# UCL Chemistry NEWSLETTER

**Special Feature**

UCL Chemistry & Covid-19

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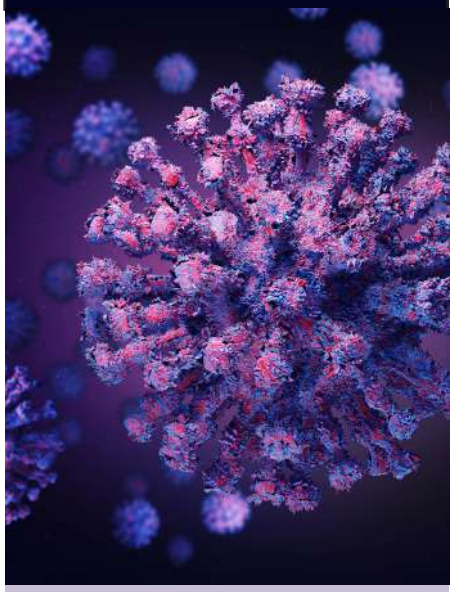

Contents



## Introduction by Claire Carmalt, Head of Department

Well this has been the strangest, most unpredictable academic year that we have all ever experienced. We started the academic year working out how to cope with a bumper undergraduate student intake, then two strikes and finally the Covid-19 pandemic!

We closed the departmental buildings on 18th March and access was limited to critical maintenance of equipment, research activity taking place to address Covid-19 and the synthesis of hand sanitiser which was distributed to UCLH and care homes across London, which you can read more about in this newsletter. I have been hugely impressed with the resilience shown by UCL Chemistry staff and students through the lockdown and remote working despite many having challenging working conditions and balancing with home life responsibilities.

The department continued working closely together with a great community spirit putting in a huge amount of effort to move teaching and assessments online for our students and developing remote projects for postgraduate taught students. We were really proud with how all the students coped with all the necessary changes. Researchers in the department used their remote working time productively with writing papers, reports, general literature reading etc. We re-opened via a partial return on 15th June and researchers have responded really well with excellent following of the new safety guidelines.

This academic year Professor Francesco Gervasio moved to the University of Geneva but will retain a part time appointment at UCL. We welcomed three new lecturers to the department, Dr Rebecca Ingle and Dr Sabrina Simoncelli in Physical Chemistry and Dr Tim Hele in Computational Chemistry. Sabrina is a joint appointment with the LCN and she has a Royal Society Dorothy Hodgkin Fellowship and Tim will start a Royal Society University Research Fellowship (URF) in October. Dr Elizabeth Munday has joined us as a new Teaching Fellow focussing on Synthetic Laboratories. In addition, Dr James Attwater will join us as a Royal Society URF and Dr Joseph Forth and Dr Chris Savory will be

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## Introduction (*Cont.*)

starting Ramsay Trust Fellowships during the next academic year. We also welcomed Frances Thomson who started as our Postgraduate Teaching & Learning Administrator, Matthew Nolan as our Assistant Teaching & Learning Administrator and Dr Lorena Ruiz-Perez moved role to Liquid Transmission Electron Microscopy Facility Manager.

There have been a number of awards within the department. Two members of the department received awards from the Royal Society of Chemistry. Dr Anna Regoutz has been awarded the Joseph Black Award and Professor Richard Catlow was awarded the Royal Society of Chemistry's Faraday Lectureship Prize. Dr Stephen Potts, a Senior Teaching Fellow in the department, received a UCL Provost Education Award for his outstanding contribution to e-learning in the department.

UCL Chemistry did extremely well in the UCL One Awards with Liz Read receiving the Ways of Working: Personal Excellence Award, Dr Dewi Lewis being recognised with the Leadership Award for Outstanding Contribution and our Security Officer Saeed Said winning the Outstanding Contribution to Staff Experience award.

Yet again the department had an excellent intake for 2019/20 and ended up recruiting 200 UG students, along with 115 Masters students and 50 PhD/EngD students. This is a superb achievement particularly since many UK universities were still struggling to fill their places on chemistry courses. Some upgrades have been able to be completed including the 3rd floor synthetic laboratories and the Laser Science Centre in the basement of the Christopher Ingold Building.

We were sorry to see final year and Masters students time at UCL cut short and that Graduation ceremonies had to be moved online. Currently, it is looking unlikely that we will be able to organise the Lab Dinner in 2020. However, I do really look forward to when we can all fully get back into the department. Having been at UCL for nearly 23 years it is very strange not going in every day!
Keep safe and well.

**Professor Claire Carmalt**

# Staff Highlights & News

## Promotions

We are very proud to announce the following senior promotions of the department, effective from 1st October.

**Martijn Zwijnenburg**
To Professor in Computational Chemistry

**Bob Schroeder**
To Associate Professor in Organic Chemistry

**Giorgio Volpe**
To Associate Professor of Physical Chemistry

**Abil Aliev**
To Principal Research Fellow



# New Appointments

### Dr. Sabrina Simoncelli

Dr. Sabrina Simoncelli, born in Buenos Aires, received both her first degree (2010) and her PhD (2014) in Chemistry from the University of Buenos Aires, Argentina. Her PhD research focused on the development of nanosized plasmonic devices to boost temporal and spatial detection limits in optical microscopy.

After completion of her PhD, Sabrina spent a year and half as a post-doctoral researcher at Ludwig Maximilian University of Munich, Germany, exploiting surface plasmons in metallic nanostructures to heat biomolecules at the nanoscale. In late 2016, Sabrina joined Imperial College London, where she developed super-resolution fluorescence microscopy imaging approaches to study plasmon-induced reactions. Then, Sabrina moved to King's College London as a Human Frontier Science Program fellow. There, she expanded her research interests towards biological sciences, implementing a DNA-based super-resolution imaging technique to visualise protein interactions in cells of the immune system.

Since January 2020, Sabrina relocated to University College London, to start a Royal Society Dorothy Hodgkin Fellowship and take-up a joint Lecturer appointment between the Department of Chemistry and the London Centre for Nanotechnology. The group combines advances in photonic nanostructures with optical microscopy and spectroscopy to image, sense and manipulate biological objects at the nanoscale.

### Dr Rebecca Ingle

Rebecca Ingle joined the department in January 2020. Her PhD at the University of Bristol involved using laser spectroscopy to study gas and solution phase photochemistry, alongside complementary computational modelling and involved two fellowships to work at the Kyoto University on techniques for ultrafast VUV generation.

She was a postdoctoral research associate at EPFL, Switzerland, during which she started to develop techniques for multidimensional spectroscopy and using X-Ray methods for monitoring the excited-state dynamics of molecules.

Rebecca's research interests include using a variety of spectroscopic techniques, including multidimensional optical spectroscopy and time-resolved X-ray spectroscopy, to understand photoinduced processes in the solution and gas phase. She particularly enjoys working with complex organic and inorganic molecules and combining theory and experiment.

### Dr Tim Hele

Tim Hele is a theoretical chemist who likes to design highly efficient organic light-emitting diodes (OLEDs) and investigate quantum time evolution.

He read Chemistry at Exeter College, Oxford, followed by a PhD in theoretical chemistry at Cambridge where he and Professor Stuart Althorpe derived Quantum Transition-State Theory, for which he was awarded the Coulson Prize by Professor Sally Price. He then took up a Research Fellowship at Jesus College Cambridge, before going on a two-year sabbatical as a postdoc at Cornell University in the USA.

After returning to Cambridge he moved to the group of Professor Sir Richard Friend where he was part of team who designed the world's most efficient deep-red LED and published this in Nature. He looks forward to meeting his new colleagues (if only remotely) and starting exciting collaborations in optoelectronics and quantum dynamics.

# Ramsay Fellows

### Dr Joseph Forth

Joe got his PhD in Physics from the University of Edinburgh in 2016, where he studied Pickering emulsions. After a brief stint in industry, he moved to Lawrence Berkeley National Laboratory in California to work on 3D printed liquid materials with Prof. Tom Russell and Dr. Brett Helms. He then joined the group of Prof. Giuseppe Battaglia at UCL in 2018, where he has been studying nanoscale phase separation in polymer vesicles. During his Ramsay Fellowship, he will focus on developing next-generation bioprinting techniques for tissue models.

### Dr Christopher Savory

Chris obtained his PhD, looking into emerging earth abundant materials for photovoltaics, at UCL in 2018 working under the supervision of Professor David Scanlon. He subsequently transitioned into the field of batteries, studying the electronic properties and defect chemistry of nickel-manganese-cobalt cathodes as part of the Multiscale Modelling Fast-Start Project for the Faraday Institution. Starting his Ramsay Memorial Fellowship in January 2021, he will be investigating perovskite-inspired materials for solid-state lighting.

# RSC Awards

*We are thrilled to announce that Prof. Richard Catlow has received a Knighthood in the Queen's birthday honours for services to leadership in science and research.*

### Professor Richard Catlow

Professor Richard Catlow has been awarded the Royal Society of Chemistry's Faraday Lectureship Prize for 2020.

Richard has been recognised for his development and application of computational methods in conjunction with experiment as powerful and predictive tools in the physical chemistry of solids.

### Dr Anna Regoutz

Dr Anna Regoutz has been awarded the Royal Society of Chemistry's Joseph Black Award for 2020. DI Dr Anna Regoutz was awarded the Joseph Black award for her "outstanding contributions to the development and application of X-ray photoelectron spectroscopy in the area of electronic materials and devices". Her group's work is interdisciplinary focusing on the understanding, discovery, and targeted design of materials for the development of future electronic device generations, including power electronics, memory, and biosensors. Beyond the synthesis and development of novel growth methods for high quality thin films, nanostructured layers, and nanostructures of inorganic materials, a main focus lies on the characterisation of materials predominantly using X-ray spectroscopy techniques. The group applies and develops both laboratory- and synchrotron-based spectroscopic methods to study in particular the electronic structure of device-relevant bulk materials and material heterostructures. A major area of development are characterisation setups and strategies to explore surfaces, interfaces, and buried layers in device-relevant material structures.

# Provost Education Awards

### Dr Stephen Potts

Stephen Potts is a Senior Teaching Fellow in the Department of Chemistry, and is one of this year's winners of the Provost Education Award.

*"He has made outstanding contributions to e-learning and enhanced networking opportunities for teaching staff."*

These awards recognise staff making outstanding contributions to the learning experience and success of our students.

Stephen joined UCL in 2016 and is currently the Year 1 Lead and Careers Liaison Tutor for the department. His interests concern pedagogy and its evaluation, which involves designing or updating teaching methods, such as assessment, and critically evaluating the outcomes of that design or update. With a focus on e-learning, he facilitates the introduction of e-learning platforms within the department and evaluate their effectiveness in enhancing the student experience and engagement with the subject.

# UCL One Awards

### Elizabeth Read
### Ways of Working: Personal Excellence Award.

Liz has been Departmental Manager in Chemistry for many years, providing transformative support in both financial management and staff development. Despite carrying a huge workload, she always finds time to help and

support colleagues from both in the Department and from across UCL.

Liz is a champion of inclusivity and played a pivotal role in the Departments Athena-Swan submission. She has set up a support scheme for UCL colleagues working at Harwell, and served on a number of UCL committees including Technicians Management, Finance Strategy, MyHR and Transforming our Professional Services (TOPS). She prioritises finding solutions collaboratively and is always approachable and ready to help.

### Dr Dewi Lewis
### Leadership Award for Outstanding Contribution As Departmental Tutor,

Dewi has spearheaded initiatives to

improve the student experience. In response to the coronavirus crisis he has gone above and beyond, taking on an exceptional leadership role in Chemistry.

He has led the team to develop and implement an innovative and forward-looking revised assessment schedule for this summer, and has pioneered a new teaching strategy for Chemistry for 20-21 – using virtual teaching to kick-start the Department into implementing a long planned change in teaching provision. Such changes will maintain ongoing student satisfaction in a practical subject like chemistry. On top of this Dewi is committed to college-wide work supporting widening participation.
Winners of this award have guided their colleagues and departments over the many hurdles thrown up by coronavirus, to the benefit of UCL and our staff and students.

### Saeed Said
### Outstanding Contribution to Staff Experience

Saeed is the Security Officer for the Christopher Ingold Building. With three main lecture theatres and two large teaching laboratories this is a busy building with lots of activity and a large number of students and visitors moving in and out Saeed is reliable, professional and effective in dealing with staff, students and visitors to the Department all with equal courtesy. He combines the reassurance of Departmental security with a charming touch and is a truly welcoming and reassuring person to meet every day in UCL.

