, Austria
Enas Aljohani: Dalton 2023, University of Warwick, UK
Oliver King: Dalton Young Members Event (DYME) 2023, Birmingham, UK
Sultanah Alhunayhin: 16th International conference on materials chemistry (MC16), University College Dublin, Ireland
Dr Tameryn Stringer: Dalton 2023 (UK) & ISBOMC 2023 (Germany)



PRIZES & AWARDS

2023 Thomas Young Medal and Prize

Professor **David Andrews** (UEA) and Professor Ventsislav Valev (University of Bath) have been awarded the Institute of Physics (IOP) 2023 Thomas Young Medal and Prize for their discovery of chirality-sensitive optical harmonic scattering, with David predicting this theoretically in 1979 and Ventsislav demonstrating it experimentally 40 years later.

Prof. David Andrews

RSC 2022 Faraday Division Horizon Prize

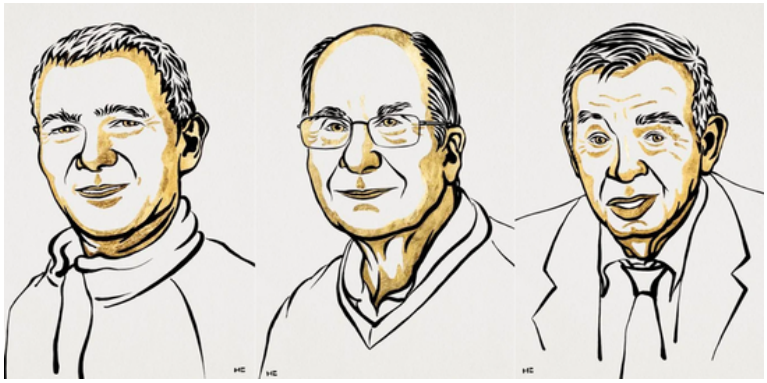
In recognition of the scientific collaboration between optical theory and experiments coming together across four decades, David and Ventsislav also shared the Royal Society of Chemistry 2022 Faraday Division Horizon Prize. Many congratulations to you both on this amazing achievement!

Nobel Prize Winners

Every year, six Nobel Prizes are awarded. Each prize recognises innovative contributions to a field, including chemistry, physics, physiology or medicine, economic science, literature and peace. Some of the highlights can be found below.

Chemistry

The Nobel Prize in Chemistry was awarded equally to three American scientists, Moungi G. Bawendi (MIT), Louis E. Brus (Columbia University), and Alexei Ekimov (Nanocrystal Technology Inc.) “for discovering and synthesising quantum dots”.



Physiology or Medicine

The Nobel Prize in Physiology or Medicine was awarded jointly to scientists Katalin Karikó (Szeged University, Hungary) and Drew Weissman (University of Pennsylvania, USA) “for their discoveries concerning base modifications that enabled the development of effective mRNA vaccines against covid-19”.

Physics

The Nobel Prize in Physics was awarded equally to Pierre Agostini (The Ohio State University, USA), Ferenc Krausz (Ludwig-Maximilians-Universität, Germany) and Anne L’Huillier (Lund University, Sweden) "for experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter".

CHEMISTRY & PHYSICS RESEARCH DAY

The School of Chemistry came together on the 15th September for our annual Research Day. The event was a fantastic opportunity to showcase and celebrate the outstanding and diverse research that is conducted within the School. This diversity was exemplified by the broad range of cognate areas represented through both talks and poster presentations on the day. These included, organic chemistry, inorganic chemistry, physical and analytical chemistry, chemical biology, and material sciences, right through to astrophysics.

We enjoyed research talks from seven PhD students and two Postdoctoral Research Associates along with 20 poster presentations. We would like to thank all our presenters for their contributions on the day, and congratulate the prize winners (below).

In addition to research presentations from within the School, we also had talks showcasing the instrumental research infrastructure available to us here on the wider UEA campus and across the Norwich Research Park. These were delivered by Scientific Platform Leads from both UEA and The John Innes Centre. Several other Platform Leads joined us on the day to answer questions and network during the session breaks.

The event was brought to a fantastic conclusion with a talk from our guest plenary speaker Dr Paul Evans who joined us for the day from University College Dublin. Paul is a UEA alumnus, and his talk entitled 'Chemistries utilising the sulfonyl group' highlighted how named reactions first introduced to him as an undergraduate here at UEA in the 90s had played important roles throughout his research career so far. This was a very fitting talk for this year's Research Day, which fell nearly precisely on the 60th Anniversary of our University's founding, with Chemistry being one of the founding Schools.

Finally, we would like to take this opportunity, to once again, thank our external sponsors for the day, Merck and Shimadzu.

Kayn Forbes and Michael Stephenson

Oral presentation prizes: the winner was **Hassan Boudjelal (left**), runner-up **Alireza Fereydoonisefiddashti (centre)** and the people's choice (sponsored by Merck) to **Petros Tsalagradas (right)**.

Poster presentation prizes: the winner (sponsored by Shimadzu) was **Zinnia Bugg (left**), runner-up **Daniel Tickner (centre)** and the people's choice to **Ala Alturk (right)**.

