# Chemistry Update

Newsletter 323, 31 July 2020

## Inside this Issue



## Calendar of Events

**Finance presentation (for staff)**

Date: Tuesday 11 August

Time: 14:30-15:30

Location: Online presentation (invitation via email)

Details: The Director of Finance, Jeremy Lindley, is keen that university staff understand the financial context of the institution's finances taking both a long-term view and also in relation to the effects of the Covid-19 pandemic. The hour -long slot will include the presentation itself and then a chance for discussion. Colleagues are strongly encouraged to attend.

Date of Next Issue:
28 August 2020

# University of York scientists receive prestigious awards

**Three scientists from the University of York's Department of Chemistry have received prestigious Royal Society of Chemistry (RSC) awards.**

Dr Glenn Hurst has been named the winner of the RSC's Higher Education Teaching Award - the fourth member of the chemistry department at York to win the award. Professors Paul Walton and Gideon Davies have been awarded the RSC's Rita and John Cornforth Award.

Dr Hurst won his award for impactful work in green chemistry teaching resulting in national and international renown, and particularly for the innovative use of social media in higher education.

His work is centered around using innovative approaches to help students engage with and contextualise chemistry with an emphasis on green and sustainable chemistry, helping them address real-world problems as outlined by the United Nations Sustainable Development Goals.

After receiving the award, Dr Hurst said: "I wish to thank the brilliant students of Chemistry at York together with my inspirational and supportive colleagues across the institution. It is a real honour for me to receive such a prestigious award so early in my career and for that I am very grateful.

"Looking ahead, I am excited to see developments in interdisciplinary teaching strategies focused around global challenges and the potential use of virtual reality as a tool to support practical teaching and visualisation."

The Walton-Davies team won their award for ground-breaking research into the extraction of sugars from cellulose to provide a rich source of sustainable biofuel known as cellulosic bioethanol. Cellulose is naturally resistant to break down into its constituent sugar molecules, which hinders its use as a feedstock for bioethanol. However, the team has focused research on a group of enzymes called lytic polysaccharide monooxygenases which significantly enhance the breakdown of cellulose, enabling it to be used as a feedstock for fuel production.

Professors Walton and Davies thanked the RSC for the award and said that they were accepting it on behalf of their many co-workers who have contributed to the insights gained into these enzymes over the past four years.

Each prize consists of a monetary award and a medal.

Dr Helen Pain, acting chief executive of the RSC said: "We live in an era of tremendous global challenges, with the need for science recognised now more so than ever – so it is important to recognise those behind the scenes who are making significant contributions towards improving the world we live in. It is our honour and privilege to do that with these awards, which recognise exceptional scientific achievement.

“The global chemical sciences community is one that covers many different specialisms, from health and climate change to product development, sustainable transport, and everything in between. In recognising the work of Professors Walton and Davies and Dr Hurst, we are also recognising the important contribution this incredible network of scientists makes to improving our lives every day.”

The RSC’s Prizes and Awards are awarded in recognition of originality and impact of research, or for each winner’s contribution to the chemical sciences industry or education. They also acknowledge the importance of teamwork across the chemical sciences, as well as the abilities of individuals to develop successful collaborations.

## National Student Survey 2020

We’re delighted to learn that our chemistry students rated their learning experience highly in the National Student Survey, and are some of the happiest in the UK.

The Department of Chemistry has received 91% for 'Overall Satisfaction' in the 2020 National Student Survey (NSS). The Department placed first out of the surveyed Russell Group universities in six of the eight individual areas:

- Teaching on my Course
- Learning Opportunities
- Academic Support
- Organisation and Management
- Learning Support
- Learning Community

Head of Department, Professor Duncan Bruce said: "We really believe that the Department of Chemistry in York is a unique learning community in which staff and students work together at the frontiers of the subject. We are delighted to see that our students value this rather special environment, appreciate the learning opportunities and resources we provide, and rate our teaching as some of the very best in the country."