## Spotlight on... *Saeed Said*

**Saeed has been on the reception desk in the Christopher Ingold Building for 18 years now. When the call came for nominations for Outstanding Contributon to the Staff experience Liz quickly received 28 replies and unfortunately was only able to submit 5 nominations. The recurring themes described Saeed as friendly, cheerful, smiling, welcoming and helpful. For those of us caught working from home, we miss our daily interaction with Saeed first thing in the morning.**

**The Christopher Ingold Building is very busy. He provides proactive assistance at a level beyond his role. He truly brings joy to very many lives in UCL and makes it a better place to work.**

***"He is simply the person everyone should meet once in their lifetime. Never shy of a smile, he is always ready to cheer you up when needed and happy to share good energy".***

***"He is the kind of person who will bring a smile to your face even on your darkest days with his friendliness and positive and helpful attitude and seeing him 1st thing as you walk through the doors he will always greet you with a grin and a warm welcome"***

# Equality, Diversity & Inclusion Committee Update

Our Athena SWAN Silver Application was submitted in April 2020 and we hope to have the results back by the end of the year. We carry on as normal with our action plan and hope you will support us in the changes to come.

Claire Carmalt has now taken over from Helen Fielding as Co-Chair alongside David Rowley. Clare Bakewell stepped down from the committee and we appoint Rebecca Ingle as the new PDRA Tutor. Clare is currently on Maternity Leave and we look forward to her returning next year.

We appointed Leila Negahdar as our Harwell Coordinator, ensuring that our staff working in the Harwell Campus continue to feel part of Chemistry. "*I am Marie-Curie Fellow in Chemistry based at UCL at Harwell campus. I joined the EDI Committee to help improving the interactions of the Harwell campus with the main UCL Chemistry campus and to ensure the staff based at Harwell are integrated with those at the main campus"*

We are looking to recruit a more diverse committee with a wider range of voices, particularly undergraduate students and those from underrepresented groups. So, if you would like to be part of our committee, please do get in touch.

## Say NO to Harassment, Bullying and Sexual Misconduct

The Department of Chemistry does not tolerate, condone or ignore harassment, bullying and sexual misconduct of any kind. If you feel you are experiencing this, including microaggression's, please do report it so we can help stamp it out. Support and advice is available via 'Report + Support' (https://report-support.ucl.ac.uk) and we have our own Dignity at Work Advisor and Student Support Officer on hand to listen to your concerns – everything you discuss is kept confidential.

**Nicola Phillips**
Dignity at Work Advisor
n.phillips@ucl.ac.uk

**Dr Cally Haynes**
Student Support Officer
c.haynes@ucl.ac.uk

## Guess the desk

Just for fun during lockdown, we thought it would be fun to guess the desk of our EDI Committee, so can you guess who belongs to what desk? These remote working desks belong to :Tamara Alhilfi  Nicola Phillips Claire Carmalt Yang Xu. Answers can be found on page 47

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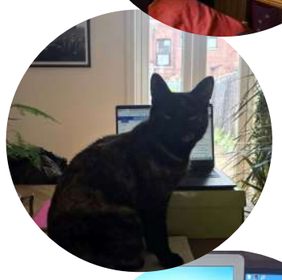

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# Mental Health During Covid-19

With the Covid-19 pandemic still present, looking after your mental wellbeing is paramount. With many of you working extra hours and experiencing burnout during lockdown, we understand the increased pressures in workload and juggling parenting/caring responsibilities.

The department has four Mental Health First Aiders who have completed the MHFA England training. They can identify, understand and help someone who may be experiencing a mental health issue.

They are available throughout the week to discuss any mental health concerns and signpost to available help. All correspondence and conversations are treated as strictly Private & Confidential.

**Debbie Allen**
Available Wed - Fri 9am – 4pm.
Email debbie.allen@ucl.ac.uk
or in the Graham Lab.

**Claire Gacki**
Available on Mon, Tues, Thurs & Fri from 9am - 4pm and Wed 11am - 5pm.
Email c.gacki@ucl.ac.uk or can be found in the Turner Lab or Office 229.

We also have Tamara Alhilfi who is our Wellbeing Champion. Wellbeing Champions help to implement and support Wellbeing @UCL through effective signposting, knowledge of available support, organising and promoting well-being activities, and encouraging healthy lifestyles and positive mental health. E: t.alhilfi@ucl.ac.uk or Via MS Teams


**Brian Kavanagh**
b.kavanagh@ucl.ac.uk
or via MS Teams

**Nicola Phillips**
n.phillips@ucl.ac.uk
or via MS Teams

Contact us:

Follow us on Twitter: @EdiUcl
https://twitter.com/EdiUcl or
Email: chem.edi@ucl.ac.uk

**Crisis support:** If you're feeling distressed and require urgent support:

Contact UCL's Employee Assistance Programme on 0800 197 4510

Contact Samaritans on 116 123 (free 24-hour helpline)

Contact your GP to arrange an emergency appointment or call the NHS out-of-hours medical line on 111

# Baby News

**Tom Bridges** and his wife had baby Francis on 28/11/19

**Gemma Davies** and **David Scanlon** had baby Stephanie on 22/5/20

**Hugh Martin** and his partner Laura had baby Hazel on 12/02/20

**Rui Guo** and his wife Huilin had baby Ella on 16/07/20

**Tom Sheppard** and his wife Ruth had baby Rebecca born on 3/5/20

**Matthew Blunt** and his partner had baby Dylan on 28/11/19

**Aroa Duro Castano** and her partner had baby Nerea on 01/02/20

**Clare Bakewell** and her partner had baby Finn on 17/08/20

**Helen Allan** and her husband had baby Beth born on 28/08/20

**Ines Lezcano-Gonzalez** and her partner had baby Lucía on 20/09/20

**Fabiana Subrizi** and her partner had baby Alessandro 31/12/19

***We are delighted to announce some new additions to the Chemistry Family this year.***





# Student Highlights & News

## 2019 - 2020 Prize Winners

### Undergraduate Prize Winners

**Sadia Begum**
**Desmond Tweneboa**
**Harry Li**
**Sareen Sargun**
**Kristina Kostadinova**

All received the **CK Ingold Prize** for excellence in undergraduate performance.

**Anna Getley**
**Neil Sharp Prize** for excellence in Theoretical (including Computational) Chemistry

**Mikesh Patel**
**Parke-Davis Prize** for excellence in Medicinal Chemistry

**Phyllida Britton**
**Harry Poole Prize** for excellence in Physical Chemistry

**Kam Poon**
**Ronald Nyholm Prize** for excellence in Inorganic Chemistry

**Andrea Poupard**
Franz Sondheimer Prize for excellence in Organic Chemistry

**Teresa Insinna**
**Charles Vernon Prize** for excellence in Biological Chemistry

### PhD Prize Winners

On the 26 June 2019 Professor Claire Carmalt congratulated the following final year PhD students who were awarded prizes for the best presentation in each of the major research areas of Organic/ Medicinal, Inorganic/Materials, Computational and Physical Chemistry, as assessed by a committee.

#### Ewing Prize
**Sam Armenta Butt**
Supervisor: Steve Price
Best student presentation in Physical Chemistry for his presentation titled: Dication-neutral reactions - understanding atmospheric processes

#### Catlow Prize
**Rhys Evans**
Supervisor: Francesco Gervasio
For the best student presentation in Computational Chemistry for his presentaiton titled: Applications of Computational Biophysics for Protein Dynamics

#### Clarke Prize
**Alexandra Groves**
Supervisor: Jawwad Darr
For the best student presentation in Inorganic Materials Chemistry for her presentation titled: Synthesis of Highly Efficient Bifunctional Oxygen Electrocatalysts

#### Davies Prize
**Roshni Malde**
Supervisor: Jamie Baker
For the best student presentation in Organic Chemistry for her presentation titled: ‘Development and Studies of Photoactive Protein Bioconjugates’

An honorable mention goes to these students:

Physical: **Mustafa Sener**, **Sukhpreet Talewar** and **Alexander Tanner**
Computational: **Maud Einhorn**
Inorganic: **Emma Campbell**, **Kristian Mears**, **Sam Douglas** and **Richard Lunn**

### Second year PhD Poster Prizes

We are pleased prizes were awarded for the best 2nd year PhD poster to the following students:

#### Inorganic Chemistry
**Katie Hobson**
Supervisor: Claire Carmalt

#### Physical Chemistry
**Joseph Broughton**
Supervisor: Helen Fielding

#### Organic Chemistry
**Eve Carter**
Supervisor: Helen Hailes

#### Computational Chemistry
**Tom Pope**
Supervisor: Ben Slater

#### Rothwell Prize for Best Synthesis work
**Rachel Szpara**
Supervisor: Tom Sheppard

# Graduating Students

**Alexander Aina**
EngD
Supervisor: Sarah Price

**Ceridwen Ash**
PhD Chemistry
Supervisor: Graham Worth

**Simon Austin**
EngD
Supervisor: Robert Bell

**Yifei Bian**
PhD Chemistry
Supervisor: Ivan Parkin

**Sebastian Dixon**
EngD
Supervisor: Ivan Parkin

**Susanne Escher**
PhD Chemistry
Supervisor: Scott Woodley

**Charles Footer**
PhD Chemistry
Supervisor: Jawwad Darr

**Niall Goodeal**
PhD Chemistry
Supervisor: Hugo Bronstein

**Jian Guo**
PhD Chemistry
Supervisor: Xiao Guo

**Frances Heale**
EngD
Supervisor: Claire Carmalt

**Jennifer Herbert**
EngD
Supervisor: Andrew Beale

**Amy Lai**
PhD Chemistry
Supervisor: Nora De Leeuw

**Winnie Leung**
PhD Chemistry
Supervisor: David Scanlon

**Claudio Lourenco**
EngD
Supervisor: Ivan Parkin

**Yue Lu**
PhD Chemistry
Supervisor: Gopinathan Sankar

**Yi Luo**
PhD Chemistry
Supervisor: Jon Wilden

**Rebecca Marchington**
PhD Chemistry
Supervisor: Matthew Powner

**Caroline Nowicka-Dylag**
PhD Chemistry
Supervisor: Tracey Clarke

**Naomi Omori**
PhD Chemistry
Supervisor: Andrew Beale

**Abdul Rashidi**
PhD Chemistry
Supervisor: Richard Catlow

**Alexis Schmidt**
PhD Chemistry
Supervisor: Gopinathan Sankar

**Peter Seavill**
PhD Chemistry
Supervisor: Jon Wilden

**Robert Westbrook**
PhD Chemistry
Supervisor: Tracey Clarke

**Miaomiao Xue**
PhD Chemistry
Supervisor: Bob Schroeder

**Jianxiong Zhao**
PhD Chemistry
Supervisor: Helen Hailes

**Yiyun Zhu**
PhD Chemistry
Supervisor: Chris Blackman

# Ramsay Medal

**Peter Seavill** is the recipient of the 2019 Ramsay Medal.

Peter graduated from UCL in 2016 with an MSci degree in Chemistry, before continuing his studies at UCL as a PhD student in the groups of Dr. Jon Wilden and Prof. Katherine Holt in the interdisciplinary field of Electro-Organic Synthesis. During his PhD, Peter's research centred around developing new electrochemical methodology for use in organic synthesis, particularly through efficient copper-catalysed processes such as the Glaser-Hay and CuAAC reactions.

This work led to: new mechanistic understanding of a 150-year old reaction; the development of a highly sustainable new catalytic process for producing copper acetylides (valuable synthetic building blocks used in a multitude of organic reactions); and to the use of metal-coated graphite electrodes as a promising strategy for the recovery of catalysts post-reaction. Peter's work has led to several publications in journals such as Green Chemistry, he has presented at conferences in London, Paris and York, and he has recently been awarded the Davies Prize and Ramsay Medal. Peter is currently writing his thesis entitled 'Utilising Copper for Methodological Advancements in Electro-Organic Synthesis', and hopes to continue his career as a researcher in Electro-Organic Chemistry.

