

Chemistry Update

Newsletter 332, 28 May 2021

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Calendar of Events

Molecular Materials Seminar

Speaker: Dr Joseph Bear, Kingston University

Title: "Inverse Vulcanisation" Sulphur Polymers

Date: Tuesday 1 June

Time: 1pm-2pm

Location: Virtual (Zoom)

Johnson Matthey Poster Competition (Year 3 PhD students)

Date: Wednesday 9 June

Time: 2pm—5pm

Location: Virtual (Zoom)

Schedule

2pm: Start

2.15pm—3.15pm: Judging

3.15pm—4pm: General viewing

4pm—5pm: Talk from Johnson Matthey guest, and announcing of winners

Inorganic Seminar

Speaker: Professor Sason Shaik,
Hebrew University of Jerusalem

Date: Wednesday 23 June

Time: 1pm—2.30pm

Location: Virtual (Zoom)

Online Open Days

Date: 26-27 June

Time: 9am—6.30pm

Date of Next Issue:

30 June 2021

The work of York scientist inspires children's story

Research led by a University of York scientist is the inspiration behind a new online children's story.



The story was written by award-winning author Patrice Lawrence and illustrated by artist educator Amara Lawrence. Picture credit: Amara Lawrence / National Centre for Atmospheric Science

[*Grandma's Footsteps*](#) prompts readers to take note of changes in their environment, and to imagine what they want their own future to look like.

Lockdown

The story was inspired by [air quality research](#) led by Professor James Lee, which showed that the air became cleaner for a short while during the UK's first Covid-19 lockdown.

The fictional story, commissioned by the [National Centre for Atmospheric Science](#), was written by award-winning author Patrice Lawrence and illustrated by artist educator Amara Lawrence.

The story is set inside the domed city of Etherley and explores why air pollution is changing in different ways and different places, and how it affects people.

When the city's delicate balance is toppled, and patching up the sagging dome isn't working anymore, protagonist Hy Knowshole follows in their grandma's footsteps to find out how to restore clean air.

Captivating

Through Hy's journal entries, readers experience a captivating account of life in Etherley, which unfolds as readers scroll down.

Author Patrice Lawrence said: "Whether we are adults, children or young people, stories help shape how we see the world around us. As we emerge from difficult times, I hope a funny story can help children feel empowered to improve their local environment."

Through collaboration between creatives, scientists and school children, *Grandma's Footsteps* employs the power of storytelling to engage young people with the latest environmental research.

Air pollution is one of the largest environmental health risks we face today. It not only poses a threat to our environment, but to our health too, causing around 36,000 deaths a year in the UK.

Massive shifts to low pollution behaviours, like not using our cars, gave us a glimpse of what the future could look like, with clear benefits to us all - especially children who are more vulnerable to the impacts of air pollution.

Emissions

Professor Lee, an atmospheric chemist at the National Centre for Atmospheric Science and University of York, said: "Air pollution, especially from vehicle exhausts, affects all of us and is a severe risk to our health and wellbeing. During the Covid-19 lockdowns, traffic reduced significantly, leading to a drop in levels of key air pollutants such as nitrogen dioxide and small particles. Whilst this effect will be short-lived, it has given us a window into a future where exhaust emissions are reduced due to the electrification of the vehicle fleet."

To help the storymakers engage with the perspectives of young readers, the themes and style of *Grandma's Footsteps* were developed in collaboration with sixty Year Five pupils at Beckfoot Heaton Primary School in Bradford - a designated clean air zone city. The students submitted hand-drawn illustrations, showing the impacts of air pollution and ways to achieve a world with cleaner air.

Zoe Mawson, Headteacher at Beckfoot Heaton Primary School, said: "Learning about air pollution and all environmental issues is so important. We need to empower children so that they are able to help shape positive environmental changes. We were delighted to be part of *Grandma's Footsteps* and proud of our children's ideas and art work."

Learning

[*Grandma's Footsteps*](#) is shared online for free, alongside a set of learning resources for Key Stage 2 which offer educators science explainers, suggestions for discussion points, and activities for further learning.

Amara Lawrence, illustrator and trainee Art Therapist, said: "We should never underestimate art's ability to tell and support stories about social issues that are hard to talk about or explain. For children, art can be an accessible point of entry into discussion about their world. Air pollution is a problem that affects us all so children shouldn't be left out of the conversation, especially those who are most affected by it. Art is a way of exploring questions which we might not ask otherwise."

The National Centre for Atmospheric Science was awarded a grant by the [Natural Environment Research Council](#) (NERC), as part of UK Research and Innovation's (UKRI) rapid response call to Covid-19.