Research Grant Highlight

Efficient and iterative construction of novel 2D and 3D polyaryls for molecular (opto)electronics (Staggarenes)

EPSRC, £814,214, 23rd April - 26th September

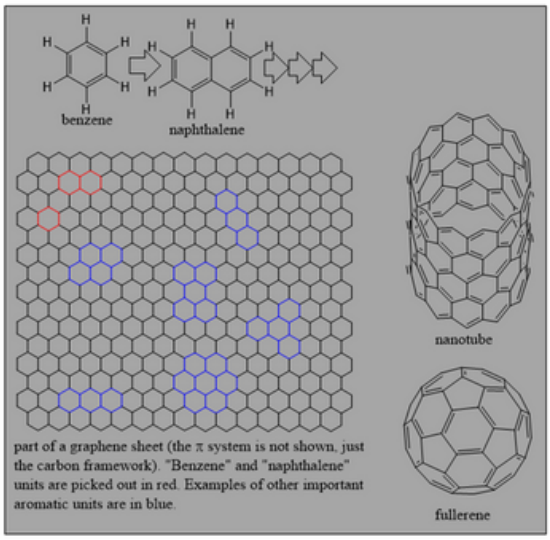
Prof. Andy Cammidge
a.cammidge@uea.ac.uk

Organic electronics, photonics and optoelectronics have already made huge impact on our everyday lives, providing multiple crucial functions in electronic and display devices, lighting, batteries, conductive inks etc. Their importance as components in solar energy capture is growing and likely to be crucial for reducing our reliance on fossil fuels. This new project will focus on all-carbon aromatic structures that are defined fragments of graphene. Graphene is the wonder material of the early 21st century.

Most people know that pencils are made from graphene, however, this is bulk graphene with the multiple sheets 'glued together" by electron clouds. Latest graphene research considers single sheet (flat) or surface (curved, tubular, spherical...) materials, which are just one atom thick. These are much more difficult to make, handle and interrogate, but the rewards are huge. Scientists have made great progress synthesising the materials, often by top-down approaches, such as peeling off single or multiple sheets of graphene or high temperature synthesis followed by separation of components from complex mixtures. They are employed for multiple functions in high technology optoelectronic components, from semiconductors to solar energy cells right through to medical applications. The diagram below depicts a sheet of graphene, and you can see how it is related to benzene (red, bottom). Draw a molecule of benzene and replace 2 neighbouring hydrogens with carbon and build a new 6-membered ring (red, top "naphthalene"). Continue the process indefinitely and you'll have a graphene sheet. Curved systems can be nanotubes or balls (fullerenes).

Our project aims to take a new approach to creation of such materials by constructing single graphene fragments (not mixtures) from the bottom up. Separately we will aim to guide the molecule construction such that it curves and completes as tube as part of the reaction design. In each case, the aim is to develop reaction chemistry that yields just a single molecular species rather than random or statistical mixtures. While such syntheses would normally be laborious, expensive and challenging our strategy will develop novel iterative procedures whereby graphene fragments can be built up using a repeating sequence that can be transferred to an automated process on polymer supports (where the expertise of collaborator **Prof. Yaroslav Khimyak** in solid state NMR spectroscopy is vital).

Each target material is novel, and the strategy will eventually permit properties to be controlled almost at will. The first stages of characterisation and evaluation for potential applications will be carried out in collaboration with **Prof. Steve Meech's** ultrafast photochemistry group. In the lab, Mamdouh (1st year PhD researcher) and Faisal (just finishing his PhD research where he has carried out the proof-of-principle experiments for this big project) will be joined by two experienced postdoctoral researchers (Dr) Isabelle and (Dr) Jacob. Watch this space for updates on our progress!



part of a graphene sheet (the π system is not shown, just the carbon framework). "Benzene" and "naphthalene" units are picked out in red. Examples of other important aromatic units are in blue.

Prof. Andy Cammidge

Paper highlight (Angewandte Chemie Cover)

Bilayer-Coating Strategy for Hydrophobic Nanoparticles Providing Colloidal Stability, Functionality, and Surface Protection in Biological Media

Dr María J. Marín
Lecturer in Analytical Chemistry
m.marin-altaba@uea.ac.uk

The capability to diagnose and treat a disease using a single platform is a highly desirable goal in the development of new medical products. The combination of diagnostics tools and therapeutic agents in a single nanoplatform, the so-called theranostic agents, together with the addition of targeting agents, is an emerging technology applicable to bioapplications such as cancer treatment.

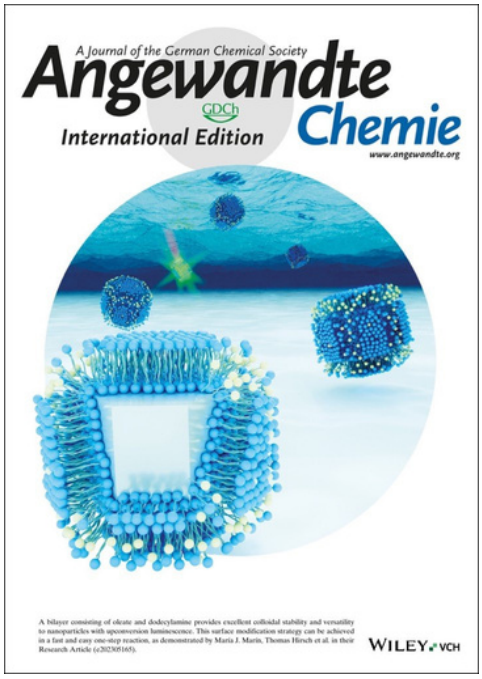
Nanomaterials are suitable for functionalisation with receptors, sensors and/or drugs due to their high surface-to-volume ratio. However, this feature also bears the greatest challenge in functionalised nanomaterial synthesis as it often results in agglomeration and, thus, poor performance and high toxicity in biological media.

Therefore, it is desirable to develop functionalisation strategies that protect particles from agglomeration in biological environments, yet still allow the particle surface to be modified to introduce multifunctionality.

Researchers at the University of East Anglia (UEA), led by Dr María J. Marín, have worked in collaboration with the group of Dr Thomas Hirsch at the University of Regensburg (Germany) to develop a synthetic strategy for the surface modification of hydrophobic nanoparticles. The strategy provides excellent colloidal stability in biological environments and good protection against disintegration, while permitting surface functionalisation via simple carbodiimide chemistry. As a proof-of-concept, the authors have demonstrated the potential of their approach using upconversion nanoparticles (UCNPs), which have shown great potential for biomedical applications due to their near-infrared excitation properties, overcoming some of the drawbacks of currently-used phototherapies in, for example, cancer.