The NSS is a nationwide survey of final-year students in higher and further education that encourages them to give honest feedback about a variety of aspects of their university experience, including their department and course. This helps prospective students to make informed choices and also influences real change in future students’ experiences, from institution-level to course-level.

As a whole, the University of York scored 85.39% for 'Overall Satisfaction', which sits above the national average of 82.65%. Of the Russell Group universities included in the survey, the results position York as first for 'Academic Support' and 'Learning Opportunities', and second for 'Teaching on my Course'.

# Post lockdown traffic getting back to normal but air remains cleaner as congestion is down, new research suggests

**Air pollution is lower than expected in some of the UK's towns and cities, despite a return to almost normal traffic levels, new research shows.**

Findings by the University of York show that while road traffic is getting back to pre-lockdown levels, some concentrations of air pollutants like nitrogen dioxide ($NO_2$) are still lower than expected.

Researchers suggest that factors such as staggered commutes and homeworking is reducing congestion – which plays a factor in air pollution.

**Pollutant**

Dr David Carslaw from the Department of Chemistry has been analysing data from roadside monitoring sites across the UK throughout the lockdown. This has included monitoring concentrations of $NO_2$, which is a key pollutant caused by vehicles.

On average across the UK, $NO_2$ levels were 56% lower than normal at the height of lockdown and as of 1 July, with many restrictions currently lifted, they remained about 30% lower. In York, $NO_2$ levels were 52% lower than normal at the height of lockdown and as of 1 July, with many restrictions currently lifted, they remained about 18% lower.

**Emissions**

Dr Carslaw said: "The data across the UK showed a deep plunge after lockdown for concentrations of nitrogen dioxide of around 50% on average nationally and a slower recovery.

"Things are not back to normal according to the air quality data. It seems that while traffic levels look like they have mostly returned to normal, concentrations of some air pollutants are still quite a lot lower than expected. We think the reason is that congestion has not fully returned, and this has quite a large effect on emissions and hence concentrations.

"Trying to measure the impact on air pollution of congestion is very challenging as there are so many factors that affect emissions.

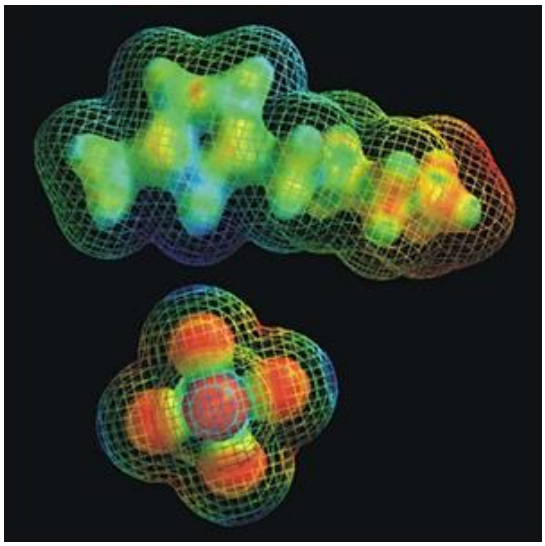
"The analysis of data gathered during lockdown and coming out of lockdown might give researchers an opportunity to better understand more about linkages between air pollution and congestion."

**Concentrations**

Dr Carslaw's team have been analysing data from more than 100 sites across a wide range of towns and cities in the UK as part of ongoing research into concentrations of roadside air pollutants.

# Major grant for ionic liquid research

**A £1.4m grant has been awarded by the Engineering and Physical Sciences Research Council (EPSRC) to support an international research network led by Dr John Slattery (University of York) and Professor Ken McKendrick (Heriot-Watt University), who will explore the surface structure and catalytic performance of ionic liquids.**



Ionic liquids (ILs) are salts with low melting temperatures that, unlike most salts, are typically liquid at room temperature. They have been of considerable interest in recent years due to their unique combination of properties, including low vapour pressures, inherent conductivity, ability to dissolve a range of solutes of differing polarity, and the fact they often have high chemical and thermal stability. This allows them to find applications in many areas, including in sustainable chemistry and catalysis, carbon capture and storage (CCS), solar cells, supercapacitors and more. In many applications of ILs, their surface structure plays a vital role and so obtaining a fundamental understanding of IL surfaces is vital for their rational design and optimisation.