Dr Avtar Matharu shortlisted for 'Masters Teacher of the Year' Award

Dr Avtar Singh Matharu, Course Director for the MSc in Green Chemistry and Sustainable Industrial Technology, has been nominated for a prestigious 'Teacher of the Year' Award.



The '[FindAMasters' Masters teacher of the year award](#) aims to celebrate the individual who has created the most positive and encouraging learning environment, who gives their students high-quality constructive feedback, who is approachable, passionate about their subject, and always put the student first.

Dr Matharu is being recognised for his work as Course Director of the [MSc in Green Chemistry and Sustainable Industrial Technology](#). This unique taught course allows students to discover how green and sustainable chemistry can help with the industrial challenges faced by increasing global demand for sustainable products and processes. Students are empowered in critical-thinking, research and leadership skills.

In recent years, working closely with colleagues in the Chemistry Graduate Office, this course has grown to a size of well over 30 students each year, who come from all corners of the world and receive supervision and guidance from Dr Matharu throughout their time in the Department. As well as being Course Director, he leads the 'Principles of Green Chemistry' module which begins the students' study in York. Alongside the academic content, Avtar helps the students to find their own place in this unique learning community. He is a previous winner of the University of York's '[Supervisor of the Year Award](#)'.

FindAMasters is an online database of Masters degree programmes and related opportunities. Established in 2005, it lists over 25,000 postgraduate courses at institutions around the world and includes detailed funding and advice sections for students.

Dr Matharu is nominated alongside six other academics from across the UK, with the winner due to be announced on Monday 7 June.

YSBL PhD student Zoe Ingold wins poster prize



Congratulations to 2nd year PhD student Zoe Ingold who has won the Organic & Biomolecular Chemistry poster prize at the Directing Biosynthesis online conference in April for her poster titled "Structural studies of deoxypodophyllotoxin synthase, a C-C bond forming enzyme". Organised by the Royal Society of Chemistry, the conference hosted leading researchers from around the world.

Zoe is based in the York Structural Biology Laboratory (YSBL) and is supervised by Professor Gideon Grogan and Dr Benjy Lichman.

Green Chemistry MSc student accepted onto RB Future Leadership Supply Programme

UK HEALTH SUPPLY FUTURE LEADERSHIP PROGRAM

INTRODUCING ROSIE STURMEY

I am really looking forward to being involved in the future of this highly innovative, globally renowned company, playing my part in helping to improve the lives of the countless millions of people who love and trust our products.

reckitt®

Green Chemistry MSc student Rosie Sturme has been accepted onto the competitive Graduate Future Leadership Supply Programme with Reckitt Benckiser (RB) in Hull after she graduates this year. RB is the world's leading health and hygiene company, responsible for renowned brands including Nurofen, Strepsils and Gaviscon. This 2-year programme is a fast track to management, and it provides in-depth, hands-on experience of the company's Supply area.

Rosie Sturme said "I am really looking forward to being involved in the future of this highly innovative, globally renowned company, playing my part in helping to improve the lives of the countless millions of people who love and trust our products".

The MSc in Green Chemistry and Sustainable Industrial Technology is taught within the internationally-leading Green Chemistry Centre of Excellence (GCCE) at the Department of Chemistry, University of York.

Rosie said "The course has taught me the importance of green chemistry within a global context, high-level communication and understanding a variety of viewpoints."

Congratulations to Odile Eisenstein



Congratulations to our Honorary Visiting Professor and Honorary graduate, Odile Eisenstein who has been elected as a foreign member of both the US National Academy of Sciences and also the American Academy of Arts and Sciences. Both in the same week!

Widening participation in research through a new pilot project

Academics from the Departments of Chemistry and Biology join forces with industry partners to pilot a new EPSRC-funded DTP.



DTP Management Team:

Jen Gibbard (Admin Manager), Avtar Matharu (P.I), Duncan MacQuarrie (Co.I.) Gavin Thomas (Co.I.) and Ian Fairlamb (Co.I)

The [EPSRC Mobility DTP in Leadership and Excellence in Circular, Resource-efficient, Sustainable Manufacturing](#) is one of four pilot programmes currently underway with the intention of exploring new pathways into research. Aimed in particular at people for whom a PhD may not otherwise have been an option, this pilot is based around EDI principles and allows for an unusual degree of flexibility in attracting, admitting and supporting candidates from non-academic and under-represented backgrounds.