The biological relevance of the novel approach developed by Dr Hirsch and Dr Marín was confirmed with the use of two model dyes, a photosensitizer drug, used for photodynamic therapy of cancer, and a nitric oxide (NO) probe that, when attached to the surface of the UCNPs, retained their functionality to produce singlet oxygen and detect intracellular NO, respectively.

The work, partially funded by the Royal Society of Chemistry, presents a simple and fast strategy to protect and functionalise inorganic nanoparticles in biological media, which is important for controlled surface engineering of nanosized materials for an extensive number of theranostic applications.



Schroter, A; Arnau del Valle, C; **Marín, MJ** & Hirsch, T; 'Bilayer-coating strategy for hydrophobic nanoparticles providing colloidal stability, functionality, and surface protection in biological media', *Angew. Chem. Int. Ed*, 2023, 62(36), e202305165.

GRANTS & PUBLICATIONS

Awarded Grants

Femtosecond to Millisecond Photo-dynamics of Third Generation Fluorescent Proteins; **S. Meech**; EPSRC £454,000

Correlating copper-^{15}N-histidine hyperfine interactions with long range DEER distance constraints in the C-terminal domain of MamM; **F. MacMillan**; RSC £10 000

Probing the physics of magnetar crust quakes through their energetic bursts; **S. Lander**; Royal Society £12 000

Fluorescent switches for direct ultrafast detection of SARS-CoV-2; **A. Sachdeva**; RSC £4 000

Tuning extracellular cytochromes for enhanced metal recovery and nanoparticle formation; **J. Butt** (Co-I); BBSRC £290,600

New approaches to novel PROTAC synthesis; **S. Bew**; Saudia Arabia Government £30 000

Carboranes as electron reservoirs in [FeFe]-hydrogenase mimics; **J. Wright**; RSC £2,200

Recent Publications

Stanfill, S; Hecht, S; Joerger; A, Gonzalez, P; Maia, L; Rivas, M; Moura, J; Gupta, A; **Le Brun, NE;** Crack, JC; + 10 authors; 'From cultivation to cancer: Formation of N-nitrosamines and other carcinogens in smokeless tobacco and their mutagenic implications', *Crit. Rev. Toxicol.* 2023 just accepted.

Gray, E; Stewart, MYY; Hanwell, L; Crack, JC; + 7 authors & **Le Brun, NE**; 'Stabilisation of the RirA [4Fe–4S] cluster results in loss of iron-sensing function', *Chem. Sci.* 2023, 14(36), 9744-9758.

Wright, JA; Madlool, AM & Cottrell, SP; 'Mixed-valence hydrides at [FeFe]-hydrogenase active site mimics', *J. Phys.: Conf. Ser.* 2023, 2462 012054.

Lara Garnica, R, Jimenez Rama, R, Chambrier, I, Agonigi, G, Hughes, DL, Lalinde, E, **Bochmann, M** & Fernandez-Cestau, J; 'Luminescent Au(III)−M(I) (M = Cu, Ag) aggregates based on dicyclometalated bis(alkynyl) gold anions', *Inorg. Chem.* 2023, 62(32), 12683−12696.

Casadevall, C; Lage, A; Mu, M; Greer, HF; Antón-García, D; **Butt, J**; Jeuken, LJC; Watson, GW; Garcia-Melchor, M & Reisner, E; 'Size-dependent activity of carbon dots for photocatalytic H_2 generation in combination with a molecular Ni cocatalyst', *Nanoscale*, 2023, 15, 15775-15784.

Butt, JN; Jeuken, LJC; Zhang, H; Burton, J & Sutton-Cook, AL 2023, 'Protein Film Electrochemistry', *Nat. Rev. Methods Primers*, 2023, 3, 77.

van Wonderen, JH; Crack, JC; Edwards, MJ; Clarke, TA; Saalbach, G; Martins, C & **Butt, JN**; 'Liquid-chromatography mass spectrometry describes post-translational modification of *Shewanella* outer membrane proteins', *BBA - Biomembranes*, 2024, 1866(1), 184221.

Verma, P; Tasior, M; Roy, P; **Meech, SR**; Gryko, DT & Vauthey, E; 'Excited-state symmetry breaking in quadrupolar pull-pushpull molecules: dicyanovinyl vs. cyanophenyl acceptors', *PCCP*, 2023, 25(34), 22689-22699.

Raics, K; + 10 authors; **Meech, SR**; Vos, MH; Bodis, E & Lukacs, A; 'Photocycle alteration and increased enzymatic activity in genetically modified photoactivated adenylate cyclase OaPAC', *JBC*, 2023, 299(8), 105056.

Bull, JN; Bolognesi + 10 authors; 'Autoionization from the plasmon resonance in isolated 1-cyanonaphthalene', *J. Chem. Phys.* 2023, 158(24), 241101.

GRANTS & PUBLICATIONS

Recent Publications cont.

Roy, P; Sardjan, AS; Danowski, W; Browne, WR; Feringa, BL & **Meech, SR**; 2023, 'Control of photoconversion yield in unidirectional photomolecular motors by push-pull substituents', *JACS*, 2023, 145(6), 19849–19855.

Ashworth, EK; Kao, M-H; Anstöter, CS; Riesco-llach, G; Blancafort, L; Solntsev, KM; **Meech, SR**; Verlet, JRR & **Bull, JN**; 'Alkylated green fluorescent protein chromophores: Dynamics in the gas phase and in aqueous solution', *PCCP*, 2023, 25(35), 23626-23636.