**Faiza Javaid** from the Chudasama group won 1st prize in the UCL 3 Minute Thesis (3MT) MAPS Faculty heat that took place on June 8, 2020. The 3MT challenge is a competition where Doctoral candidates compete to present their research in just three minutes, in language fit for non-specialists, using a single static presentation slide. Faiza went on to compete in the UCL 3MT Institutional Final that took place on June 17, 2020. The title of Faiza's winning talk was: *Antibody-drug conjugates: The quest for a magic bullet in the war against cancer.*



# My Time at UCL

by

**Martha Jennings MSci**

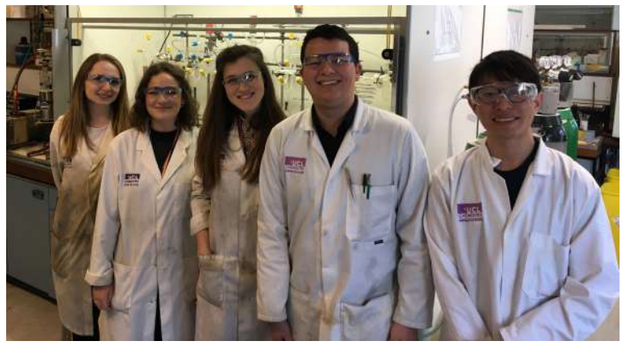
When reflecting on my time at UCL, I always think back to my first year. Before embarking on my university journey, I dreaded leaving home. I spent the weeks leading up to the move anxious and worried. Questions flowed through my mind: Would the course be too difficult? Would I make any new friends? Would I be cut out for life in a huge city far from the small island I grew up on? But after I walked through the department doors on the first day and sat next to my now best friend, I immediately felt the sense of community within the course and knew I would love it.

I spent my first two years enjoying university life as all undergraduates do (with a lot more time than I'd care to admit across the road in Phineas), but in my third and fourth year I took a much more active role within the department. The first role was becoming a part of one of the first student committees in an extremely long time for the Chemical & Physical Society (CPS). I began by only attending the odd talk in my first year, to returning week after week in my second year, and then finally joined the committee in third and fourth year. CPS was a constant lifeline throughout my degree and allowed me to build strong relationships with my fellow Chemists across multiple years, alongside getting involved with some fantastic members of staff across the department. From weekly talks to the Christmas quiz (which is my favourite event of the year) I loved giving back to the department by organising events that students and staff alike enjoyed. I also had the opportunity to attend the Annual Lab Dinner two years running, with seats often only reserved for members of staff, which was an incredible experience and I felt extremely lucky to be a part of it.

I was also elected by my fellow students to be the Lead Academic Representative for the Chemistry Department in my final year. This allowed me to act as a voice for my fellow students, leading me to invoke some change within the department, and taught me even further about how much the academics cared about the student cohort.

My fourth and final year was extremely special. Rather than feeling like an undergraduate, I became a part of the departmental family in my own right. Nestled in a fumehood, constantly in the dark (if anyone else has worked with silver I'm sure they can understand my pain) I became a part of a real lab group, even if only for a short while. Seeing a project from beginning to end whilst also learning about another side of the department I previously wasn't aware of in my first few years was an absolute joy and I loved every second of it.

**Above: CPS Committee**
*Left to right, back row: Kristina Kostadinova, Kam Poon, Andrey Ten, Reuben Scott, Kenny Ting*
*Front row: Chiara Argenti, Miranda Molloy, Martha Jennings, Rachael Doherty*
*Left: Katie Hobson, Martha Jennings, Clare Bakewell, Kam Poon & Daniel Neo*



Although my year has ended in a very peculiar and unconventional way, it has made me look back at the incredible time I've had over the last four years and appreciate it even more. Despite the fact that the lab reports were difficult, the hours were long, and the physical chemistry was nearly impossible, I managed to navigate my way through. My time at UCL has undoubtedly given me the best years of my life, filling them with irreplaceable experiences and incredible friends. I am beyond grateful to the department for what it has given me and will miss the Christopher Ingold Building dearly as I embark on my next adventure, whatever it may be.

# Chemical & Physical Society Annual Report 2019 - 2020

**Dr Anna Roffey, President**

The Chemical & Physical Society (CPS) was founded in 1876, which makes it UCL's oldest student-run society. The cornerstone of the CPS is its committee, comprising dedicated and enthusiastic undergraduate students and postgraduate researchers, who organise and run the events. Academic staff sit on the committee as President and Vice-President in mentoring and advisory roles, but it was safe to say that, this year, the mentoring was not necessary! The main draws of the CPS are its weekly talks, held on Tuesday evenings during term-time, in addition to social events and, of course, the coveted colour-changing CPS mug.

This year marked the 144th academic year of the CPS and was one of the few years in its history where the university was forced to close its doors outside of the official dates. (You can read more about the history of the department in Alwyn Davies and Peter Garratt's excellent book.) The recent unprecedented and sad events put a stop to several talks this year, but in true CPS fashion the student committee are rising to the challenge, rescheduling and preparing to move the society's events temporarily online for as long as is required in the coming year. You can find an account of our pre-COVID activities this year below.

This year's programme kicked off with a return to a previous tradition, a talk by our very own Prof. Andrea Sella on **"Mercury: Window on the Invisible"**, describing the fascinating history and chemistry of this most inconsistent element. We then moved on to **"Stop Thinking Like Chemists and Start Thinking Like Chefs!"** by Ross Campbell (Cyber Colloids). The talk, covering work undertaken by his company, contained insights into the food industry, in particular the texturisers and gellants used to enhance our grub, certainly food for thought! The following week's talk took us away from the edible, to the often toxic superheavy elements. In his talk **"How to Discover a New Element"**, Kit Chapman (science writer) described the history of the superheavy elements and how the next one might be discovered.

Continuing on the topic of toxicity, Charles Harrison (University of Exeter) gave a horrifying presentation on **"The Problem of Lab Horror Stories"**, in which he described his work as a Safety Officer in several UK universities. The shocking stories of lab slip-ups, which we all like to revel in from time-to-time, were contrasted against the public health and safety perceptions of our field. We were asked: is the reputational hit worth the entertaining story? The following week, we hosted our annual careers event, where speakers with chemistry degrees explained how they got to where they are today. This event was very well attended with speakers from the National Physical Laboratory (Michael Ward, UCL graduate: MSci 2009, PhD 2014) science policy (Dr Penny Carmichael, UCL graduate: PhD 2016), patent law (Peter Marchand, UCL graduate: PhD 2014) and energy consultancy (Pragna Kiri, UCL graduate: MSci 2011, PhD 2015).

The next talk left us up in the air, as Dr Simon Clarke (science communicator and climate researcher) gave an enthusiastic overview of his PhD thesis on **"Why you Should Care About the Stratosphere".** His experience as a vlogger on his eponymous YouTube



*Left to right; Dr Penny Carmichael giving her careers talk on science policy; Rapt CPS audience members; Dr Nina Notman about to give her talk on indoor air pollution*



*CPS Committee members ready to feed (and water) the hungry Tuesday audience members*

*Below: The winners of the infamous CPS Christmas Quiz*

channel was clear through his engaging talk, and by the end of the hour we were all convinced that the stratosphere deserves respect, and geoengineering is a dangerous tool in the wrong hands.

**"The Air I (Actually) Breath: A Look at Air Pollution Indoors"** was the topic of our next talk by Dr Nina Notman (science writer/journalist). Nina described her work raising public awareness of indoor air pollution, following several research groups in their endeavours. We will never look at a toaster the same way again. Sticking with matters closer to home, the following week Jim Taylor (Lenzing AG) discussed **"Lyocell Fibres – A Sustainable Solution?"**. He described how lyocell fibres were developed, how they are manufactured today, and the possible future of fabrics in a more sustainable focussed world.

The penultimate talk of 2019 was given by forensic scientist Dr Hilary Hamnett (University of Lincoln) which made us think twice about our post-event drinks. In **"One for the Road: What Happens When the Drink Drive Limit is Lower?"** we heard a comparison between Scotland and New Zealand, which both lowered their drink-driving limits in 2014 in an attempt to reduce road deaths. In both cases, driving under the influence of drugs increased, in many ways negating the effect of the rule change. A sobering thought.

For our last talk of 2019, we brought things into sharp focus with **"Next Generation Super-Resolution Microscopy"** by Dr Izzy Jayasinghe (University of Leeds). Izzy covered the evolution of super-resolution nanoscale imaging tools and their application to studying the biophysics underpinning life, in particular the heart. It was fascinating, eye-opening stuff.

We said goodbye to the year with our infamous Christmas Quiz, which this year was won by the staff team – something which I'm sure will be rectified this December.

The new year kicked off with a fascinating talk by SME industrial chemist, Lorna Radford (Enkos Developments), entitled **"Cosmetics: Interesting Science or Marketing Spin?"**. We learned about formulation chemistry, how surfactants, colloids and crystallisation are applied to shampoo and moisturiser and the future of cosmetics (the skin microbiome).

From the Tangible to the intangible, we followed that talk with **“Beyond Weird: What does quantum mechanics really mean?”** by Dr Philip Ball (prolific science writer and long time editor at Nature). In this extremely engaging talk we learned about what quantum theory really means – and what it doesn’t – and how its counterintuitive principles create the world we experience. We were left dazed and confused and eager to buy his next book!

Our very own Prof Matthew Powner followed on with more inspiring science in his talk **“The Chemical Origins of Peptides”**. Matt looked at the chemical origins of life, linking universal biological traits to geochemical feedstocks, shedding light on the chemical reactions that predisposed life to emerged on our planet. We were left convinced it pays to think outside the glovebox. We were treated to more home-grown research from Dr Adam Clancy (Research Fellow, UCL), whose talk “**Making nano materials for the world’s strongest PVC**” described how he had accidentally broken double layer theory (at least he was sorry) on his journey towards making the strongest ever PVC.
The next talk turned to alcohol with Guy Hutchinson (Eel Pie Breweries) who used his many years in the brewing industry to give an interactive talk and **“Beer Tasting”**. He presented a history of beer before giving us a hands on insight into the key ingredients; hops, barley, malt and yeast as well as tasting a variety of craft beers, lagers, ales, porters and stouts. We all had a chance to try it and it was delicious (from what I remember).

We came full-circle back to mercury with the next and what turned out to be the final talk of the year **“Measuring Mercury in Petrochemical Sample Streams”** by Matthew Dexter (PS Analytical). We were given a deep insight into the analytical chemistry behind monitoring this contaminant in oil and gas streams, touching again on some common themes from the year (sustainability and environmental chemistry).

Sadly, we were not able to hold the final few talks of the year, including the Presidential lecture to be given by Dr Anna Roffey (**“Are Pigeons Smarter Than Mathematicians?”**) nor the CPS **Boat Party**. These events will be rescheduled for this coming year, the former taking the plunge as the first talk of the year. The CPS student committee are currently beavering away on the new CPS site on our online teaching platform, where live events will temporarily be held for the next teaching term and possibly beyond. It feels strange to have such a stalwart in our chemistry calendar also be affected by the troubling times we are going through, but I take solace in the fact that our students are creative, enthusiastic and dare I say, rather clever. Nothing stands still in this world, and I have a feeling the new incarnation of CPS is likely to be as good, if not better, than before.

For more information about the CPS and the talk schedule for the next academic year, please visit cpsucl.com. Don’t forget to follow us on Facebook, Twitter (@CPSUCL) and Instagram (@cps_ucl) too!


*Left: Dr Anna Roffey highlighting CPS activities at the 2019 Lab dinner. Right :The CPS committee at the 2019 Lab Dinner*

### Physical Chemistry Journal Club

For the least few years we have been running a Physical Chemistry Journal club. The club meets (semi-) weekly, normally in person but now via teams. A vast range of papers are discussed, from gas-phase reaction dynamics, high level calculations, properties of dye solar cells to how to study the behaviour of Polar bears on Svalbard. Practically any topic is open to discussion. The club also creates a friendly environment to discuss and show your results (both good and bad). For more info please contact Mike Parkes (michael.parkes@ucl.ac.uk)



# Spectroscopy & Dynamics Group

The UCL spectroscopy and dynamics group (SDG, now CLD – more on that below!) hold weekly seminars hosting speakers from within UCL and in the greater scientific community. The sessions are organised and led by a small team of PhD students and post-docs, and aim to promote links between research groups within UCL and expose UCL students and staff to cutting edge research from other institutes. The SDG is currently comprised of the research groups of Helen Fielding, Steve Price, Graham Worth, Tracey Clarke, Rebecca Ingle, Geoff Thornton and Sabrina Simoncelli – and in 2020/21 we are welcoming the groups of Martijn Zwijnenburg and Tim Hele. We encourage more groups and individuals to join us for individual seminars or as regular members!

Over the past year, the SDG seminars have provided a space for students and post-docs to present their work, chair sessions, practise communicating to a broad scientific audience, as well as attend invited talks from researchers outside of UCL. Special sessions in 19/20 included Women’s day, the Q&A session ‘Everything you wanted to know about Academia…’ with a panel of UCL Chemistry academics, and a perspective session titled ‘Snapshots of Scientists in Industry’ with two invited commercial scientists. In April, the SDG sessions moved online and have since successfully hosted weekly scientific seminars, taking advantage of the virtual platform by inviting speakers from further afield.