Through close cooperation with industry partners, this pilot is working to address barriers to entry for candidates who have demonstrable skill and experience in research through their employment. The candidates won't need to step away from industry to enter academia - this DTP allows them to co-exist in both.

Employers can use this DTP to retain valuable staff whilst nurturing their professional development. It's particularly well suited to employees preparing for leadership roles, especially those where the ability to work across and between both the business and research sectors would be a significant asset.

Graduates of the DTP will be doing industry-backed research whilst growing their networks throughout academia and beyond, helping to build new bridges and create opportunities for enhancing the flow of knowledge, talent and best practice.

Recruitment for the eight available places on the DTP began in 2020 and we're pleased to have been able to make three offers already. Applications are currently being invited for the remaining five places. More information is available on [the DTP webpage](#) and in this [information pack \(PDF\)](#).

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 at this [link](#).

Artwork of Fazeelah Munir showcased at Represent York

Artwork of Fazeelah Munir (Marie Skłodowska-Curie Early Stage Researcher in the Department of Chemistry) was recently selected to be displayed at the Represent York exhibition.



Fazeelah Munir

[Represent York](#) was a week-long event from 4-7 May 2021 held by the University of York's Student Union (YUSU) to continue and facilitate conversations surrounding race, racism and anti-racism on campus. As part of this, there was a virtual and physical art exhibition, featuring art submitted by students on the topic of race and representation.

Fazeelah said: "I think the Department of Chemistry is very good in promoting diversity and inclusion. We chemists have a lot more colours in ourselves and we do not all the time deal with chemicals and operating instruments. There is a life apart from the lab as well."

The pieces shown below by Fazeelah are "Colours of Pakistan" (left) and "Priest King" (right).

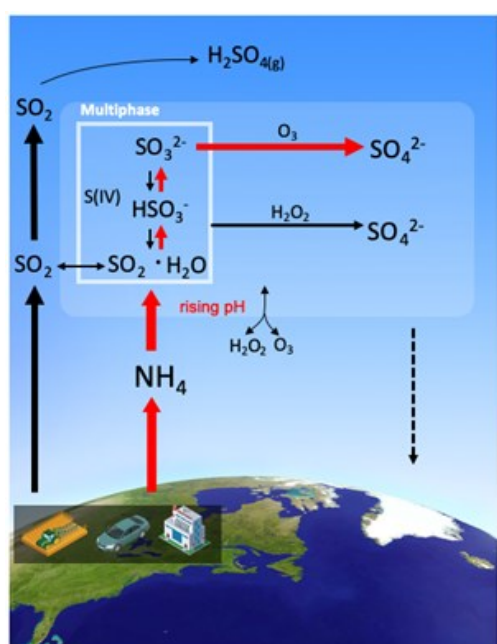


The full virtual exhibition can be [seen on the Represent York website](#).

Ice core data show why, despite lower sulfur emissions in US and Western Europe, air pollution is dropping more slowly

The air in the United States and Western Europe is much cleaner than even a decade ago. Low-sulfur oil standards and regulations on power plants have successfully cut sulfate concentrations in the air, reducing the fine particulate matter that harms human health and cleaning up the environmental hazard of acid rain.

Despite these successes, sulfate levels in the atmosphere have declined more slowly than sulfur dioxide emissions, especially in wintertime. This unexpected phenomenon suggests sulfur dioxide emission reductions are less efficient than expected for cutting sulfate aerosols. A new study led by the Tokyo Institute of Technology, Hokkaido University and the University of Washington explains why. The [open-access paper](#) was published in May in *Science Advances*.



Sulfur dioxide from human activities follow various chemical paths to form hazardous sulfate particulates. The multiphase path (inside the shaded box) becomes more important under less acidic conditions, resulting in a weaker response of sulfate to reductions in SO₂ emissions. *Tokyo Institute of Technology*