Bridge, T; Wegmann, U; Crack, JC; Orman, K; Shaikh, SA; Farndon, W; Martins, C; Saalbach, G & **Sachdeva, A**; 'Site-specific encoding of photoactivity and photoreactivity into antibody fragments', *Nat. Chem. Biol.* 2023, 19, (6), 740–749.

Madlool, AM; Wingrove, GE; Paran Rutterford, BJ; Malik, A; Butcher, HK & **Wright, JA**; 'Improved access to 'butterfly' di-iron dithiolates $Fe_2(\mu\text{-}SR)_2(CO)_6$ and their mono- and bis(phosphine) adducts', *ChemistrySelect*, 2023, 8(33), e202302935.

Hee, YY; Mohd Hanif; N, Weston, K; Latif, MT; Suratman, S; Rusli, MU & **Mayes, AG**; 'Atmospheric microplastic transport and deposition to urban and pristine tropical locations in Southeast Asia', *Sci. Total Environ.* 2023, 902, 166153.

Boazegevski, S; + 7 authors; Bressan, G, **Meech, SR** & Heisler, IA; 'Ultrafast excited state dynamics of a fluorene derivative conjugated polymer', *J. Phys. Chem. C*, 2023, 127(24), 11570–11578.

Ashworth, EK; Dezalay, J; Ryan, C; Ieritano, C; Hopkins, WS; Chambrier, I; **Cammidge, AN**; Stockett, MH; Noble, JA & **Bull, JN;** 'Protomers of the green and cyan fluorescent protein chromophores investigated using action spectroscopy', *PCCP*, 2023, 25(30), 20405-20413.

Haines, CRS; + 6 authors 'Magnetoelastic coupling behaviour of nanocrystalline ε-Fe_2O_3', *J. Magn. Magn. Mater.* 2023, 583, 170240.

Hernando, PJ; Ivanova, IM; Chessa, S; **Marin, MJ**; Dedola, S & Field, RA; 'Sensitive dipstick assays for lectin detection, based on glycan-BSA conjugate immobilisation on gold nanoparticles', *Org. Chem. Front.* 2023, 10(15), 3819-3829

Forbes, KA & **Green, D**; 'Customized optical chirality of vortex structured light through state and degree-of-polarization control', *Phys. Rev. A*, 2023, 107(6), 063504.

Zhang, H; Casadevall, C; van Wonderen, JH; Su, L; **Butt, JN**; Reisner, E & Jeuken, LJC; 'Rational design of covalent multiheme cytochrome-graphitic carbon dot biohybrids for photo-induced electron transfer', *Adv. Funct. Mater.* 2023, 33(40), 2302204.

Bonvicini, A; **Forbes, K**; **Andrews, D** & Champagne, B; 'Hyper-Rayleigh scattering optical activity: Theory, symmetry considerations and quantum chemistry applications', *J. Chem. Phys.* 2023, 158(20), 204103.

Lander, S; 'The game of life on a magnetar crust: From gamma-ray flares to FRBs', *ApJL*, 2023, 947(1), L16.

Elford, D; **Lancaster, SJ** & **Jones, GA**; 'Augmented reality and worked examples: Targeting organic chemistry competence', *CEXR*, 2023, 2, 100021.

Lee, JWL; Stockett, MH + 9 authors; & **Bull, JN**; 'Cooling dynamics of energized naphthalene and azulene radical cations', *J. Chem. Phys.* 2023, 158(17), 174305.

Recent Publications continued

Mishra, A; Djoko, KY; Lee, Y-H; **Lord, RM**; Kaul, G, Akhir; A, Saxena; D, Chopra, S & Walton, JW; 'Water-soluble copper pyrithione complexes with cytotoxic and antibacterial activity', *OBC*, 2023, 21(12), 2539-2544.

Sosa-Vargas, L; Coles, SJ;, Tizzard, GJ; Chambrier, I; Cook, MJ & **Cammidge, AN**; 'Synthesis and characterization of lead metallated non-peripherally substituted octa-octyltetrabenzo(aza)porphyrins showing face-to-face columnar stacking in the crystal phase', *JPP*, 2023, 27, 07n10, 1285-1291.

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Jarvis, DM; Coak, MJ; Hamidov, H; **Haines, CRS**; + 8 authors; 'Comparative structural evolution under pressure of powder and single crystals of the layered antiferromagnet $FePS_3$', *Phys. Rev. B*, 2023, 107(5), 054106.

Addison, K, Roy, P, Bressan, G, Skudaite, K, Robb, J, Bulman Page, PC, Ashworth, EK, **Bull, JN** & **Meech, SR**; 'Photophysics of the red-form Kaede chromophore', *Chem. Sci.* 2023, 14(14), 3763-3775.

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Andrews, DL; 'Symmetry-based identification and enumeration of independent tensor properties in nonlinear and chiral optics', *J. Chem. Phys.* 2023, 158(3), 034101.

Roy, P; Browne, WR; Feringa, BL & **Meech, SR**; 'Ultrafast motion in a third generation photomolecular motor', *Nat. Commun.* 2023, 14, 1253.

Pena, RDL; Hodgson, H; Liu, C-T; **Stephenson, MJ**; + 7 authors 'Complex scaffold remodeling in plant triterpene biosynthesis', *Science*, 2023, 379(6630), 361-368.

Navarro Navarrete, JE; **Bull, JN**; + 7 authors, 'Experimental radiative cooling rates of a polycyclic aromatic hydrocarbon cation', *Faraday Discuss.* 2023, 245, 352-367.