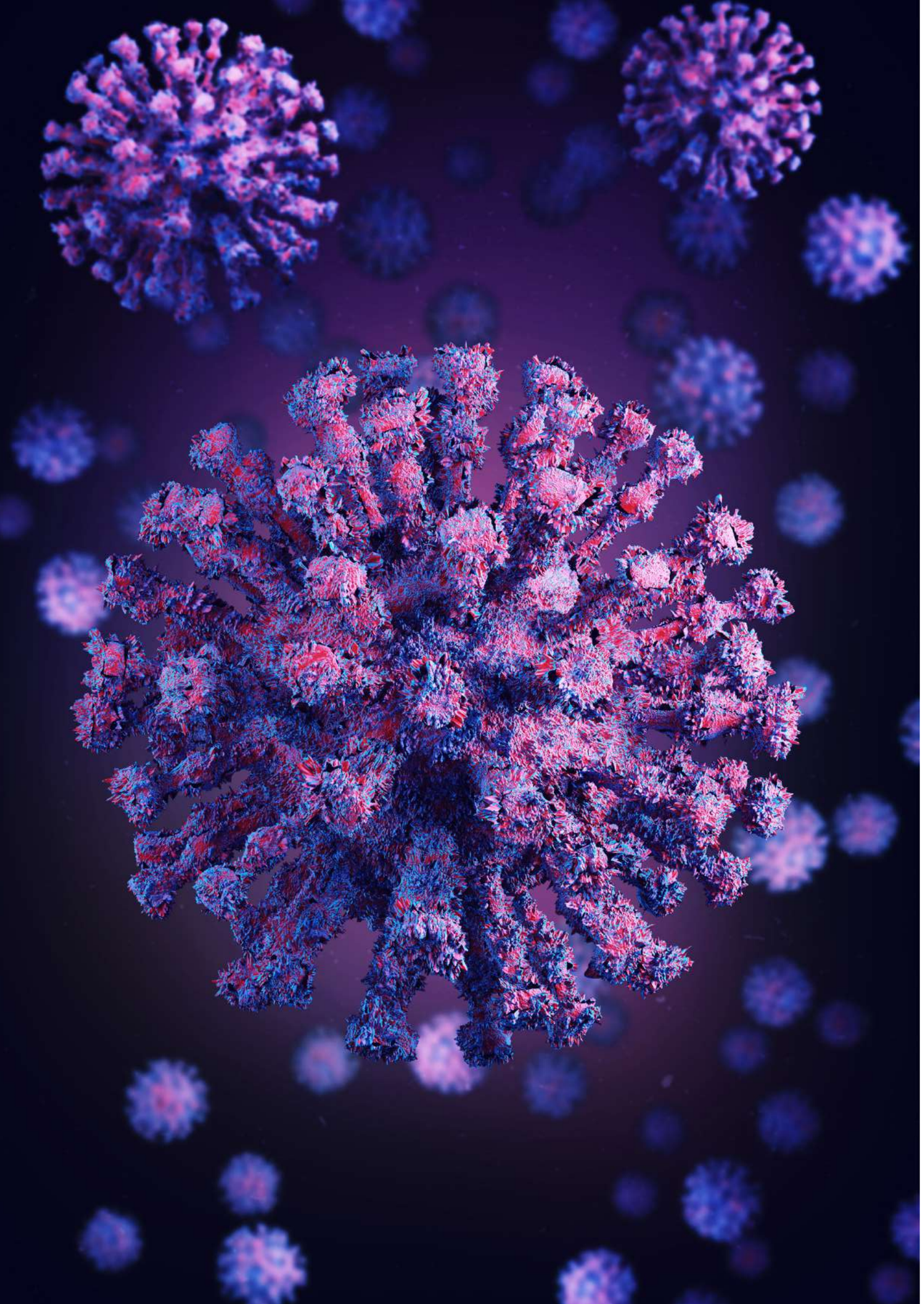
To maintain connection, there have been ``pub'' quizzes, games nights and fortnightly coffee mornings, keeping the community active through lockdown.

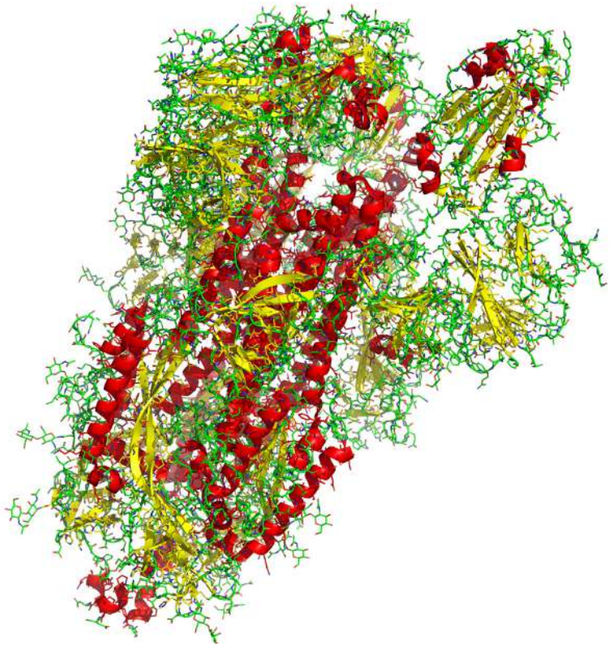
In exciting news for the seminar series, we have been invited to join the new Chemistry department theme ‘Chemistry and Light’, and as such are changing the name of the seminars to Chemistry, Light and Dynamics. To join the CLD please sign up to keep up to date in the MS Team (CLD-teams). For more information on the UCL SDG sessions, see helenfieldinggroup.co.uk We hope joining Chemistry and Light will improve and expand the seminar series in the coming year and invite you along.

# Chemistry Lab Dinner 2019 & 2020

It is with sadness that we have had to postpone this year’s Thomas Graham Lecture & Laboratory Dinner due to the ongoing Covid-19 crisis. We hope to be able to welcome you all back in 2021.

Photos from 2019 left to right: Prof. Matthew Powner delivering the Thomas Graham lecture *On the Chemical Origins Peptides*, Prof. Claire Carmalt & Emeritus Professor Edgar Anderson delivering the after dinner speech.



On March 18th the department was closed and everyone moved to remote working. Although the building was largely closed a number of labs remained open. There were a number of research groups who had access in order for research projects in the Covid-19 area to continue. In addition, we had a team going in to synthesise hand sanitiser, and some instruments remained on, which were necessary for those continuing research and so a number of people had access in order to look after the instruments. Anyone entering during the closure period were provided with special access permission and instructed on safety measures.

We were given the green light to be part of a pilot for the reopening of buildings at UCL and on 15th June the Christopher Ingold Building (CIB) was once again accessible. Re-opening the department had been a challenging and time-consuming process. The process started with meetings (virtual of course!) between departmental representatives (myself, Steve Price and Joe Nolan) and the university Area Facility Managers to discuss operational elements including opening hours and security arrangements, cleaning arrangements and waste collection services, one way systems in the building and signage. To ensure that we could maintain social distancing and keep the occupancy of the building low only experimental researchers were permitted to return. We chose to adopt a two-cohort system where researchers have one week in the lab and one week working at home. This ensured that we did not prioritise projects.  I prepared a lengthy document on the new safety practices which was also summarised in a one-page “Code of Conduct” that anyone having to access the building had to agree to adhere to (via an online form).

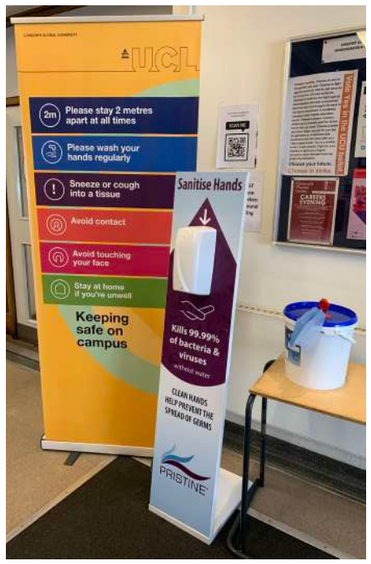
The week prior to researchers returning all facility managers came into the department and turned any equipment on and got the stores ready. New safety protocols on access to instruments and stores were put in place. I gave safety briefings via MS Teams to different groups prior to anyone returning to the department, which was a really effective way to explain all the new safety procedures. The responsibility for deciding the safe occupancy of labs was passed to relevant supervisors, or groups of supervisors, which has worked well and engaged colleagues with the issues involved in the return.

*Above: 3D representation of the Covid Spike Protein*

We have an on-line "diary" of which key safety related staff would be in the building, which allowed us to be confident that there was safety cover every day. We also have on-line monitoring of access to ensure that the agreed numbers are adhered to, which is working well to ensure social distancing can be maintain along with permitted room (office and lab) occupancy numbers, which are displayed on the doors. We do regular safety tours to ensure implementation of the new safety procedures and to talk to staff and students to obtain feedback and clarify any queries or issues.

The response of researchers has been excellent and people are following the new safety guidelines effectively. Feedback has been very positive and researchers have informed us that they feel reassured with all the safety measures in place to prevent any spreading of coronavirus. In particular they like the one-way system throughout the department and the requirement to wear face coverings around the department.

**Professor Claire Carmalt**




When the department locked down on 18 March, Professor Andrea Sella, Lab Technician Claire Gacki, Senior RA Raul Quesada Cabrera, PhD Student Claudio Oliveira Lourenco and Sacha Noimark (Dept. of Medical Physics & Biomedical Engineering) continued working to help address the shortages of essential items that defined those early weeks of the covid-19 crisis seen here in London. In addition to hand sanitiser production Professor Sella collected all unused PPE in the department and packaged it up to donate to UCLH. (**Photo Left)**

Claire Gaki, describes the process:

We followed a WHO recipe to make the hand sanitiser. There was two versions of the method - one used Ethanol and one used Isopropyl Alcohol. We used the ethanol method first, until we used up all the ethanol in the department, and then we moved onto the isopropyl alcohol method, until we used up all of that as well.


We cleaned our working areas with 70% ethanol solutions. We had a dedicated, sterile area for the manufacturing of the sanitiser and a bottling area, where we dispensed the sanitiser into smaller pump bottles. We boiled all the distilled water on hot plates, and allowed it to cool down. All our batches and bottles were labelled, with batch numbers, detailed information of the sanitiser and all the relevant GHS symbols. We tested the density of each batch, to make sure it was correct, in accordance to the WHO recipe.

Our first load of batches went to UCLH. We transported the boxes of bottles over to the the NHS offices on Tottenham Court Road. Some of the other batches went to local councils and nursing homes. The rest of them are sitting in the Graham Lab waiting for someone to need them. In the end we made about 20 batches of 20Ls, so about 400L in total.

*Above: The first batch*
*Left to right: Boiling, testing, dispencing, bottling*
*Bottom right: The Team - Claudio, Andrea & Claire.*


***UCL Chemistry Staff have continued to work during the lockdown to produce 400 litres of hand sanitiser to help our colleagues at University College Hospital, local care homes and charities.***

**As part of our series on the COVID-19 research in Chemistry, UCL final year undergraduate student Lily Newton interviews Professor Giuseppe Battaglia about his research and what it was like running a lab during a national lockdown.**

**Could you tell me about your research group and current work?**

Our research group is very diverse – comprising biologists, physicists and chemists and researchers with very mixed backgrounds. This is necessary for understanding how transport in biological systems works for finding new ways to deliver drugs in the body. By finding ways for drugs to reach affected areas more efficiently, we can either increase the efficacy of existing drugs or develop completely new therapies and ways of treating diseases This is known as nanomedicine.

Our research is driven by the application end. Clinicians tell us what they need and where in the body the disease occurs and then, around that, we build our technology. However, this is a complex problem and why we really utilise expertise and skills from chemistry, physics and biology.

From chemistry and physics, we employ a tool called molecular engineering or self-assembly to build our core structure, our carrier. We use weak supermolecular forces to create all the bonding necessary to create the final devices which are typically shaped like capsules. These capsules have the ability to get across and inside cells and protect their contents. Their exact properties depend on the type of application, making them a multi-functional platform that you can then study in a biological environment.

That takes us to the biophysical and biological aspect of our work where we're pushing the limits of studying the system in a biological world using microscopy techniques to look at things in action. A few years ago, we built one of the very first electron microscopes in the UK, possibly in the world, capable of studying liquids without freezing them beforehand. As we can directly watch the liquid itself, we can see all the molecules and macromolecules in action and how they perform and react to external stimulus. It's very exciting because it does allow us to really gather not just two dimensions of the molecular space but also how they evolve with time.

