Chemistry Update

Newsletter 284, 28th April 2017

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Calendar of Events

Research Seminar
Speaker: Dr Sam Eden, Open University
Date: Wednesday 3 May
Time: 1pm—2pm
Location: A122

Research Seminar
Speaker: Dr Ai-Lan Lee, Heriot-Watt University
Date: Wednesday 17 May
Time: 1pm—2pm
Location: A122

Evening Lecture
Speaker: Professor Stephen Rimmer, University of Bradford
Date: Wednesday 17 May
Time: 7pm
Light refreshments will be available from 6pm
Location: A122

A Celebration of York Chemistry RSC Award Winners from 2016
Speakers: Ian Fairlamb, Kirsty Penkman and Paul Walton
Date: Friday 19 May
Time: 1pm—2.30pm
Location: A101

Green Manufacturing for the 21st Century Chemical Industry: Case studies, Methodologies and Tools Symposium
Date: Wednesday 24 May
Time: 10am—5pm
Location: GCCE, F Block

Research Seminar
Speaker: Prof Helma Wennemers, ETH Zürich (RSC Pedler Award)
Date: Thursday 25 May
Time: 1pm—2pm
Location: A101

Date of Next Issue: 26th May 2017

European Research Collaboration to Prove Feasibility of Using Starch in Energy Storage and Green Catalysis

Scientists at the University of York have teamed up with industry partners to turn renewable plant-based resources such as potato starch into a potential energy source for electric cars.

The team, which includes scientists from York's Biorenewables Development Centre (BDC), will be trialling different methods for converting three bio-based starting materials into a porous carbon: potato starch, alginic acid and fruit pectin.

Scientists say the resulting material could be used for energy storage for electric vehicles and as a green catalyst for the chemicals industry.

Dr Peter Hurst, Senior Technologist, working in the BDC's process development scale-up facility.

Dr Duncan Macquarrie, of the Green Chemistry Centre of Excellence (GCCE), said: "The first step in our conversion uses expansion technologies, then we freeze dry the material before converting it into a carbon material using a furnace.

"We are investigating using this as a catalyst for chemical processes and to make batteries for electric vehicles."

Dr Peter Hurst, Senior Technologist at the BDC, added: "We are using the porosity offered by nature to engineer a stable material with controlled pores, like changing the hole sizes in a sponge.

"By manipulating these and studying how they interact with other materials, like metals, we can change how the material performs; ultimately improving its effectiveness for different uses."

David Amantia, Principal Investigator for the project from Leitat, Spain, added: "Fundamentally, this project is about replacing a fossil resource, with a more sustainable, biorenewable alternative.

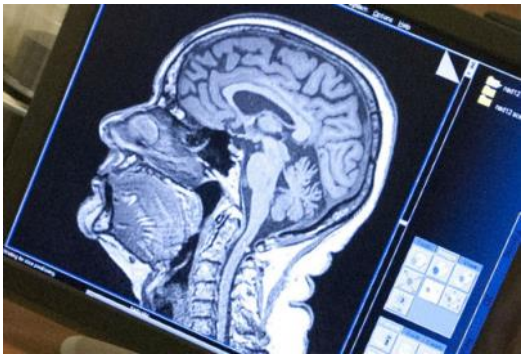
"What is exciting, is that by bringing together the nine partners, we are able to hone the technology from research level right through to a scaled-up production process for industrial testing."

The team at the BDC will take the process from a lab scale of 100g, and scale it up to develop a pilot line capable of producing up to 20kg/day of the material. This will provide enough sample material for the industry partners to test and analyse.

If successful, one of the project outcomes will be a pilot-scale production plant for producing this material, based at the BDC in York, UK. The four-year project is funded by the EU's Horizon2020 programme.