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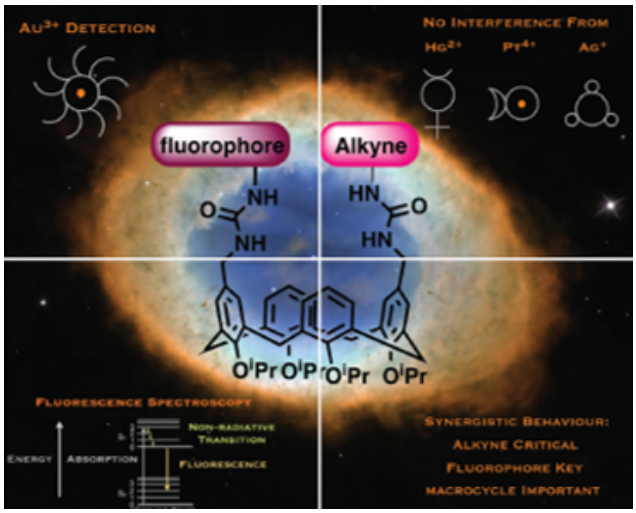
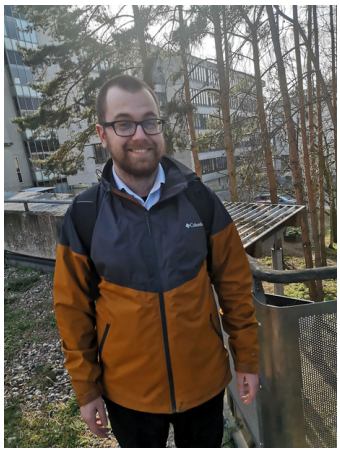
Clayden, NJ; 'NMR Chemical Shielding in Cyclosarcosyl' *Chem. Phys. Lett.* 2023, 812, 140258

Green, D. & **Forbes, KA**; 'Optical chirality of vortex beams at the nanoscale' *Nanoscale*, 2023, 15, 540-552

Bew, SP; Sharma, SV & Gardiner, WH; 'Upper-rim functionalised calix[4]arenes for chemoselective Au^{3+} detection' **COVER (RHS)**, *Org. Chem. Front.* 2023, 10, 2397-2404.



UNDERGRADUATE RESEARCH UPDATE



Daniel Strout: I worked as a summer intern (as part of the School Internship Scheme) under the supervision of Dr Vasily Oganesyan. The purpose of the project was to investigate the application of AI neural networks to predict spectroscopic parameters for a spin probe molecule, using methods employed in the Oganesyan research group (QM calculations being expensive and AI might give accurate answers much faster). This required the use of molecular dynamics simulations, quantum chemistry software, TensorFlow and python (for data extraction/ automated file generation). It was interesting to see how AI is used for a real-world application that I had contributed to, and the project has motivated me to learn about molecular dynamics. I would recommend engaging with opportunities like this!

Chemistry Research at UEA

Aran Boakye-Smith: I have recently completed my MChem degree with a Foundation Year (5 years in total). During my time at UEA, I have strived to learn a range of topics ranging from medicinal chemistry to analytical chemistry and even to modules outside the School of Chemistry including the carbon cycle and climate change module in the School of Environmental Sciences. Learning these topics led me to undertaking an organometallic project in my Master's year under the supervision of Dr Tameryn Stringer. Conducting research in this field helped me to gain a practical aspect of concepts I had learned throughout my degree. I was able to improve on my synthetic skills, analysis of NMR, performing ATR/FT-IR, learning practically about XRD, and even delving into the biological side of chemistry, learning colorimetric assays such as MTT assay to determine the cytotoxic effects of the compounds synthesised during my project. My time during my project, has inspired me to want to pursue a PhD in a similar field but before that I would like to work in the industry to gain an understanding of what life is like for the average chemist. My long-term goal is to work in research. My time at UEA has definitely inspired my passion for this.

Karina Chan: I completed my MSc in Molecular Medicine and conducted my project with Dr Rianne Lord in the School of Chemistry. My project was titled 'Understanding the modes of action of vanadium drugs in 3D breast cancer models'. Having studied a BSc Chemistry, this project gave me an insight into the best of both worlds of chemistry and biology, building on synthetic chemistry skills and learning to carry out biological studies. In this project, I've learnt new skills particularly cell culture, MTT, ROS assays, 3D cell models, and microscopy. I have synthesised benzoylacetone ligands and carried out complexation reactions with vanadium, learning to work under Schlenk conditions and also revisiting analytical chemistry skills from my undergraduate degree such as NMR and IR Spectroscopy. The project has confirmed my strong interests in cancer research, and I have a further understanding of research in the field of bioinorganic chemistry. I have really enjoyed working in the Lord Research Group with the friendly and approachable team, and I am enthusiastic to continue research in cancer studies. I have learnt many new skills from this project, and I look forward to taking these transferable skills with me to my PhD studies in Ireland.

Other internship recipients: **Thomas Carvalho**, supervisor Dr Richards; **Jessica Sanders**, supervisor Dr Bew; **Rosina Poller**, supervisors Dr Lander/Dr Stringer; **Finn Hubbard** (RSC funded), supervised by Dr Wright.

Students helping students: undergraduate research into improving accessibility

Prof. Simon Lancaster
@S_J_Lancaster

All students in the School of Chemistry benefit from adaptations to our teaching materials designed to supported students with disabilities. For example, our lectures are recorded and published with transcripts and the option to view those as closed captions. We employ minimum font sizes and off-white backgrounds to aid reading. This open and supportive environment is encouraging chemistry students to share their particular challenges and for us all to reflect on the impact of learning difficulties and neurodiversity on studying chemistry.

All UEA Chemistry students do an undergraduate research project. The majority of our students work in laboratories or perform computational or theoretical projects. Some students opt for chemistry education research projects. In the 22/23 academic year one of our undergraduate students developed a toolkit to help organisers audit accessibility on their modules. This year, two of our chemistry education project students are researching approaches to support fellow students with conditions they have personal experience of.