We can then take these experimental developments to go back to the original problem of how to deliver drugs. One great example of our research approach is one paper that we published two years ago where the challenge was to find a way to take drugs and put them into the brain. The brain is one of our most difficult organs to reach with more than 99 per cent of the drugs that we know failing to arrive there. However, the brain will happily take things like glucose and certain proteins. We studied this trafficking process to see how glucose could make it to the brain and used this to create a synthetic surrogate that could hijack the same process to get inside.

***"Of course, when Covid came,...we felt that we should try something. A bunch of people in my group, with the help of my spin-out company, have been trying to apply the principle of our nanomedicines, to create something that can work for treating a viral infection."***

We targeted a receptor that is used by the brain to take cholesterols and get rid of fatty materials. We identified how the brain pumped out fatty species through vessel walls and found a system that could navigate this route in reverse – to get into the brain allowing for a high level of selectivity and targeting. Eventually, you can even push forward this design by not only having a capsule that can get across and inside the cell but also by making the capsule able to follow and move in biological environments by tracing chemical gradients. A big area in my research activities that we are pushing forward is called active matter, where we convert chemical transformations to mechanical power in the form of motion and locomotion - things that bacteria are really good at.



We are trying to create drugs that can essentially 'move' and 'hunt' like bacteria do and we have a couple of spinoff companies that are really pushing this into proper drug development. We expect there will be a couple of formulations in the clinic in the next couple of years for a range of diseases. Of course, when Covid came, that means we felt that we should try something. A bunch of people in my group, with the help of my spin-out company, have been trying to apply the principle of our nanomedicines, to create something that can work for treating a viral infection. We are now formulating both antivirals and anti-inflammatories that can work both in the early stage of the infection so that you can stop this virus spreading or you can mitigate the viral effect of inflammation, which causes that ultra-immune responses and that can lead to some very deadly effects.

**Could you go into more detail about your Covid-19 research? What are the main questions**

The virus itself is a nanoparticle so we very quickly recognised that the tools that we use to design our own nanomedicines could help us to understand how the virus interacts with its host, in particular, what part of the body it infects. When you reduce the virus into a series of interactions, you can take that series and transform it into a synthetic surrogate and essentially copy-cat the virus. You can then access the same place that the virus infects and limit the damage that the virus does with the delivery of anti-inflammatory drugs.

Because of the necessity of getting this done quickly, we've focused on materials that are already known to be safe for use in the human body and then we recombine them using our physics. Hopefully, in the next couple of months, we will be able to raise more money to create a nanomedicine that is technology-driven.

**How did you find working under lockdown at UCL? How did you and your group adapt?**

Well, it was very hard. My wife is a scientist too and she also runs a research facility at UCL. We have two young daughters so suddenly our lives were very different, and we needed to find time to become primary school teachers as well. It was great to spend more time together but that was the biggest distraction from work. So, it meant starting our day at 5 AM to catch up on work and working nights. Then, to fit in with my research group we ended up shifting our group meetings to 4/5 o'clock in the afternoon because that was the only time everyone could be available. Research wise, as we were working on COVID research, four or five people in my group managed to stay in the lab during the lockdown. In fact, I was going into the lab more frequently during lockdown than now that the labs have reopened. My working hours increased and there was also a sense of importance to the COVID work which could be quite demanding.

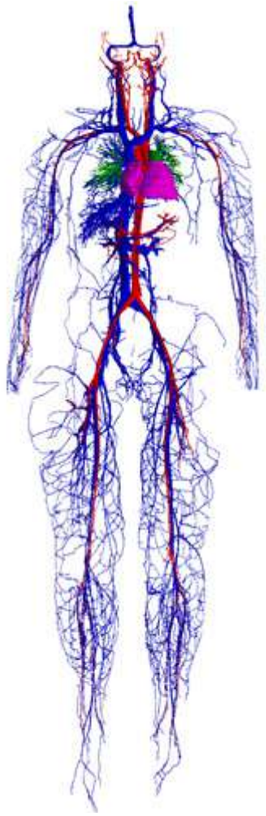
***"The virus itself is a nanoparticle so we very quickly recognised that the tools that we use to design our own nanomedicines could help us to understand how the virus interacts with its host"***

**What are the next steps for your research?**

Firstly, I'm going to push making sure that we get our medicines out there to patients. This means focusing on and polishing the medicines that we think work. So that does involve moving away from some of my academic research and into ventures that lead to commercialisation.

On the other side, I'm getting more interested in biophysics and understanding of transport phenomena. From what we've discovered, we can actually start to contribute to the fundamental science of how things get transported into our cells. I think this is really exciting. From an intellectual point of view, the more I understand about this, the more I get curious. In the background, there is also the fundamental question of how life emerged. Recently, we got a grant with a colleague in the genetics department, an expert in the origins of life and metabolism, Nick Lane. We are going to try to apply biophysical principles to this question and perhaps contribute to understanding how a bunch of chemicals can become much more complex than that to the point where they start to replicate and become alive. That transition has always been quite fascinating to me.

*Blood flow in the full arterial tree using HemeLB*



Prof Peter Coveney's group in the Centre of Computational Science (CCS) is working on a number of topics including inhibitors for protein targets of Covid-19, simulating blood flow in the entire vasculature—comprising the arterial and venous trees—of a "virtual" human, and the properties of polymer nanocomposites containing graphene and graphene oxide.

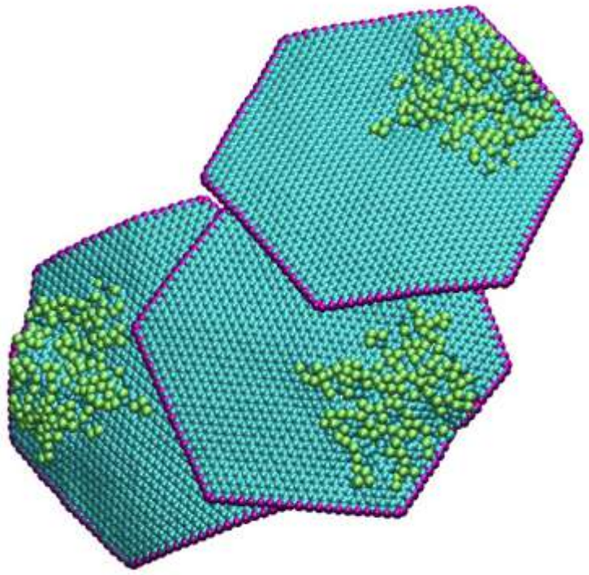
In the fight against Covid-19, CCS are working with colleagues in Europe and the USA as part of the CompBioMed H2020 project (www.compbiomed.eu) to identify compounds (new or existing) that might have activity against the coronavirus, SARS-Cov-2. Their multi-level approach to identify tight binding inhibitors uses fast machine learning and docking methods to provide an initial ranking of billions of drug compounds. That ranking is refined by using methods that take the protein dynamics fully into account. These methods include machine learning driven sampling as well as molecular dynamics methods to sample the protein and protein-ligand complex phase space. These computationally intensive calculations are being carried out on the supercomputers Summit, Frontera, Longhorn, Theta, SuperMUC-NG, and Scafell Pike (at Hartree Centre). The CCS group is now carrying out more advanced binding free energy prediction calculations on thousands of compounds selected by this workflow.

HemeLB is a massively parallel, highly scalable blood flow simulator optimised for sparse geometries such as those that are found in the human vasculature. Currently, it is a flat MPI code which scales extremely well on all existing multicore platforms. With the advent of SuperMUC-NG, #13 in the Top500 list with almost 27 Petaflops performance and over 310,000 cores, HemeLB has been ported to the behemoth and, after reported very good benchmarks last November over one half of the machine, has now been able to get access to the entire production partition and successfully run the code. (https://pop-coe.eu/sites/default/files/pop_files/pop2_summary_hemelb.pdf). A GPU version is also now in development. For this work, we have to use European and US based supercomputers; at the present time, the UK has fallen a long way behind the leading international players.

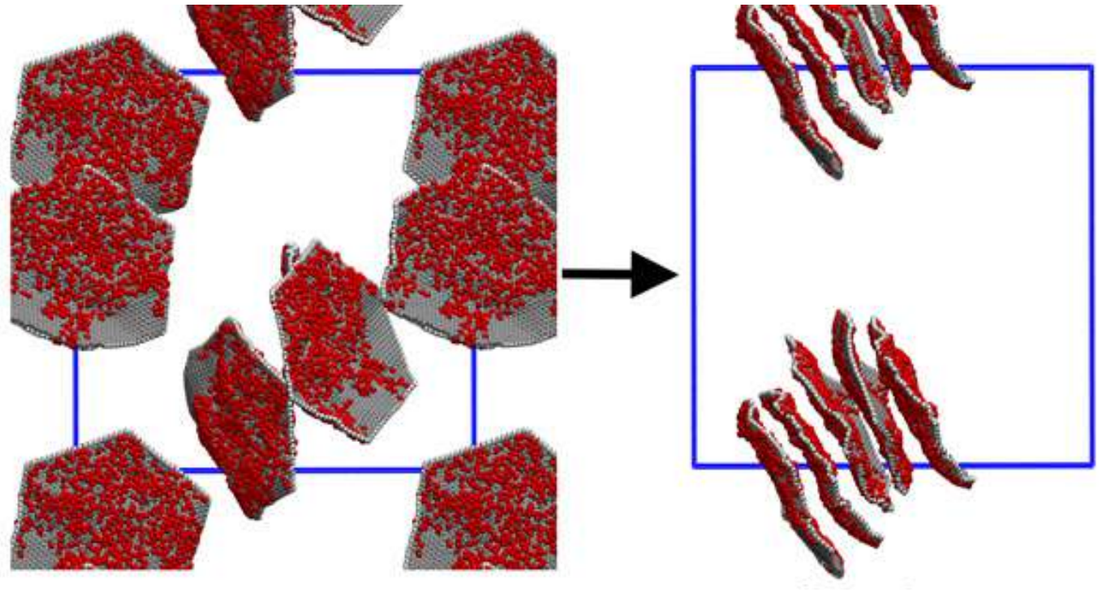
Graphene oxide (GO) is extremely versatile, with potential applications in many engineering fields. The group at CCS have been building fundamental studies on graphene over the last two years (DOI: 10.1002/adma.201705791, DOI: 10.1021/acs.jcim.9b00114), but for its effective use, control of its structure is essential. For instance, thin films and membranes require highly ordered nanoparticle arrangements; composites require dispersed nanoparticles, and hydrogels require 3D porous arrangements. However, the structure of graphene oxide can vary significantly depending on its fabrication process and the amount of oxygen it contains. This makes its characterisation difficult, which in turn makes it challenging to understand the link between the structure of a graphene oxide flake and their final morphology in composites. In a recent study within the CCS they have been able to gain insights into the driving forces behind the formation of different graphene morphologies by using multiscale modelling.

To create model GO flakes, they used quantum mechanics to calculate where oxidation occurs on the atomistic scale, which created variegated flakes with oxidised and unoxidised domains, as observed in experiment. The flakes were then inserted into a coarse-grained model, where many atoms are grouped together and is built upon their previous research in designing a new forcefield for graphene. These "bottom-up" simulations, spanning from quantum mechanics to the mesoscale, can reach relatively long length and timescales. As a result, they afforded new principles in directed synthesis of novel GO nanocomposites by determining what structures may be produced when the GO flakes are added to molten polymer for composite applications. Multiple, very long simulations were then performed, which were used to determine the thermodynamically stable morphologies of GO and dispersion mechanisms. The large number of simulations allowed an estimate of the uncertainty of each prediction, based upon tools created in the VECMA project (www.vecma.eu). This work has been recently published in Advanced Materials journal with a very informative video to accompany it and can be found here: onlinelibrary.wiley.com.

To this end, we used an array of high performance computing resources, including the UK national supercomputer, ARCHER. Overall, this study explains the sometimes unpredictable morphologies of graphene oxide and provides tools and rules to design new synthesis routes for desired graphene structures for various applications.



*Snapshots from the simulation of PVA–GO system with a C:O ratio of 2.5, starting from initially dispersed GO sheets. Hydroxyl groups are red, graphitic carbon atoms are gray, and edge carbon atoms are white. Polymers are not shown for clarity. Periodic boundaries are indicated by blue lines*



# Director of Undergraduate Studies & Deputy Head (Teaching) Dr Dewi Lewis outlines the steps taken to successfully meet the challenges of delivering our undergraduate & MSci programmes at a distance

## The end of the year

The Covid-19 closure of the department on 18 March occurred two weeks before the end of our normal teaching year. Overnight we were forced to move both lectures and tutorials online, with academic staff forced to learn very quickly the technology available and the different teaching style required. The biggest challenge the department faced was with the closure of the labs – ensuring that the 2nd year inorganic lab course could be delivered remotely required the biggest work around, but we managed to ensure all students had experience of analysis. Overall, the feedback received from students has been very good.