A Heavyweight Enters the Fray – Improved Biomolecule Imaging by Isotopic Labelling

Researchers from the Centre for Hyperpolarisation in Magnetic Resonance (CHyM) have discovered a synthetic method for optimising the hyperpolarisation technique, Signal Amplification by Reversible Exchange (SABRE) to give signal strengths up to 100,000 times greater than those obtained on a typical hospital scanner. This research could open the door to non-invasively probing metabolism in the human body.



Magnetic Resonance Imaging (MRI) is one of the most powerful methods for clinical diagnosis available in hospitals around the globe. However, it suffers from an inherent low sensitivity as the equivalent of just 1 in 200,000 molecules are ever observed on a typical 1.5 T hospital scanner. SABRE is able to improve this sensitivity by a process known as hyperpolarisation and its ultimate goal is producing a signal that is simultaneously as strong and long-lasting as possible.

These goals were both achieved through synthetic incorporation of deuterium isotopes (a heavy version of hydrogen) to a series of biomolecules, such as the vitamin nicotinamide and also the SABRE catalyst itself. These isotopic labelling strategies were shown to have two effects: first they reduce the possibilities for dilution of hyperpolarisation across many protons and second, they increase the relaxation times by removing strong spin-spin couplings. As a result one out of every two molecules can now be detected over a number of minutes. Scientists hope this will allow both large and small changes in the body to be detected by MRI, thereby improving diagnosis of new disease and returning illness.

Professor Simon Duckett said: “In practical terms this could eventually mean that if a patient comes in for a scan for suspected heart disease, for example, a medical professional will be able to inject a non-toxic contrast agent into the blood that can be traced through the veins to the heart to understand if there are any blockages on route, without the risk of getting a poor or partial image of what is happening. Our long term goal is to be able to apply this diagnostic technique in hospitals around the world”.

The heavy biomolecules and SABRE catalysts used in this research required the development of new synthetic methods which can now be used to make many grams of the desired product. With the ability to make large quantities of the key materials, studies are now being progressed for detecting them inside a living organism.

Dr Peter Rayner said: “We are still some way off using this new technique in hospitals, but it is an important step forward in our understanding of how molecules behave, with exciting potential for the future of health care diagnostics.”

This research is published in *Proceedings of the National Academy of Sciences of the United States of America* and is titled “Delivering Strong 1H Nuclear Hyperpolarization Levels and Long Magnetic Lifetimes through Signal Amplification by Reversible Exchange”.

Organic Chemist Wins Industry-Sponsored Prize

Professor Peter O'Brien has been awarded the 2017 AstraZeneca, GlaxoSmithKline, Pfizer & Syngenta prize for Process Chemistry Research.

Professor Peter O'Brien has been recognised for his creativity and published achievement in the area of lithiation-trapping of saturated nitrogen heterocycles, including his more recent work on the use of in situ React IR spectroscopy for monitoring the lithiation step. Professor O'Brien's numerous contributions have focused on the development of broadly useful methodology and have featured a number of fundamental and mechanistic insights.

Each year, a panel of process chemists from AstraZeneca, GlaxoSmithKline, Pfizer & Syngenta select a UK-based academic who has developed chemistry that has the potential to be of relevance to large scale manufacturing in the agrochemical and/or pharmaceutical sector. In general, many of the chemical reactions and novel reagents that are invented in university chemistry laboratories are unsuitable for use at large scale; the reagents may be too expensive or dangerous, or the reaction may not work when it is scaled up. This award recognises the development of new chemical reactions that solve problems in process chemistry.

The award was presented by Alan Robinson of Syngenta at the 34th SCI Process Development Symposium in Cambridge held between on 29—31 March 2017, where Professor O'Brien also gave a plenary prize-winning lecture.

Royal Society of Chemistry Re-Accreditation

The Department received notification last week, following the submission of extensive documentation in early January and a site visit to York on 2 March, that the Royal Society of Chemistry (RSC) has accredited the new Chemistry undergraduate programmes that will run from 2017-18, and re-accredited the MSc in 'Green Chemistry & Sustainable Industrial Technology'. The new undergraduate programmes include two new specialised 'Chemistry with' degrees ('Chemistry, Green Chemistry and Sustainable Processes' & 'Chemistry, the Atmosphere and the Environment') that mark a slight re-focusing of content from, and replacement of 'Chemistry with Resources and Environment' and 'Chemistry with Management and Industry'.