Dyslexia is a common learning difficulty that causes problems with the abilities we use for reading and writing. The symptoms differ from person to person but can include confusing the order of letters in words. Confusing the order of coefficients, letters, subscripts or state symbols can have a particularly acute effect on the ability of dyslexic chemistry students to process and indeed balance chemical equations. One of our students is exploring the impact of dyslexia amongst chemistry students and mitigations we can apply to support them.

Aphantasia is a much less well known condition. It refers to the inability to form mental models of things that we are not actually looking at. A chemistry student with aphantasia will not be able to visualise a molecule in their mind's eye (**Figure 1**). While aphantasia describes the end of the visualisation difficulty spectrum, we suspect many students would benefit from assistance. A second undergraduate project is exploring how immersive virtual reality can provide an alternative to purely mental models.

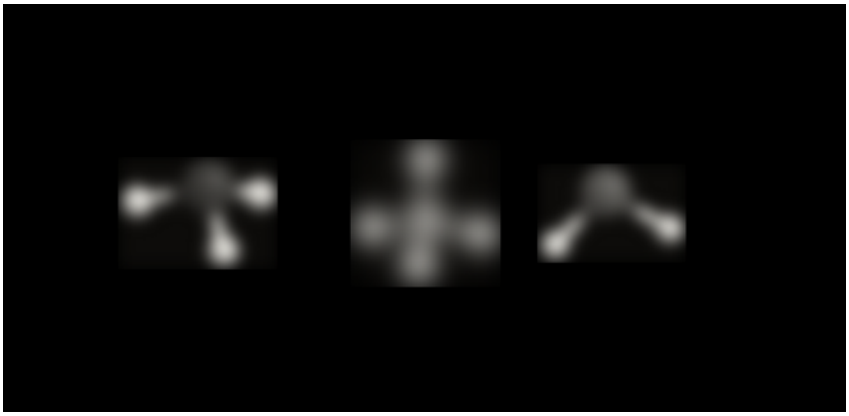


Figure 1: A chemistry student with aphantasia will not be able to visualise a molecule in their mind's eye

ADMISSIONS

Admissions

Hi! I am **Dr Rianne Lord**, an Associate Professor in Inorganic Chemistry and a UKRI Research Fellow in the School of Chemistry. I am the acting CHE Director of Admissions, and will remain in this role for the remainder of the 2023-24 academic year.

We are pleased to have welcomed the new 2023 cohort into the School, and are now in full swing for the next academic year. We held two Open Days in September and October, and have a final one scheduled for 18th November. The QR code can be used to registered your attendance or please contact me directly (right).

Our guests can enjoy a lively "Colourful Chemistry Demo" which emphasises A-level and degree learning points in a series of fun experiments, and also see our impressive start-of-the-art £26M teaching laboratory. We offer BSc and MChem degrees (plus industry or abroad options) in Chemistry and both the BSc or MChem (plus industry option) for Medicinal Chemistry, all of these can be taken with a Foundation Year course. Please visit the **UEA's course website** to find out more.

After the UCAS application deadline on the 31st January 2024, we will be inviting applicants to a series of Applicant Days that will be run between February and May, giving applicants the opportunity to sample our facilities, do an experiment based on one of our undergraduate lab classes, and of course, get to know us and our students a bit more and ask all of those important questions.

We look forward to welcoming all our guests to UEA Chemistry!

Hi! I am **Dr Sam Lander**, Director of Admissions in Physics. In UEA, there are many other staff with physics expertise who belong to other Schools: especially in Mathematics, Chemistry, and Environmental Sciences. We collaborate with them on some modules, enabling our students to learn physics in a broad range of settings. We are proud that a substantial fraction of our teaching is in small groups, making for a more interactive and personal experience, and the project modules in the 3rd year (and 4th year too, for those on the MPhys) involve a lot of one-to-one tuition.

We take a lot of care to ensure that our students cover all the key areas of modern physics theory and also get thorough experience in lab work. In this we follow the requirements for undergrad degrees set by the Institute of Physics, the key professional body for physics in the UK. We use the training we receive in higher educational practice together with our research expertise - particularly in astrophysics and quantum physics - to inform our teaching. We also have some exciting plans to increase the range of modules available to our students in the near future too, but these will need to stay under wraps for a little longer!

You can explore some of the research we do and the modules we teach at our **website**.

Dr Rianne Lord
CHE Director of Admissions
r.lord@uea.ac.uk

Open Day

Next UEA open days
18 November 2023

REGISTER HERE

Open Days

Dr Sam Lander
PHY Director of Admissions
samuel.lander@uea.ac.uk

OUTREACH

Our main aim as the outreach team is to keep schools and the public informed of our outreach activities. These are shared using numerous platforms including our social media pages (see below), email campaigns as well as through our School's Higher Education advisers. Please get in touch with our Outreach Officer, **Dr Tameryn Stringer**, if you are interested in the School's outreach events and opportunities.

Dr Tameryn Stringer
Outreach Officer
tameryn.stringer@uea.ac.uk

Poringland Science Day

Earlier this year, Poringland Primary hosted a Science Day which the School contributed to by providing lab coats and safety goggles. In the school's Working as Scientists day the children enjoyed all things science. Each year group learnt about a famous scientist. They were also taught to understand that science is not just lab coats and goggles. There is much more to science than that!

Visits to UEA

On the 20th January, we hosted approximately 80 Year 12 students from various schools in the area to get experience of an organic chemistry practical, where the students were able to synthesise their own ester in our Chemistry Undergraduate Laboratory in the New Science Building.

On the 24th May, we hosted 59 Year 12 students along with two of their teachers from Sir Isaac Newton Sixth Form. The students were taken on a tour of our analytical facilities including equipment related to mass spectrometry, microscopy and nuclear magnetic resonance spectroscopy! A huge thanks to all those involved.