This project builds on a long-standing collaboration between Dr John Slattery and Professor Duncan Bruce here at the University of York, Professor Kenneth McKendrick and Professor Matt Costen at Heriot -Watt University, and Professor Tim Minton at Montana State University.

The team has previously focused on studying the surface and bulk structure and behaviour of a wide range of ILs using several complementary techniques. This major EPSRC grant will allow them to use their collective expertise to develop new methods for studying the surfaces of IL mixtures to enable their use as components of industrially focused catalytic systems. By making mixtures, their properties can be 'tuned' selectively to deliver enhanced performance, enabling catalysts to be more selective and longer-lived. Collaboration with Professor Peter Wasserscheid and Dr Marco Haumann, from Friedrich-Alexander Universität Erlangen-Nürnberg, and the UK Catalysis Hub will allow catalytic testing and facilitate interactions with potential end users of the technology.

# Undergraduate Admissions lockdown lectures

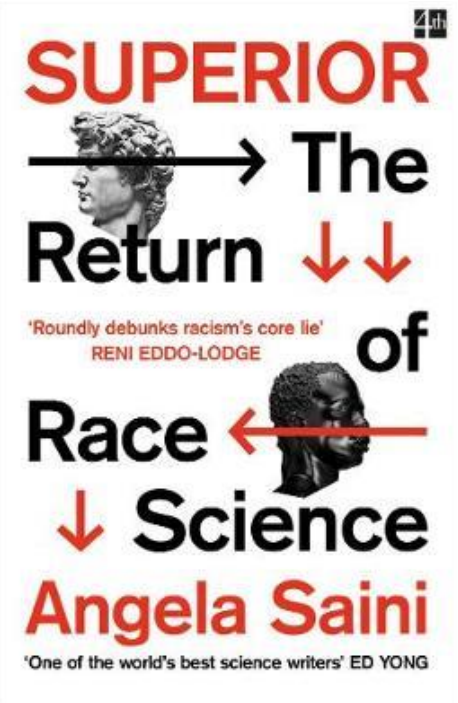
We've created a range of lockdown lectures to support our undergraduate admissions work and promote studying Chemistry at York. The new video resources feature a number of Chemistry academic staff showcasing how their research influences our teaching. We've linked these prominently from our undergraduate admissions landing page. We're also promoting them at our online Open Days, Twitter and via student enquiries.

The new online resources are important in the current 'Covid-19' environment where we have been unable to host face to face visit days and we'll use them to support our admissions activities for the 2021/22 UCAS season. A big thank you to staff who have helped create these resources and to our vacation placement students, Alastair and Mae for their contributions.

# Racism in Science & Academia:
# Q&A with Award winning science journalist Angela Saini

On 15 July, we co-hosted a fantastic beacon equality and diversity event with the University of Leeds. Angela Saini is an award-winning science journalist whose two most recent books are highly acclaimed. 'Superior' addresses the history and current resurgence of race science. An earlier book 'Inferior' explores the origins of gender stereotypes and is so powerful that there is now a copy available in every state school library in the UK following a crowd funding campaign led by Jess Wade.

The subject of Racism in Science & Academia is extremely relevant for us as it connects with our current work around decolonising and diversifying our curriculum. In the Q&A session Angela discussed the way that discredited pseudoscientific ideas such as eugenics and race science still influence mainstream thinking today. Although we now understand that the concept of race is essentially a social construct, the popular belief that race has a genetic basis still remains in our consciousness and in some cases our teaching.




Some of the ideas presented are quite challenging and make us all reflect on our own understanding of the concept of race. For example, when it became apparent that BAME individuals were disproportionately affected by Covid-19, it was quickly assumed by many that there must be an unknown genetic component. There was much less focus on socio-economic reasons, despite the fact that the most obvious racial disparities in health across the board can be attributed to socio-economics.