RSC accreditation is a 'kite-mark' for degree-level courses around the world and covers 360+ programmes at over 60 universities. The process is based on satisfying 15 Key Requirements relating to content, skills training and standards in undergraduate and taught masters courses. These reflect expectations relating to breadth and depth of knowledge, practical skills, project work, placements, professional skills, assessment and quality assurance. An accredited degree not only reassures students about the standards of their course, it feeds directly into the RSC's own professional qualifications such as Chartered Chemist status.

The visiting RSC panel complimented several aspects of the Department's delivery including the core material in Years 1-3 and the way it supported specialisation through the options. They also reported having enjoyed the opportunity to meet a number of our student representatives, drawn from the Staff Student Forum, in what they described as a 'lively' lunchtime encounter!

RSC accreditation runs on a 5-year cycle and sharp-eyed readers will realise that our new suite of undergraduate courses will have all have been delivered just the once before it's time to engage with the process once again!

Dr Thomas Farmer Interviewed by Sky News

Dr Thomas Farmer (Senior Researcher in the GCCE) was interviewed by Sky News on 17 April, about bio-based plastics and their potential for reduced environmental impact.

The GCCE has developed new bioplastics that can be composted completely and are made of sustainable materials. They are currently working with the company Biome Bioplastics on a new straw-based plastic, who have already developed a fully compostable and recyclable coffee cup and lid.

Read the full article at: http://news.sky.com/story/coffee-chains-trial-fully-compostable-cup-and-lid-10840320

Clarke Group News

Paul gave an invited lecture on "New Strategies for the Stereoselective Synthesis of Functionalised THPs" at Vertex Pharmaceuticals on 27 March, when he also consulted on routes to tetrahydropyrans of medicinal interest.

The group attended the RSC Organic Section Regional Meeting in Durham on 29 March. Ian George, Sam Griggs and Giacomo Ludovici all presented posters on their work which were very well received.

On 3 April the group travelled to the Newcastle University for the annual SCI Postgraduate Research Lecture Symposium and to support Sam Griggs who was presenting. Sam gave a presentation entitled "An Aza-Maitland-Japp Inspired Synthesis of 2-Spiropiperdine 3-D Scaffolds" and came way with **FIRST PRIZE! Well done Sam!**

Sam Griggs (second from right) with his SCI Prize

Paul gave an invited lecture at the EU ORIGINS COST Meeting at the Polish Academy of Sciences, Warsaw (3-7 April). The Polish Academy of Sciences is dedicated to Copernicus and has a large statue of him and model of the solar system in the square outside, a fitting venue for a conference on the origins of exo-planets and life. Paul's lecture was entitled "Potentially Prebiotic One-Pot Asymmetric Synthesis of 2-Deoxyribose" and focused on the work carried out by Andy Steer during his PhD.

Palace of Culture and Science in Warsaw

Polish Academy of Sciences in Warsaw

Also, Andrew Steer had 15 mins of fame when he appeared on the BBC1 Quiz Show Who Dares Wins on 8 April (photo left). Sadly Andy dared, but didn't win, being caught out on girls names beginning with H. Don't give up Andy, there's always Pointless!

Updated 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 new Google form on the intranet homepage or at this link.

RSC Organic Section NE Regional Meeting, Durham

York's organic chemists stole the show at March's annual North East regional meeting at Durham University. First, there was our excellent attendance—32 staff members and postgraduate students made the journey from York in total, making us easily the best represented department apart from hosts Durham.

Second, there was a very nice lecture on photoredox chemistry given by Dr James Donald. James' talk was focused on his work on photoredox-catalyzed reductive carbamoyl radical generation, which was done in collaboration with Professor Richard Taylor and Dr Wade Petersen and was recently published in *Organic Letters* (*Org. Lett*. **2017**, 19, 874).