OUTREACH

Bringing Scientists to You

Since our last issue, our School participated in the Bringing Scientists To You event over the summer which took place at the Thetford Academy (6th June), East Norfolk Sixth Form College (21st & 22nd June) and Springwood High School (6th July). PhD students, **Shona Hepworth** and **Elizabeth Gray**, and Dr **Tameryn Stringer** took part in these events, where the students performed an invisible ink experiment.

Alex Sutton-Cook was involved in a day-long outreach event for 50 Year 12 students organised by the School of Biological Sciences, where attendees investigated DNA Fingerprinting techniques in the New Science Laboratories. **Dominic Dennis** also organised and ran an outreach event at Blakeney Primary School, where the students learnt a bit more about molecules and their shapes.

Channel Talent

Some of our staff are also involved in the interactive Channel Talent webinars, which aim to inform and inspire young people's choices about their education and careers.

If you are a Year 12 & 13 student, please register for our insight4me Chemistry – Inorganic Chemistry webinar with Dr Rianne Lord on 'Metals in Medicine' to be held on 28th November.

Channel Talent

Past Sessions 2023

- Skills & Insight – The Periodic Table – The 7th Row & Beyond With Professor **Stephen Ashworth**
- What Can We Use Nanotechnology For? From Diagnosis To Treatment With Dr **María J. Marín**
- insight4me Physics – Waves Across Space With Dr **Samuel Lander**
- Computational Chemistry – Predicting Properties Of Molecules – University Tutorial With Dr **Garth Jones**
- Nuclear Magnetic Resonance Spectroscopy – How Chemists Can Use Physics To Understand Biology With Dr **Tharin Blumenschein**
- Chirality and Stereochemistry – An Introduction With Model Building With Dr **Chris Richards**
- Skills & Insight – Focus on Problem Solving & Thinking Skills With Dr **Magnus Borgh**

Instagram

Follow us on Social Media

X @UEA_Chemistry

Facebook @UEAChemistry

Instagram @UEA_chemistry

You can also use the right QR code to see a tour of our state-of-the-art Undergraduate Teaching Laboratory.

Lab Tour

If you think your school would be interested in a visit to the facilities and experience one of our taster days, please get in contact with Dr Stringer (tameryn.stringer@uea.ac.uk).

KITCHEN CHEMISTRY

Kitchen Chemistry activities have been happening at full steam. Events at the British Science Festival, Rackheath Women's Institute, Kwazulu-Natal (South Africa), the Eastern Cape (South Africa) and even Brunei (Borneo).

Prof. Stephen Ashworth

s.ashworth@uea.ac.uk

www.kitchenchemistry.uk

In addition to this I attended the Association for Science and Discovery Centres (ASDC) Annual Conference in Belfast (28-29th September 2023). This was an important meeting for me as I often perform science shows, including the renowned "Kitchen Chemistry", in such centres and I wanted to share my experiences with Umjikelezo We-Science. The word Umjikelezo means circle in IsiZulu and draws on a cultural practice of church groups taking their message on the road to communities. The partnership between the Science and Technology Education Centre (STEC) at the University of KwaZulu-Natal, Durban, UniZulu Science Centre, the University of Zululand's Science Centre in Richard's Bay, the KwaZulu-Natal (KZN) Science Centre, the Centre for Advancement of Science and Mathematics Education (CASME), the Durban Natural Science Museum Outreach (GoWild), and Kitchen Chemistry from the University of East Anglia (UEA) aims to take the message of science to rural KwaZulu-Natal. The project is modelled after Dr Graham Walker's Science Circus Africa which is a pioneering science outreach project running in Southern Africa.

Like that of Science Circus Africa, the philosophy of Umjikelezo We-Science is to bring the experience of science centres, museums and, equally importantly, careers advice, to isolated rural communities around Durban. This aligned well with one of the conference themes of "Diversity, equity, inclusion and accessibility in science, including utilising STEM for positive youth and community outcomes".

My contribution to the proceedings was a discussion table "Umjikelezo We-Science: A partnership for equity, inclusion and accessibility". I provided questions to stimulate conversation and discussion.

Thanks go to the School of Chemistry and the Centre for Higher Education Research (CHERRPS) at UEA for funding my travel to the conference.

Prof. Stephen Ashworth

Chemistry and Physics Graduation and Awards

Many congratulations to all of our bachelors and masters students from CHE and PHY who graduated on the 19th July 2023. We hope you all had a wonderful time studying at UEA and wish you all the best for your futures.

There were a number of students who won prizes for highest marks in BSc and MChem, and the best undergraduate research projects for Organic, Inorganic, Physical or Biological Chemistry. Here are this year's prize winners for CHE - many congratulations to you all on your hard work!

Franklin Potts - The Katritzky Prize (BSc)

Jamies Williamson - Best project in Organic Chemistry at MChem or BSc

Nathan Croft - The Katritzky Prize (MChem)

Charles Hazelwood - Best project in Biological Chemistry at MChem or BSc

Archie Crook - Best project in Biological Chemistry at MChem or BSc

Joshua Kinslow - Best project in Physical Chemistry at MChem or BSc

Aran Boakye-Smith - Best project in Inorganic Chemistry at MChem or BSc

UEA Scholarships & funding options for MSc & PhD

Are you a current UEA student seeking to continue your studies at UEA after you graduate this summer?
Remember UEA offers some excellent MSc and PhD opportunities to take your learning further.
Exclusive fee reductions available for UEA Alumni:

- 30% Final Year Continuation Scholarships
- 10% Alumni Scholarships

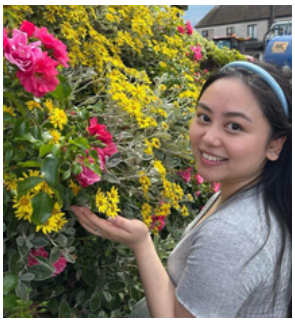
The UK Government Postgraduate Loan scheme also currently offers up to £12,167 to support Master's study, and up to £28,673 for postgraduate Doctoral courses. Check your eligibility to apply. Turn your passion into specialist knowledge, diversify your expertise and widen your career choices. Find out about all UEA Scholarship options: https://www.uea.ac.uk/study/fees-and-funding/scholarships-finder/postgraduate

Meet the Chemistry Society Committee

Throughout the academic year, the Chemistry Society organise an array of activities. To kick-start the year, the Chemistry Society committee hosted a welcome bar social for our new first year students, with more activities planned!