Angela highlighted examples of well-established ideas in medicine where race is used as a proxy for something else. For example, many of us have been taught that sickle cell anaemia is more common in certain ethnic groups, but it is more accurate to say that it occurs most frequently in those whose ancestors lived in regions where malaria was endemic. So, for this very well-known example, race is frequently being used as a proxy for geography.

Another example is the NICE guidelines on hypertension drugs. These recommend different treatment pathways for those of Black-African or African-Caribbean family origin despite the fact that the benefit of assigning ACE inhibitors vs calcium channel blockers to individual patients on the basis of race is no more effective than flipping a coin.

Angela ended the discussion by underlining the importance of teaching the history of science as part of

our degrees. It is essential to understand how scientific ideas have been developed if we are to challenge outdated orthodoxies.

If you missed the Q&A, you may be able to attend similar events hosted by other institutions listed on Angea Saini's events page or keep an eye out on Twitter. If you have not done so already, we strongly encourage you to add Superior (and Inferior) to your summer reading list. There is also a nice summary of some of the ideas discussed in a recent *Lancet* article.

-Leonie Jones and Caroline Dessent

## From optical microscopy to Pride Month of protest

To mark Pride Month in June, Dr Izzy Jayasinghe a UKRI Future Leader Fellow from the University of Sheffield gave an amazing virtual equality and diversity seminar. This was the first of our Equality and Diversity Seminars to be held virtually and we were delighted to find this made the event more accessible, with attendees joining from Strathclyde to Southampton.

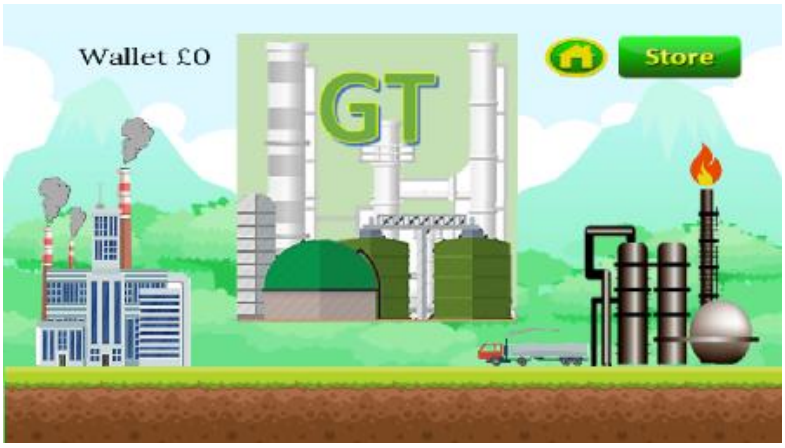

Izzy gave an inspiring overview of her research, using super-resolution imaging, localisation and expansion microscopies to visualise the two- and three-dimensional structure of calcium channels in heart cells. She intertwined her science talk with insights into her lived experience as an out and proud trans woman of colour who has worked across the globe.

In the second half of the talk, Izzy talked about her work around the inclusion of LGBTQ+ people, as well as projects like TIGER in STEMM, LGBTQ+ STEMM and the Institute of Physics. She talked powerfully about how #BlackLivesMatter intersects with Pride and the lessons that we, in STEMM, could take away from that intersection of marginalised communities.