### Assessment

UCL took the decision to run either online exams (which ran for a full 24 hours), or that departments offer one week of coursework. For a subject like Chemistry in which the focus is on problem solving, we had to modify our (already signed-off!) papers to ensure they tested unseen problem skills, without the supporting book work type questions. Some modules took the plunge and set alternatives – such as writing short reports on how to tackle specific problems. Overall, the students coped very well with the changes

### MSci Projects

The vivas and the oral presentation all happened online. The SARPIC presentation symposium was fantastic – students were asked to record their presentation, but when given the option, many were brave enough to present live via Blackboard. It really was a triumph – if nerve-wracking for those chairing session!

### Our graduates

We managed to host our end of year parties online! With the "quiet" of an online event (not the noise of the Nyholm room) it was easier for us and students to express their thoughts to the assembled crowd and we awarded prizes for the presentation for the MSci talks as well.

Random breakout rooms meant we chatted to more people – although the instant "back to the main room" led to some interesting tales being interrupted never to be finished!

The attitude of the students who finished in such strange circumstances was incredible and we wish them all well.

## The future

This year is going to be challenging! All lectures are going to be online (200 in a room isn't ever going to happen this year is it, let's be honest!) and tutorials/ workshops will be mainly online with some provision on campus.

But the major changes are going to be the lab and the final year.

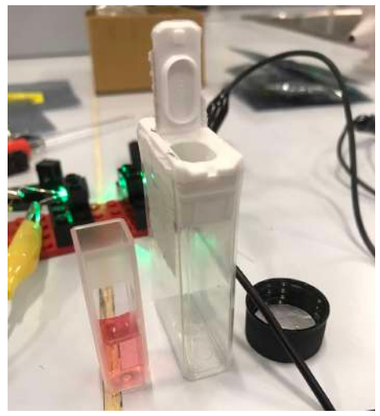
For the lab we took the decision as early as we could to move all labs to term two and three. To alleviate assessment (which again will be online) some modules are going to be assessed by coursework.

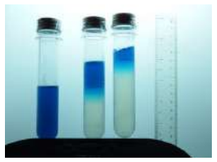
### MSci Projects

The biggest change is to our final year where we have done what we've thought of doing many a year! The research project is now a larger component (70 credits of the 120 credits for the year for those that like these facts) and the taught component is now a freer choice of topics – 9 topics from about 30 culled from our pre-existing modules.

We hope that this year we can ensure the students have plenty of time in the lab but that they are better prepared for it, with a greater emphasis on experimental design from the off. Too often the urge to dive straight into the lab means early experiments are "wasted". We consulted with the incoming year and those just finishing last year and they unanimously supported the changes. So now we must make it reality!

This (and well, possibly further) academic year is going to be challenging for all of us. In our teaching this means using different approaches and being more tuned to student's approaches to learning – but we also need to help them learn how to learn in this new environment. Supporting our students as personal tutors is going to be more critical as personal contact (between each other as well) is going to be limited.



*Photos courtesy of Andrea Sella. Cake & test tube photograph courtesy of Miranda Molloy (who Andrea asked to be descibed as a 'paragon of skills and virtues')*

### Lab14

The most dramatic change is going to be the first year lab. The uncertainties of being here, the numbers (we are well over target) led Prof Andrea Sella to lead on developing an at home lab kit. This is going to be so exciting! Not the tired old chemistry set of (probably) our youth but a bit of exploration and measurement. You can read his "manifesto" (his words) in an essay in Nature here: Practical science at home in a pandemic world (nature.com)

With input from colleagues near and far, and assisted by Dr Liz Munday (our newest teaching fellow) and Helena Wong (physical chemistry technical staff – and now ace procurer of balances, thermocouples, pipettes etc from around the world!), together with a host of willing student guinea pigs, we now have an amazing lab course, full of really deep thoughtful experiments coupled with a playfulness and "build it" element mainly missing from introductory lab: starting with baking a cake as a scalable analogue of complex synthesis and tic tac boxes for cuvettes in a Lego based spectrophotometer (**photos above**) . If you read the manifesto and tell me you wouldn't like to do it yourself!

**The attitude of all our staff has been exemplary and I am pleased to be able to say, commented upon by many across college ("chemistry seem to be ahead of everyone" is a common theme). Now we need to deliver the best education we can under these circumstances, supporting each other and our students.**

# EPSRC New Investigator Awards

The EPSRC New Investigator Award scheme is to support individuals who hold an academic lectureship position, have not previously led an academic research group or been the recipient of a significant grant. UCL Chemistry has 3 academics awarded this year for the following projects.

### Vacancy Engineering in Anode Materials for High-Power K-Ion Batteries

Dr Yang Xu

The goal of the project is to design K-ion battery anode materials that can fast charge and discharge and to develop high-power K-ion battery full cells based on the designed anode materials. The design is in accordance with the time scales of K-ion kinetics, focusing on the crystalline structures that have directional pathways for K-ion insertion and diffusion at a long-range time scale and structural defects that enable fast K-ion diffusion at a short-range time scale.

We will first examine the feasibility of intercalation-type oxide anodes to reversibly store K-ions and investigate the associated electrochemical mechanism via a series of in-situ and ex-situ characterisation. We hope to clarify the potential difference of intercalation chemistry in storing Li-, Na- and K-ions in the anodes. We will then develop synthetic protocols to not only create oxygen vacancies in the anodes' structures but also confine the vacancies on the surface or toward the bulk. This will allow us to understand the spatial effect of oxygen vacancies on improving K-ion diffusion kinetics and the resulting battery performance. We expect the obtained results could be transferrable for other intercalation-type K-ion battery anodes. We will finally pair the structurally defective anodes with state-of-the-art cathode materials (Prussian blue analogues), aiming to achieve high-power K-ion battery full-cells.

### Smart hydrophilic/ hydrophobic switches for targeted membrane delivery

Dr Cally J. E. Haynes (PI), Dr Paola Vergani (co-I)

The project aims to develop small molecules that can reversibly switch between hydrophilic and hydrophobic on the application of a triggering stimulus (light or heat). These switches will be designed as "tags" that can be easily appended to small, hydrophobic therapeutic and imaging agents, with the goal of improving their delivery to target sites within the body. When the tags are in the hydrophilic form, they will act as solubilising agents and allow the appended hydrophobic molecules to be delivered via the blood without precipitation or aggregation. When the tags are switched to their hydrophobic form, the appended cargo will become hydrophobic and it's function will be switched on.

We will append our switchable tags to small molecule ionophores, which are typically hydrophobic molecules that can mediate ion transport from within a lipid bilayer. Such molecules have potential as channel replacement therapies, but their delivery is extremely challenging due to their high hydrophobicity. In collaboration with Dr Paola Vergani (UCL Division of Neuroscience Physiology and Pharmacology), we will investigate whether our appended ionophores can mediate ion transport in epithelial cell membranes, and crucially whether their delivery is improved compared to unmodified transporters. We will also append our switches to simple fluorophores to enable us to visualise stimuli-driven membrane uptake through fluorescence imaging techniques.

### High Throughput Preparation of Tuneable Magnetically Assembled 1D Nanostructures

Gemma-Louise Davies

Magnetic 1D materials have become particularly popular in recent years, as their large aspect ratio and 1D structure gives rise to anisotropy, which can produce orientated electronic and ionic transport and unusual anisotropic optical and magnetic properties useful in a variety of applications. Such 1D materials can outperform their nanoparticle (or 0-dimensional, 0D) counterparts in many applications, for example in medicine, where anisotropy leads to increased magnetisation and local magnetic field strengths. This provides improved performance in medical imaging techniques such as magnetic resonance imaging (MRI), where 1D materials boost signal enhancement compared to their 0D analogues thanks to the increased anisotropy of their 1D structures.

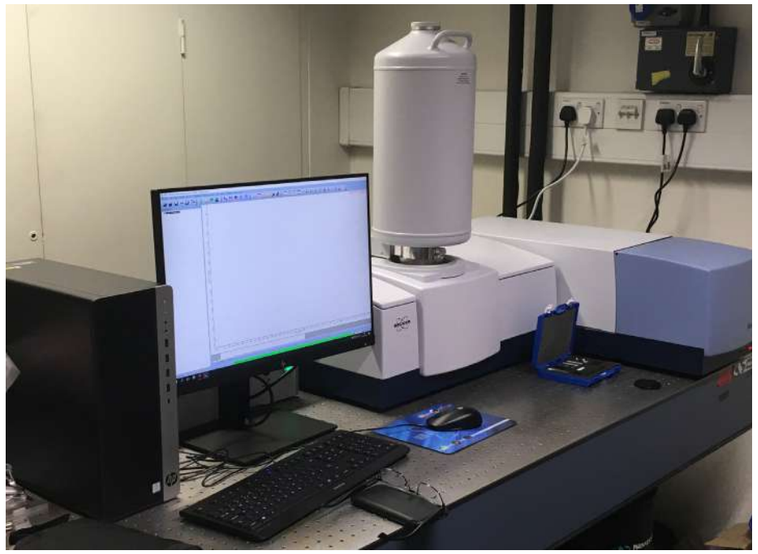
A number of new fabrication techniques for 1D materials have hence been pioneered and developed, though these often suffer from poor tuneability of the resulting structures, and hence properties, as well as challenges with scalability - issues which are critical for their long-term use and industrial uptake. Magnetic interactions have long been used to generate colloidal structures which respond readily to a magnetic field, with ferrofluids being the most well-known example. The preparation of permanent 1D materials using magnetic assembly approaches has been explored recently, with clusters of magnetic nanoparticles being assembled into permanent arrays of nanowires or nanotubes either during synthesis, or through magnetically stimulated nanoparticle assembly. Although successfully forming 1D nanostructures, these approaches suffer from difficulties in controlling the resulting materials' size, aspect ratio and surface chemistry. There is, therefore, a clear need for a technique capable of reproducibly fabricating magnetic 1D nanostructures with controlled and tuneable aspect ratios, sizes and surfaces, at high scales. In this project, we will develop a novel, high throughput approach to magnetic 1D nanomaterials through the exploitation of continuous flow technology combined with magnetic assembly to produce core-shell 1D nanostructured materials with various coatings, which can be modified with ease for numerous different applications. This work will systematically explore the effect of flow rate, magnetic field strength and duration, magnetic nanoparticle building blocks and various coating agents in order to form a library of 1D materials whose properties are tuneable and reproducible. As a case study, the produced materials will be tested for their performance as contrast agents in magnetic resonance imaging (MRI). Using state-of-the-art magnetic resonance imaging tools, quantitative assessment of performance will demonstrate the benefits of tuneable 1D materials in this important medical application.

# A new "racehorse" spectrometer for the Robin Clark Raman spectroscopy suite

**Professor Christoph Salzmann**

Raman spectroscopy has become a highly popular technique for characterising materials ranging from classic inorganic and organic compounds to nanomaterials, biological samples, complex liquids and even artwork. In addition to rapid developments on the instrumental side, the computational prediction of Raman spectra has become a very powerful and accurate tool for the modern-day Raman spectroscopist. Prof. Robin Clark FRS at our Department has been one of the leading international scientists for establishing and promoting this powerful type of spectroscopy. In his honour, our Raman facility has now been named the "Robin Clark Raman spectroscopy suite" (RCRSS) which is managed with remarkable dedication by Dr Steven Firth. The number of users from different parts of UCL and beyond is impressive and a true testament to the power of Raman spectroscopy.

Fluorescence can be regarded as the arch nemesis of Raman spectroscopy due to its typically much larger quantum yield. A way to minimise fluorescence is to use long excitation wavelengths beyond the visible spectrum. We are therefore very proud that a new departmental FT-Raman spectrometer with 1066 nm excitation (Bruker MultiRAM) has now been added to the RCRSS with funds from the MAPS faculty. Following its journey from the factory in Germany through lockdown Europe, the new spectrometer was installed in July 2020 at the Department and will be available for general booking with the start of the new term. In addition to its very gentle excitation wavelength, which will be beneficial for many samples, the new spectrometer is based on a Fourier-transform technology, which means that outstanding signal-to-noise ratios can be achieved while recording spectra across the entire spectroscopic range from 50 to 3600 wavenumbers in one go. The new addition has certainly added a very powerful racehorse to the stable of our Raman spectrometers and one can only wonder about the exciting scientific discoveries that it will facilitate.