President / Chemistry Convenor - Henry Harrison

"Hello, my name is Henry, I am a 3rd year BSc Chemistry student, with a love of organic chemistry. I am currently starting my research project and am hoping to work in pharmaceuticals to help produce novel medicines for untreated diseases."



Vice-President - Krisma Gurung

"Hello! My name is Krisma. I am a 3rd year BSc Chemistry student, taking modules in inorganic, organic, physical and analytical chemistry. This year I am starting my research project, related to azobenzene!"

Treasurer - Chanelle Shallow

"Hi! I am Chanelle, a 2nd year BSc Chemistry student. My current favourite module is physical chemistry. I chose chemistry because I love that it has an application in everything we do! It shifts my perspective on everyday life."

Media Officer - Erinn Fowler

"Hello, my name is Erinn. I am a 2nd year BSc Natural Sciences student, originally on the BSc Chemistry course. Currently, I am taking modules in biochemistry, biophysical chemistry and molecular biology & genetics."

Welfare Secretary - Nuala Rooney

"Hi, I am Nuala. I'm a 2nd year BSc Chemistry student, with a love for cosmetic chemistry. My current modules include biophysical and medicinal chemistry, as well as polymers & materials."

UEA Chemistry Society

The team are active on Facebook and Instagram, and have been doing a fantastic job to connect with our undergraduate students, by sign-posting them to online events, quizzes and enjoying social events.

Chem Soc

UEA Biochemistry Society

We also have our Biochemistry Society, which aims to give members a chance to put down their beakers and pipettes, and relax, while also providing academic and career support.

Biochem Soc

SOCIETIES

Royal Society of Chemistry (RSC)

All of our chemistry courses are accredited by the RSC. An **RSC membership** provides a whole range of support and opportunities for those studying for a degree in the chemical sciences. Members can gain access to a number of online careers support tools, helping them to track progress throughout their time at university and to plan for the future, as well as different platforms for networking with other like-minded individuals through our Local Sections and Interest Groups. There are also lots of help and support available to University Student Chemistry Societies, please do contact the membership team for more information.

The RSC are offering all students enrolled on a chemical science degree a free RSC student membership. Please contact **Dr Rianne Lord** if you would like any more information.

The RSC offer a range of **funding opportunities and bursaries** for conference attendance, outreach, diversity events etc. They also support many conferences, such as the Dalton 2023, Dalton Young Members Event (DYME) or the RSC Chemical Biology & Bioorganic Group, which were well attended by our School. The RSC **Joliot Curie Conference** (13-14th September) for early career chemists was held in Southampton. Talks from a diverse range of scientists, including Dr Lord, gave insights into their careers and how to get funded, delivered grant reviewing workshops and mentoring sessions. This is a must event for those wanting to continue in chemistry - look out for the 2025 event!

RSC East Anglia

Upcoming and Past Events

From polymers to granules: How do plants make starch? 11th October 2023 19:00-20:00, UK

Sugar Coated Vaccines 14th November 2023 19:00-20:00, UK

Community: Retired Members' Lunch, 20th October 2023, 12:30-15:00, Wymondham, UK

Contact Us:
UEA's RSC East Anglia Local Section Committee member and the School of Chemistry RSC Departmental Representative:
Dr Rianne Lord, X: @DrRianneLord or the **RSC East Anglia, X**: @RSCeastanglia

Please visit the Local Section's **website for updates**
The Local Section is looking for new participants to join the committee and particularly welcome applications from teachers in East Anglia. Please get in contact with Rianne if you wish to join.

RSC Top of the Bench (ToTB) East Anglia Competition

This years ToTB is in full swing, with 25 school participating in the round 1 quiz, which took place between 16 -20 October 2023. The top 12 schools have now been chosen and will compete in the round 2 practical quiz held in UEA's state-of-the-art state-of-the-art Undergraduate Teaching Laboratory on 29th November 2023.

We wish all the students and their teams the best of luck in the next steps of the competition.

If you wish for your school to be included in ToTB 2024-25 or would like any further information, please contact Ms Karen Pardoe and Dr Rianne Lord at **rsceastcompetitions@gmail.com**

The School of Chemistry at UEA

- World leading research in biological chemistry, synthesis, clean energy technology, advanced laser spectroscopy and analysis
- >95% of Chemistry research considered world leading or internationally excellent in REF21
- 4th in the UK in REF21 for impact from research
- >83% of the School's impact from research was considered outstanding at REF21
- >84% of our students are in graduate-level employment at the 15 months post graduation census
- 3rd for graduate prospects in the Complete University Guide 2024 League Tables
- 15th in the Guardian League Table for Chemistry 2024
- >90% overall satisfaction with the teaching in the Guardian 2023
- Athena Swan Bronze award for equality and diversity

University of East Anglia

REF 2021 Research Excellence Framework

THE TIMES THE SUNDAY TIMES GOOD UNIVERSITY GUIDE

NSS National Student Survey

Complete University Guide