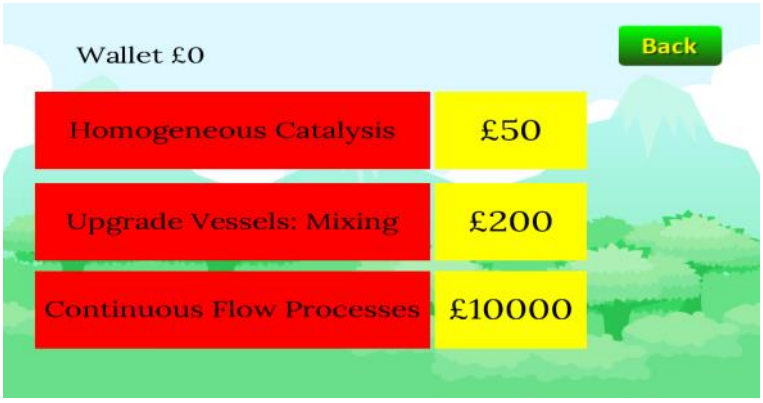
You can read a recent article that Izzy wrote on the subject: Don't paint my 2020 Pride Month in rainbow colours. For those of you who missed the seminar, we hope to place a link to the talk on the event page shortly.

# Green Tycoon app released to introduce biorefining principles in green chemistry

Matthew Lees, a recent MChem (York) graduate who conducted his research project with Dr Glenn Hurst published a free-of-charge game-based mobile application, Green Tycoon, that embraces a systems thinking approach to introducing students to a biorefining process model within green chemistry.




In his project, Matthew explores how, through education, society can transition toward a bioeconomy, making responsible and efficient use of natural resources to include their conservation, restoration and recycling. More specifically, Matthew identified that biorefinery systems meet this demand well through the sustainable processing of biomass into a spectrum of biobased products and bioenergy. The most sustainable third-generation whole-crop biorefineries take an entire systems-level approach with due consideration of feedstock(s), processing, product stream(s), and associated transport of natural resources/products. In reviewing such biorefining models, Matthew produced a new educational resource where students can recognise the interdependence of components in complex and dynamic systems such as biorefining models and in doing so, attempt to transition from a fragmented and reductionist knowledge of green chemistry to a more integrated and holistic understanding, which is of significant relevance in moving society towards a more sustainable future.




In Green Tycoon, players adopt the role of a manager in a chemical factory, synthesising the fictional compound, Yorkanone. Through upgrading the system and engaging with the integrated quiz, players can learn green chemistry principles while appreciating some of the considerations in biorefining. Green Tycoon was implemented with students on our MSc in Green and Sustainable Industrial Technology together with in Augsburg University in Minnesota through a collaboration with Dr Michael Wentzel. Following evaluation, Green Tycoon proved to be a useful resource to introduce students to green chemistry and its role in moving toward a bioeconomy.

It is noteworthy that Matthew had no coding knowledge upon commencing his project and hence this serves as a useful example of what students can achieve through a chemistry education research project in the area of technology-enhanced learning.

This work was published in the *Journal of Chemical Education*. The game can be download for free from the Apple App Store and Google Play.