# SMTG Wins Faraday Institution Phase 2 Funding

**Professor David Scanlon**

On the 5th of September, it was announced that SMTG has been awarded funding in two projects from the Faraday Institution Phase 2 projects. Firstly, David along with a team of collaborators from the University of Sheffield, Cambridge University, Oxford University and Lancaster University has been awarded funding for “Next generation lithium ion cathode materials”, in a project entitled **FutureCat**. The aim of the project is to take a coordinated approach to cathode chemistry design, development and discovery (including tailored protective coatings and designer interfaces) to deliver cathodes that hold more charge, that are better suited to withstand prolonged cycling and promote ion mobility (increasing battery durability and range and acceleration of the EV) while reducing the dependency of cell manufacturers on cobalt.

Secondly, in a project called NEXGENNA a team led by Professor John Irvine of the University of St Andrews, with contributions from Lancaster University, University of Cambridge, University College London, University of Sheffield and the Science and Technology Facilities Council will investigate next generation sodium ion batteries. The team aims to accelerate the development of sodium ion battery technology by taking a multi-disciplinary approach incorporating fundamental chemistry right through to considerations for scale-up and cell manufacturing. Its aim is to put on the path to commercialisation a safe sodium ion battery with high performance, low cost and a long cycle life. The relatively low cost of sodium ion batteries makes them an attractive next generation technology, particularly for static energy storage applications and low-cost vehicles.

In addition, Faraday will provide £1.3 million for the expansion of the MICHAEL supercomputer, the Faraday insttutions dedicated computing cluster. The expansion will cover the calculations envisaged for the FutureCat, NEXGENNA, and CatMat projects.

The department would like to thank the family of Pamela Self, who kindly left a legacy in her will this year. Pamela studied chemistry between 1940 – 1943, at the time when the department evacuated to Aberystwyth.

We were lucky to have been able to find a class photo and her son Prof. Jonathan Slack identified her below, as shown by the red arrow. Prof. Slack let us know that at the time she was Pamela Gregory, and after graduating, worked as a chemist for May and Baker Ltd and later as a chemistry teacher at the Thame Girls Grammar School and at Queensgate School in London. After retirement Pamela was very active in the Friends of UCL.




# Alumni Matters

## Professor Peter Day 1938 – 2020

It is with great sadness that we report the death on the 19th May of Peter Day, who served as Director of the Royal Institution and of the Davy Faraday Research Laboratory, affiliated to UCL, from 1991 to 1998 and was subsequently an Emeritus Professor of Chemistry at UCL.

Peter was educated at Maidstone Grammar school and Wadham College Oxford. He continued in Oxford to study for a PhD under the supervision of RJP (Bob) Williams – a leading and influential figure in UK Chemistry; and he subsequently became a fellow and tutor in Chemistry at St John’s College, Oxford. His pioneering work in the field of mixed valence compounds and molecular electronic materials earned him election to the Fellowship of the Royal Society in 1986. In 1988, he moved to become Director of the *Institut Laue Langevin* in Grenoble - a world leading, international centre for scientific research using neutrons. He followed Sir John Meurig Thomas as Director of the RI and Fullerian Professor in 1991 and served the Institution with distinction for seven years, during which both the research and public programmes enjoyed great success. The Davy Faraday Research Laboratory (DFRL) was home to an international leading programme in solid state and materials chemistry, which was strengthened by the successful affiliation with UCL chemistry; while the public programmes included several outstanding Christmas lectures. Peter retired from the RI in 1998, although he continued a productive research programme in the DFRL and UCL for several years, before becoming a UCL emeritus professor.

Richard Catlow who was Wolfson Professor at the RI from 1989 – 2006, Director of the DFRL from 1998 – 2006 and Head of UCL Chemistry, 2002-2007, writes “Peter was a major figure who made lasting contributions to materials chemistry. I had known him since I was an undergraduate in Oxford and worked with him throughout his period as RI Director. It was an exciting time in which the research programme of the DFRL in collaboration with UCL, enjoyed great success and international recognition, while the outstanding lectures programmes including discourses, schools and Christmas lectures maintained the unique RI style and impact. I also remember well his wife Frances who sadly died a few years ago”.

Frank James, who was Reader in the History of Science at the RI and currently Professor of the History of Science in the UCL Science and Technology Studies Department writes: “Peter was a cultured man who valued evidence in all areas and was always willing to listen. He was thus very supportive of the history of science activities undertaken at the Royal Institution, indeed the first three volumes of Faraday’s correspondence was published during his time.”

Peter wrote an autobiography entitled *“On the Cucumber Tree - Scenes from the Life of an Itinerant Jobbing Scientist”* (Grimsay Press) and more details of his life and work can be found in the links below:

royalsociety.org/people/peter-day
wikipedia.org/wiki/PeterDay

**Donations**

A big thank you to all the kind people who have supported the department directly to help us to build on our international reputation for teaching, research, and to make a range of exciting activities possible. Your kind contributions have a direct impact upon our students and staff, and we are very grateful for it. We continue to provide an excellent education and training environment for undergraduate and postgraduate students in Chemistry and all staff are developing innovative methods to inspire and instruct. It is great to know that we have your support and assistance as we work to do this.

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# Grants

**Investigator:** Parkin, Professor Ivan
**Project:** Enhanced transparent conducting oxide coatings on glass
**Sponsor:** Pilkington Group Ltd
**Value:** £35,000
**Start Date:** 26/08/2019
**End Date:** 30/09/2023

**Investigator:** Volpe, Dr Giorgio
**Project:** ActiveMatter
**Sponsor:** EC H2020
**Value:** £225,258
**Start Date:** 01/09/2019
**End Date:** 31/08/2023

**Investigator:** Darr, Professor Jawwad
**Project:** Scalable Ultra-Power Electric-vehicle Batteries (SUPErB)
**Sponsor:** Innovate
**Value:** £258,411
**Start Date:** 01/09/2019
**End Date:** 28/02/2021

**Investigator:** Palgrave, Professor Robert
**Project:** Photoemission and Inverse Photoemission Spectroscopy for Electronic Structure Determination of Functional Materials
**Sponsor:** Thermo Fisher Scientific
**Value:** £32,000
**Start Date:** 23/09/2019
**End Date:** 22/09/2023

**Investigator:** Parkin, Professor Ivan
**Project:** Studentship - Denture cleaning tablers - Reactive Chemistry, Formulation and Antimicrobial effects
**Sponsor:** GSK Glaxosmithkline LLC
**Value:** £32,000
**Start Date:** 23/09/2019
**End Date:** 30/09/2023

**Investigator:** Parkin, Professor Ivan
**Project:** Development of Antimicrobial Films on Glass
**Sponsor:** Pilkington Group Limited
**Value:** £38,000
**Start Date:** 23/09/2019
**End Date:** 22/09/2023

**Investigator:** Beale, Professor Andrew
**Project:** Studentship A high pressure flow reactor for the Operando surface X-ray scattering analysis
**Sponsor:** Diamond Light Source
**Value:** £50,679
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Negahdar, Dr Leila
**Project:** Combined operando spectroscopy with model-based
experimental design to study the mechanism of catalytic surface reactions — OpeSpeKin'
**Sponsor:** Marie Curie fellow
**Value:** £170,347
**Start Date:** 01/10/2019
**End Date:** 30/09/2021

**Investigator:** Coveney, Professor Peter
**Project:** A Centre of Excellence in Computational
Biomedicine' — 'CompBioMed2'
**Sponsor:** EC
**Value:** £1,344,011
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Coveney, Professor Peter
**Project:** Studentship - Multiscale modelling and simulation of graphene and graphene-oxide polymer composites
**Sponsor:** Hexcel
**Value:** £40,000
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Sheppard, Professor Tom
**Project:** Studentship -Boron-Directed C-H Activation -Double direct functionalisation of CH bonds
**Sponsor:** AstraZeneca
**Value:** £28,600
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Tabor, Professor Alethea
**Project:** Studentship - Synthesis and structural properties of cyclic peptides including novel non-reducible cystine mimics
**Sponsor:** Cambridge Research Biochemicals
**Value:** £3,000
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Scanlon, Professor David
**Project:** FutureCat: The Faraday Institution Future Cathode Project
**Sponsor:** Faraday Institute
**Value:** £173,288
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Scanlon, Professor David
**Project:** Michael Computer Upgrade
**Sponsor:** Faraday Institute
**Value:** £1,749,417
**Start Date:** 01/10/2019
**End Date:** 30/09/2024

**Investigator:** Scanlon, Professor David
**Project:** Next Generation Na-ion Batteries
**Sponsor:** Faraday Institute
**Value:** £435,149
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Beale, Professor Andrew
**Project:** Low T shift catalyst failure
**Sponsor:** Yara International SA
**Value:** £45,000
**Start Date:** 01/10/2019
**End Date:** 30/09/2022

**Investigator:** Gervasio, Professor Francesco
**Project:** Efficient Calculation Of Binding Free-energies And Druggability In Challenging Drug targets
**Sponsor:** UCB Pharma Ltd
**Value:** £32,000
**Start Date:** 01/10/2019
**End Date:** 30/09/2023

**Investigator:** Worth, Professor Graham
**Project:** Rational design of photoactive molecules using "black box" quantum dynamics simulations
**Sponsor:** EPSRC
**Value:** £392,509
**Start Date:** 25/10/2019
**End Date:** 24/10/2022

**Investigator:** Battaglia, Professor Giuseppe
**Project:** Mapping out glioma heterogeneity along the blood brain barrier using super-selective brain penetrating polymersomes
**Sponsor:** CRUK
**Value:** £269,938
**Start Date:** 21/11/2019
**End Date:** 31/07/2023

**Investigator:** Regoutz, Dr Anna
**Project:** Advancing Hard X-ray Photoelectron Spectroscopy
**Sponsor:** Analytical Chemistry Trust Fund
**Value:** £28,393
**Start Date:** 26/11/2019
**End Date:** 31/12/2021

**Investigator:** Aliev, Dr Abil
**Project:** EPSRC Capital Award for Core Equipment
**Sponsor:** EPSRC
**Value:** £48,000
**Start Date:** 29/11/2019
**End Date:** 28/05/2021

**Investigator:** Zwijnenburg, Dr Martijn
**Project:** Exploring metal--free pathways of hydrogen evolution by polymer photocatalysts
**Sponsor:** Leverhulme trust
**Value:** £114,893
**Start Date:** 01/12/2019
**End Date:** 30/11/2021



**Investigator:** Wilden, Dr Jon
**Project:** Electrochemical Bio-Inspired activation of molecular oxygen for C-H activation
**Sponsor:** Leverhulme trust
**Value:** £124,981
**Start Date:** 02/12/2019
**End Date:** 06/05/2022

**Investigator:** Fielding, Professor Helen
**Project:** A bottom-up approach to the rational design of new bioluminescence emitters
**Sponsor:** EPSRC
**Value:** £1,373,812
**Start Date:** 01/01/2020
**End Date:** 31/12/2023

**Investigator:** Carmalt, Professor Claire
**Project:** Studentship- Removal of Oral Biofilm by Activated Oxygen: A Targeted Study
**Sponsor:** BBSRC
**Value:** £9,766
**Start Date:** 13/01/2020
**End Date:** 29/03/2020

**Investigator:** Chudasama, Professor Vijay
**Project:** 'New Strategies For Therapeutic Antibodies – Synthetic bispecific antibodies & Antibody-Drug Conjugates with controlled drug loading. General
methods for unexplored ADCs and personalised therapies. — NSFTA'
**Sponsor:** H2020 EU
**Value:** £179,947
**Start Date:** 15/01/2020
**End Date:** 14/01/2022

**Investigator:** Worth, Professor Graham
**Project:** Controlling photophysics and photochemistry via quantum superpositions of electronic states: towards attochemistry
**Sponsor:** EPSRC
**Value:** £479,550
**Start Date:** 01/02/2020
**End Date:** 31/01/2024

**Investigator:** Hailes, Professor Helen
**Project:** Identifying and developing microbial systems and enzymes for the breakdown of waste products
**Sponsor:** Defence Science and Technology Laboratory
**Value:** £109,764
**Start Date:** 01/02/2020
**End Date:** 31/01/2021

**Investigator:** Schroeder, Dr Bob
**Project:** Self-healing organic semiconductors for bionic skin
**Sponsor:** MRC
**Value:** £1,223,852
**Start Date:** 01/02/2020
**End Date:** 31/01/2024