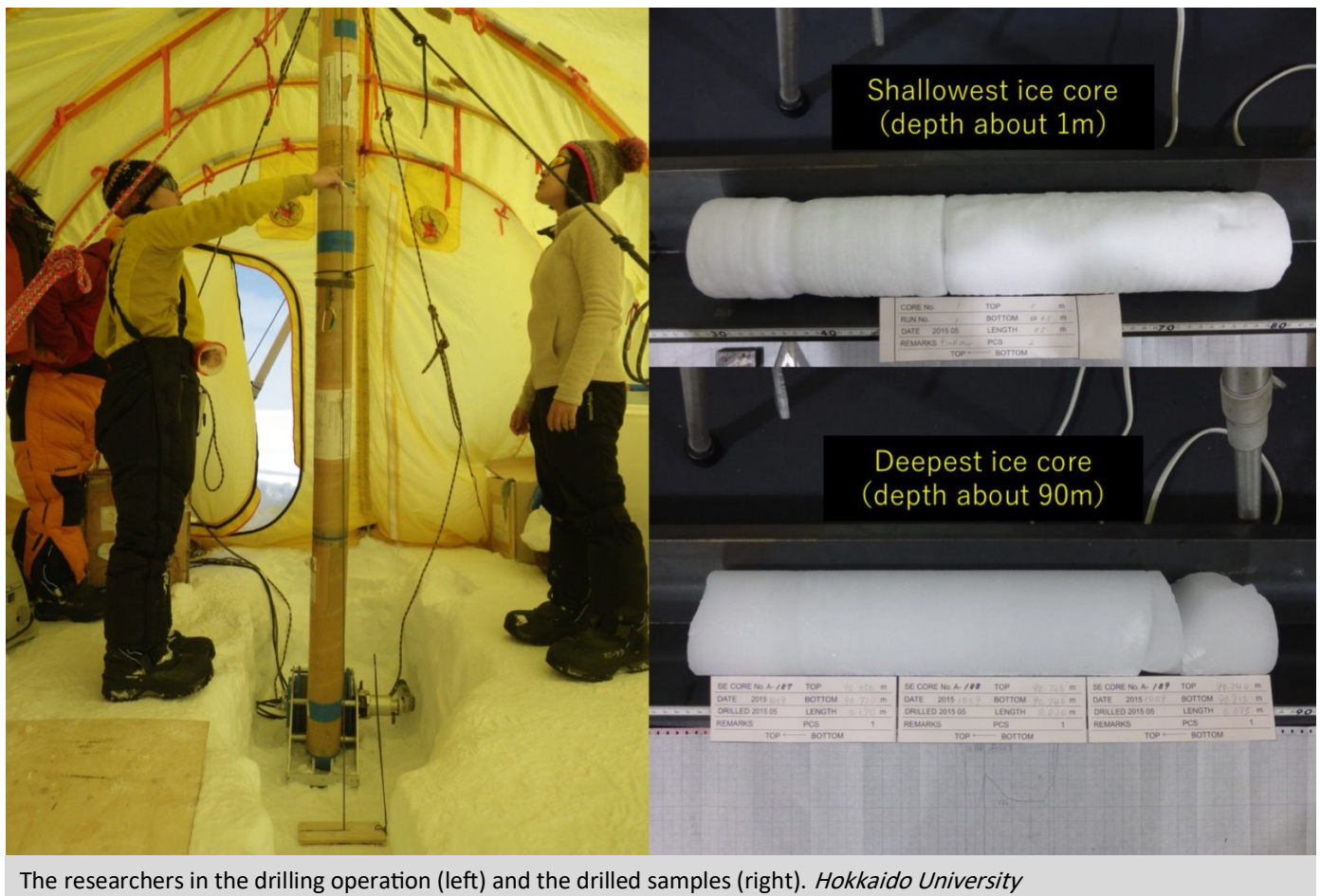
When concentrations of acidic sulfate from fossil fuel emissions decrease while the concentration of more basic ammonium molecules in the atmosphere stay constant, liquid water droplets in clouds become less acidic. This makes conversion of sulfur dioxide to sulfate more efficient. So, even though air quality regulations have reduced the supply of sulfur dioxide from power plants and shipping, the total amount of sulfate particulates that harm human health has dropped more slowly.

“It does not mean that the emissions reductions aren’t working. It’s just that there is a reaction which partially mitigates the reductions,” said co-author Becky Alexander, a UW professor of atmospheric sciences. “We need to understand this multiphase chemistry in the atmosphere to make an efficient strategy to manage air pollution and accurately predict future air pollution and climate change impacts.”

During most of the 20th century, sulfur dioxide emissions increased with industrialization in many parts of the world. But recently that trend has reversed in response to regulations, while ammonium emissions from animals and agriculture continue at the same rate. These trends are expected to continue.

Data from an ice core in Greenland that preserves past years’ atmospheres show that the proportion of sulfate containing oxygen with one extra neutron, or oxygen-17, increased in the 1980s after countries began to regulate emissions. The authors’ analysis shows this is due to faster sulfate formation in the liquid phase in the atmosphere, which occurs largely within clouds, under less-acidic conditions.

“After the SO₂ emission control, relatively lower atmospheric acidity promotes the efficiency of sulfate production in the atmosphere, which weakens the response of sulfate level to the SO₂ reduction,” said lead author Shohei Hattori at the Tokyo Institute of Technology. “Our unique isotopic techniques applied for the Greenland ice core records identify the key process of the weakened response of sulfate to SO₂ emissions reduction.”