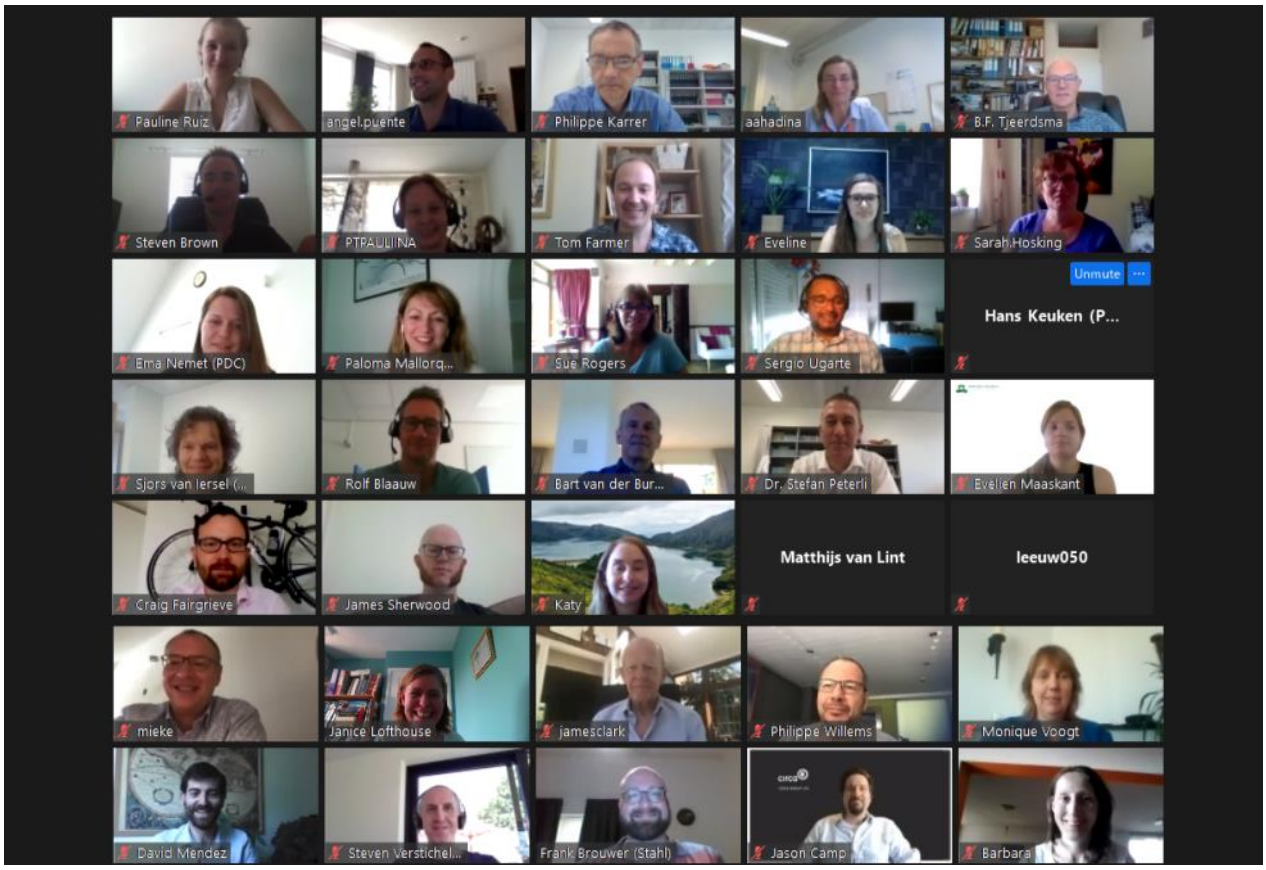
# CHAMPION Project hosts virtual kick-off meeting

On 25-26 June, CHAMPION hosted its virtual kick-off meeting, organised by Project Manager Janice Lofthouse of the Green Chemistry Centre of Excellence (GCCE). Thirty-four people from the 14 partner organisations plus the BBI JU project officer attended the meeting, held via Zoom due to the on-going Covid-19 pandemic. The project will run for 3.5 years and has a total budget of €5.7 million, of which €4.8 million is funded by the BBI JU, under the EU's Horizon 2020 programme.

The meeting celebrated the start of the project, which aims to develop and demonstrate that new bio-based polymers can be produced and successfully used in high-performance applications including coatings, textiles, home care and structural adhesives. Each end-user sector is represented in the project, to provide the best opportunity to achieve industrially-relevant outcomes for the project.

Despite some limitations due to the virtual format, it also provided a number of advantages over a face-to-face meeting, including enabling more people to join the meeting than is normally possible due to cost and a significantly reduced time requirement. This is particularly helpful for attendees with part-time roles or commitments outside work that can make travelling a challenge.

The attendees, including York PI Professor James Clark and Co-I Dr Thomas Farmer, were excited to start the project and are looking forward to meeting the challenging goals. Updates from the project will be communicated through a number of routes including the project website and social media (Twitter, Facebook and LinkedIn).




This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No. 887398.

# Chemistry pays tribute to David Wails

There was sadness in the Department of Chemistry last month at the news that one of the victims of the Reading terror attack is a former student.

Dr David Wails, Senior Principal Scientist at Johnson Matthey, studied for both his undergraduate degree and PhD in the Department of Chemistry at the University of York.