**Investigator:** Powner, Professor Matt
**Project:** 3-Amino TNA -Predisposed Synthesis and Non-Enzymatic replication
**Sponsor:** Leverhulme Trust
**Value:** £288,566
**Start Date:** 01/03/2020
**End Date:** 30/09/2023

**Investigator:** Anderson, Professor Jim
**Project:** The Synthesis and Investigation of Chimeric Luciferins
**Sponsor:** Leverhulme Trust
**Value:** £196,902
**Start Date:** 01/03/2020
**End Date:** 30/09/2023

**Investigator:** Blackman, Professor Chris
**Project:** Feasibility of scale-up of MEMS-based gas sensors
**Sponsor:** Royal Society
**Value:** £38,522
**Start Date:** 01/03/2020
**End Date:** 28/02/2021

**Investigator:** Chudasama, Professor Vijay
**Project:** Targeted Anti-Cancer Therapies
**Sponsor:** EC H2020 European Commission Horizon 2020
**Value:** £225,258
**Start Date:** 01/04/2020
**End Date:** 31/03/2024

**Investigator:** Mcmillan, Professor Paul
**Project:** Graphene Flagship Core Project 3
**Sponsor:** EC H2020 European Commission Horizon 2020
**Value:** £169,601
**Start Date:** 01/04/2020
**End Date:** 31/03/2023

**Investigator:** Sander, Dr Kerstin
**Project:** Mapping neuroinflammation in frontotemporal lobar degeneration – development of a surrogate marker for early diagnosis and disease progression
**Sponsor:** AFTD Association for Frontotemporal Degeneration
**Value:** £365,842
**Start Date:** 01/04/2020
**End Date:** 31/03/2023

**Investigator:** Catlow, Professor Richard
**Project:** Next generation ammonia synthesis: a highly integrated computational modelling
**Sponsor:** EPSRC
**Value:** £488,797
**Start Date:** 01/04/2020
**End Date:** 31/03/2024

**Investigator:** Davies, Dr Gemma Louise
**Project:** High Throughput Preparation of Tuneable Magnetically Assembled 1D Nanostructures
**Sponsor:** EPSRC
**Value:** £427,802
**Start Date:** 01/05/2020
**End Date:** 30/04/2023

**Investigator:** Woodley, Professor Scott
**Project:** Materials and Molecular Modelling Exascale Design and Development Working Group
**Sponsor:** EPSRC
**Value:** £76,800
**Start Date:** 01/05/2020
**End Date:** 31/07/2021

**Investigator:** Sander, Dr Kerstin
**Project:** A "Shake and Use" Theranostic System for Combined Radio-imaging and Photodynamic Therapy
**Sponsor:** EPSRC
**Value:** £167,143
**Start Date:** 01/05/2020
**End Date:** 31/08/2022

**Investigator:** Scanlon, Professor David
**Project:** Quantum computing for battery materials
**Sponsor:** Innovate
**Value:** £139,164
**Start Date:** 01/05/2020
**End Date:** 31/10/2021

**Investigator:** Sheppard, Professor Tom
**Project:** Unleashing the synthetic potential of Azaenolates
**Sponsor:** Leverhulme Trust
**Value:** £129,631
**Start Date:** 01/05/2020
**End Date:** 30/04/2022

**Investigator:** Catlow, Professor Richard
**Project:** Boundary Conditions for Atomistic Simulation of Material Defects
**Sponsor:** EPSRC
**Value:** £65,112
**Start Date:** 01/06/2020
**End Date:** 31/05/2021

**Investigator:** Caruana, Professor Daren
**Project:** Single-Step Plasma Jet Material Deposition
**Sponsor:** EPSRC
**Value:** £558,343
**Start Date:** 01/06/2020
**End Date:** 30/11/2023

**Investigator:** Howorka, Professor Stefan
**Project:** Nanomechanical sensors built with DNA
**Sponsor:** EPSRC
**Value:** £45,557
**Start Date:** 01/06/2020
**End Date:** 31/12/2020

**Investigator:** Sander, Dr Kerstin
**Project:** Image-Derived Enzymatic Adrenal Lateralisation of Primary Hyperaldosteronism (IDEAL)
**Sponsor:** MRC
**Value:** £24,942
**Start Date:** 01/07/2020
**End Date:** 31/12/2023

**Investigator:** Sheppard, Professor Tom
**Project:** Development of a generally applicable catalytic direct amidation reaction
**Sponsor:** EPSRC
**Value:** £336,290
**Start Date:** 01/07/2020
**End Date:** 31/12/2022

**Investigator:** Howorka, Professor Stefan
**Project:** Functionally enhanced RNA for intracellular delivery of ATMPs
**Sponsor:** Research England
**Value:** £8,500
**Start Date:** 01/07/2020
**End Date:** 30/06/2021

**Investigator:** Howorka, Professor Stefan
**Project:** Rapid, portable, and scalable Covid-19 antibody testing
**Sponsor:** Wellcome Institutional Strategic Support Fund
**Value:** £37,347
**Start Date**: 01/07/2020
**End Date:** 30/11/2020

**Investigator:** Carmalt, Professor Claire
**Project:** To Embed Omniphobic Powder Technology in Developing Innovative 'Easy-To-Clean' Slip-Resistant Flooring
**Sponsor:** EPSRC
**Value:** £64,053
**Start Date:** 01/07/2020
**End Date:** 31/03/2021

**Investigator:** Worth, Professor Graham
**Project:** Simulating Intramolecular Charge Migration on Attosecond timescales
**Sponsor:** EC-H2020
**Value:** £170,347
**Start Date:** 01/08/2020
**End Date:** 31/07/2022

**Investigator:** Baker, Dr Jamie
**Project:** C-Terminal Selective Ligation to Access Homogeneous Antibody Conjugates
**Sponsor:** EPSRC
**Value:** £444,296
**Start Date:** 01/09/2020
**End Date:** 31/08/2023

**Investigator:** Haynes, Dr Cally
**Project:** Smart hydrophilic/ hydrophobic switches for targeted membrane delivery
**Sponsor:** EPSRC
**Value:** £381,795
**Start Date:** 01/09/2020
**End Date:** 31/08/2023

**Investigator:** Battaglia, Professor Giuseppe
**Project:** Nanoparticle delivery of microRNA in a preclinical model of glioblastoma
**Sponsor:** Brain Tumour Charity
**Value:** £40,044
**Start Date:** 01/09/2020
**End Date:** 31/08/2022

**Investigator:** Howorka, Professor Stefan
**Project:** Rapid, portable, and scalable Covid-19 antibody testing
**Sponsor:** EPSRC
**Value:** £387,586
**Start Date:** 05/09/2020
**End Date:** 04/03/2022

**Investigator:** Chudasama, Professor Vijay
**Project:** Site-selective lysine modification
**Sponsor:** LifeArc
**Value:** £35,000
**Start Date:** 28/09/2020
**End Date:** 30/09/2024

**Investigator:** Blackman, Professor Chris
**Project:** Atomic layer deposition of anti-viral coating on temperature sensitive substrates for use in personal protection equipment (PPE)
**Sponsor:** EPSRC
**Value:** £14,944
**Start Date:** 28/09/2020
**End Date:** 21/02/2021

**Investigator:** Fielding, Professor Helen
**Project:** Ultrafast Laser Spectroscopy with Photons from the IR to the VUV
**Sponsor:** EPSRC
**Value:** £1,249,135
**Start Date:** 01/10/2020
**End Date:** 30/09/2022

**Investigator:** Sankar, Professor Gopinathan
**Project:** Diffraction Anomalous Fine Structure technique for electronic and geometric structure determination of functional materials @ DLS
**Sponsor:** Diamond Light Source Limited
**Value:** £44,699
**Start Date:** 01/10/2020
**End Date:** 31/03/2024

**Investigator:** Bucar, Dr Kreso
**Project:** In situ X-ray diffraction studies of pharmaceutical solids at variable temperatures and high pressures under mechanochemical conditions
**Sponsor:** Diamond Light Source Limited
**Value:** £38,213
**Start Date:** 01/10/2020
**End Date:** 30/09/2023

**Investigator:** Xu, Dr Yang
**Project:** Vacancy Engineering in Anode Materials for High-Power K-Ion Batteries
**Sponsor:** EPSRC
**Value:** £389,974
**Start Date:** 01/10/2020
**End Date:** 30/09/2023

**Investigator:** Hele, Dr Tim
**Project:** University Research Fellowship
**Sponsor:** Royal Society
**Value:** £578,201
**Start Date:** 01/10/2020
**End Date:** 30/09/2025

**Investigator:** Chudasama, Professor Vijay
**Project:** Revisiting the protein-nanoparticle interface
**Sponsor:** Leverhulme Trust
**Value:** £152,396
**Start Date:** 01/11/2020
**End Date:** 30/04/2023

**Investigator:** Battaglia, Professor Giuseppe
**Project:** Origins Of Biology: How Energy Flow Structures Metabolism And Heredity At The Origin Of Life
**Sponsor:** BBSRC
**Value:** £40,095
**Start Date:** 01/11/2020
**End Date:** 31/10/2025





# Staff

## Departmental Structure

### Head of Department
C.J. Carmalt

### Deputy Head of Department (Teaching)
D.W Lewis

### Deputy Head of Department (Operations)
S. D. Price

### Head of Physical Chemistry & Virtual Computational Chemistry Section
G.A. Worth

### Head of Materials & Inorganic Chemistry Section
F. Cora

### Head of Organic Chemistry & Chemical Biology Section
A.B. Tabor

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### Professors
C.R.A. Catlow
P.V. Coveney
T. Hele
S.L. Price
B. Slater
D. Scanlon
S. Woodley
G. Worth
M. Zwijnenburg

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D.W. Lewis

### Principal Research Associate
A. Sokol

### Ramsay Memorial Fellow
C. Savory

### Marie Curie Fellow
D. Dey

### Research Associates
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Y-S Choi
D. Davies
M. Einhorn
S. Gomez Rodriguez
K. Gopalakrishnan
J. Guan
R. Guo
M. Kochman
B. Mant
H. Martin
J. McCullough
A. Prentice
J. Suter
S. Wan
I. Zacharoudiou
B. Zhu

## Materials & Inorganic Chemistry

### Professors
A. Beale
C. Blackman
C.J. Carmalt
F. Cora
J.A. Darr
P.F. McMillan
I. P. Parkin
R. Palgrave
G. Sankar
A. Sella

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C. E. Knapp
Y. Xu
A. Regoutz

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A. Clancy
G. Hwang

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D. Commandeur
H. Duncan
F. Foglia
R. Gaifulina
T. Hickman
M. Isaacs
I. Lezcano Gonzalez
J. Manning
K. Page
S. Sathasivam
S. Sudeshna
S. Wang
T. Zhao

### Senior Research Associate
M. Vickers

## Organic & Chemical Biology

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E. Arstad
S. Caddick
V. Chudasama
H. C. Hailes
S. Howorka
C. M. Marson
M. Porter
M. Powner
T. Sheppard
A. B. Tabor

### Associate Professor
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D. Macmillan
B. Schroeder
J. Wilden

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K. Sander
C. Haynes

### Marie Curie Fellow
F. Thoreau

### NMR Manager and Principal Research Fellow
A. Aliev

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H. Allan

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J. Burns
L. Cowen
A. Dorey
N. Forte
K Hawkins

S. Islam
L. Leipold
F. Ma
S. Singh
R. Spears
F. Subrizi
D. Whitaker
Y. Xing
S. Yap
H. Yu

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### Professors
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D. J. Caruana
H. H. Fielding
F. L. Gervasio
K. B. Holt
S. D. Price
C. G. Salzmann
G. Thornton
A. S. Wills

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D.M. Rowley
G. Volpe

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R Ingle
S. Simoncelli

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D. Lourenco Matias
J. Marin Beloqui
D Moreira Leite
A. Rosu-Finsen
E. Scarpa - left
S. Varlas
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J. C. Anderson

### Director of Undergraduate Studies
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### EngD Coordinator
Z. Du

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D. J. Caruana

### Undergraduate Admissions Tutor
M. Blunt

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V. Hilborne

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A. Roffey
L. Munday

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J. Cowley

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T. Bridges

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### Mass Spectrometry Manager
K. Karu

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L. Ruiz-Perez

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H. Wong

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L. Price

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L. McSeveny

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M. Johnson
W. Motherwell
F. Pearce
J.H. Ridd
B. Roberts
P. Smith
D.A. Tocher
S. Walmsley

## Guess the desk

Answers:

1. Claire Carmalt
2. Tamara Alhilfi
3. Nicola Phillips
4. Yang Xu

## UCL Chemistry

Christopher Ingold Building
20 Gordon Square
London WC1H 0AJ

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