The data came from an ice core drilled in southeast Greenland (SE-Dome) as part of a project led by Hokkaido University. The oxygen trapped in this ice provided evidence of sulfate composition from 1959 to 2015, without contamination from local pollution.

“Based on a continuous and high-resolution ice core record from SE-Dome, we could obtain reliable records for atmospheric aerosols without second modification after deposition,” said co-author and leader of SE-Dome ice core project Yoshinori Iizuka at Hokkaido University. “We plan to drill a second ice core at the same location this year, and try to reconstruct the aerosol history back to the 1750s.”

The ice core does not contain separate data for summer and winter, but models show that other, gas-phase chemical reactions for sulfur dioxide become more important in summer, reducing the summertime impact of changing cloud acidity. Knowing how these molecules react will help improve the atmospheric models used to forecast air quality and project climate change.

The research was funded by the Japan Society for the Promotion of Science and the National Science Foundation. The Department of Chemistry and the National Centre for Atmospheric Science (NCAS)'s Tomás Sherwen is among the co-authors who contributed to using model simulations to understand and explain the observations.

Adapted from a press release by Tokyo Institute of Technology.

Dillon group investigate impact of cooking and cleaning on air quality

Researchers from the Dillon group have enjoyed getting back to fieldwork in May, studying impacts of cooking and cleaning on indoor air quality at the Chester DOMESTIC facility. The WACL-based team have brought the “Environmental Baseline Monitoring” van, equipped with a wealth of instrumentation for gas- and particle-phase analysis. “DOMESTIC allows us to study cooking and cleaning in a highly instrumented, controlled and well-characterised kitchen environment” says Terry. “We were able to do some preliminary work on the Heslington campus, but lockdowns prevented us from going further afield. ”



Ellen and Catherine outside the Chester DOMESTIC facility. Also pictured is Archit Mehra from the University of Chester and some very valuable scientific equipment!

This campaign forms part of IMPeCCABLE, a three-year project bringing together chemists, environmental scientists and engineers from York, Chester and Nottingham. IMPeCCABLE PDRA Catherine O’Leary said “There are literally thousands of VOC emitted when cooking. Here we’ve been able to target the most interesting species thanks to detailed lab work from MChem student Matthew Thompson - thanks Matthew!”. On the results so far, NCAS researcher Marvin Shaw commented “We can see each cooking step via real-time mass-spectra: from food preparation through heating the oil to the addition of spices.”

In the second half of the campaign, the focus shifts from cooking to cleaning. PhD student Ellen Harding-Smith said “Emissions of reactive gases vary considerably from product to product. These experiments are a great opportunity to study subsequent chemistry for hours after a cleaning event.” Later in the summer, the team will be working with *Which?* magazine to provide an indoor air perspective on cleaning products.

New starters



Dr Joyashish Debgupta, Associate Lecturer

Room: C/B123c; Ext: 2537; Email: joyashish.debgupta@york.ac.uk

Victoria Leadley, Technical Specialist in NMR

Room: CHM/114; Ext: 8892; Email: vicky.leadley@york.ac.uk

Dr Graeme McAllister, Departmental Technical Operations Manager (new post)

Room: C/A135; Ext: 2513; Email: graeme.mcallister@york.ac.uk

Dr Samantha Furfari, Associate Lecturer

Room: C/D014; Ext: 3056; Email: sam.furfari@york.ac.uk

Volunteers needed for Soapbox Science

www.soapboxscience.org



Message from Karla Evans, Department of Psychology. I would like to invite interested parties to come and support an outreach platform for promoting women scientists and the science they do by volunteering for the [Soapbox Science event](#). The event will be held in person on Wednesday 12 June at King's Square from 13.00 -15.00 as part of the York University Festival of Ideas. Even though this is an event in which the speakers will be women talking about their science we hope that we will have volunteers who are men, women and non-binary happy to support this event. In return for your help during part of a Saturday afternoon we offer inspiring conversation, comradeship, fun and refreshments. **We need your help to have this event happen.**

If you are interested, please contact Karla K Evans **before Tuesday 1 June**: karla.evans@york.ac.uk

Congratulations to Derek



Congratulations to Dr Derek Wann who is the new Faculty Athena SWAN lead, taking over from Professor Caroline Dessent this summer.

Derek has also been appointed, following a competitive recruitment process, to chair application panel meetings for Advance HE under the transformed Athena SWAN Charter.