Professor James Clark, David's PhD supervisor, said: “We are deeply saddened by the news that York alumnus David Wails was a victim of the Reading terror attack.

“David studied with us from 1988 to 1995, first achieving his BSc in Chemistry in 1991 followed by a PhD in Chemistry in 1995. His PhD was on high performance membrane and fibre materials.

“During his time at York, David proved himself to be a bright and engaged student, and our thoughts and sympathies are with his family and friends at this very sad time.”

Dr Stewart Tavener, a fellow alumnus of the Department of Chemistry and a close co-worker of Dr Wails in the 1990s, said: “Dave was a lovely bloke and we were a close-knit group while doing our PhD together. He was good company and always had a very dry wit and sense of humour. I was shocked and saddened to hear the news and my sympathies go out to his family and friends.”

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# SAQN publishes Air Quality & COVID-19 Executive Summary

Following the successful online workshop held on 20 May, STFC Air Quality Network (SAQN) are pleased to announce the publication of the Executive Summary. This document identifies the key knowledge gaps relating to air quality and COVID-19 and recommends action to researchers and research funding organisations. The full report from the workshop will be published in the coming weeks. The three organising networks (AQNUK, SAQN, UKIEG) will be working with network members to act on these knowledge gaps and seek to contribute to the research in these areas.

It is clear that further interdisciplinary work is needed to tackle the questions raised at the workshop, and that more research is needed, particularly relating to indoor and outdoor air quality and the interaction between them. This is particularly timely as we begin to emerge from lockdown and consider how COVID-19 transmission and effects may change as we approach the autumn.

We encourage our network members and event attendees to share these findings widely and welcome suggestions and ideas as to how the SAQN can continue to support discussion and action in this space. Following the announcement of the UKRI SPF Clean Air networks, we will be exploring ways of collaborating with these networks to address these research questions in the coming months.

Download Air Quality & COVID-19 Executive Summary

# New starters


**Dr Dustin White**, Research Fellow (Penkman Group)
Room: C/D024; Ext: 4472; Email: dustin.white@york.ac.uk

**Jake Smith**, YSBL Technician
Room: B/L/019; Ext: 8658; Email: jake.smith@york.ac.uk

**De-Sheng Ker**, YSBL Technician
Room: B/L/019; Ext: 8658; Email: sheng.ker@york.ac.uk

**Dorothy Hawkins**, YSBL Technician
Room: B/L/019; Ext: 8658; Email: dorothy.hawkins@york.ac.uk

**Jake Vallow**, WACL Chemistry industrial placement (Based in Cranfield)
Email: jake.vallow@york.ac.uk

# Rising Scholars Land Opportunities with MolMatYork

Matteo Albino, 3rd year undergraduate on the MChem in Industry course, has won a competitive EPSRC Vacation Bursary to conduct a 10-week summer research project with the Avestro Group in the Molecular Materials Research Grouping. Uniquely, he will be completing what would've been a synthetic laboratory project instead as a remote computational summer research project from his home country of Italy, where he decided to relocate when the UK went into lockdown. He will be carrying out the DFT/ TD-DFT modelling of colourful, brightly fluorescent and electroactive aromatic imides that have the potential to serve as functional materials within organic energy storage and light-emitting devices. Notably, his virtual research activities will make use of York's VDS to access software and the York Viking HPC to run calculations, with supervision over Zoom.

Ruhee Azim Dawood, who recently completed her 3-year BSc in Chemistry w/ Distinctions and as Top in Class, has been awarded a York Chemistry Platinum Wild Fund Scholarship to begin a 36-month PhD studentship (full overseas tuition funded) in October 2020 with the Avestro Group, with whom she also carried out her final-year independent BSc project. Ruhee is a Kenyan national who attended the University of York under the impressive auspices of a three-year Sharifah Sofia Albukhary Scholarship, a Chemistry Excellence Award as well as a York Future Leaders Award during her undergraduate studies.

# Online Department suggestion box

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