Finally, York students won 3 out the 4 prizes on offer at the meeting! David Turnbull (IJSF group) and Nico Seling (PAOB group) won 1st and 3rd prize respectively in the poster competition, while Kiri Thornally (DKS group) won the networking prize. Well done to all, plus the other York students and PDRAs who also presented posters. Our thanks go to all involved at Durham for organising a fantastic meeting, especially Dr AnnMarie O'Donoghue and Dr Alyssa Avestro.

WPU

David Turnbull and Nico Seling collecting their poster prizes from RSC organic division president Dr Alison Humle.

Kiri Thornally getting the networking prize from Dr AnnMarie O'Donoghue

Photos taken by Andrew Unwin (Durham Chemistry)

Introducing: International / EU Postgrad Socials

The Chemistry Graduate School is always keen to consider ways to improve the experience of postgraduate students during their time in the Department.

Recent feedback has suggested that it might be beneficial for students from outside of the UK to have an opportunity to regularly meet with other international / EU students. We have a number of students from around the world who are currently studying in the Department, but as students may often be spread around different research groups, they may not all get an opportunity to meet one another.

Therefore, we have decided to introduce a regular opportunity for non-UK postgraduate students to meet up with each other in the Department. These informal socials will be approximately once a month with tea / coffee / biscuits provided. Please feel free to come along to chat to others who may have had similar experiences to you when moving to the UK and getting settled into postgraduate study.

The sessions have been scheduled as below. Further dates will be added later for the new academic year when new students will be arriving. If the sessions prove to be popular, it would be nice for them to be more student-led. All these sessions are on a Tuesday in room C/A122- no need to sign up, just come along:

- 16 May 10.45 - 11.30
- 20 June 15.00 - 15.45
- 25 July 10.45 - 11.30
- 22 August 15.00 - 15.45
- 19 September 15.00 - 15.45

New Arrivals

Congratulations to Gregg Addicott (Teaching Labs) and his wife Jenni on the birth of their son Jacob James (photo left) on 13 March, weighing 7lb 4oz.

Also congratulations to Jon Agirre and Saioa Urresti (both PDRAs in YSBL) on the birth of Luke Agirre (photo right), born in York Hospital on 14 April at 8.18, weighing a whooping 10lb 2oz.

First 'Equality and Diversity Lunchtime Forum' Held

'Work life balance: Is it possible to have a good work-life balance along with a successful career in academia?'

Dr Caroline Dessent, chair of the Equality and Diversity Group (EDG) hosted the first lunchtime discussion forum on 4 April. We met in the Quiet Room (C/A137) and it was a nice opportunity for those who had not visited before to see the room.

The informal discussion was an opportunity to share views and meet others in the Department who are interested in equality and diversity. It was great to see a real mixture of academic and support staff as well as graduate students come along. A number of people shared their experience of part-time working and it was very interesting to hear how individuals juggle work, family and health.

There were some great tips shared:

- Using an email plug-in like boomerang to avoid dealing with or sending emails out of hours.
- Getting better at saying 'no' for example taking some time to think about things instead of agreeing straight away or negotiating which other piece of work should be dropped when asked to do something.
- Setting your out of office on non-working days and turning off / using separate app for work emails so you are not tempted to check them on your days off.

We plan to hold Equality and Diversity Lunchtime Forum sessions once or twice a term and everybody is welcome to attend (staff and students); we will select a different topic each time. Please get in touch if you have ideas for future discussions and look out for the next session.

Recent articles on work-life balance:

https://www.theguardian.com/lifeandstyle/2014/nov/07/ten-tips-for-a-better-work-life-balance

http://www.bbc.co.uk/news/business-38607682

https://www.psychologytoday.com/blog/in-one-lifespan/201504/work-hours-work-life-conflict-and-well-being-in-academics

- Leonie Jones

Chemical *Inter*Actions

Chemical *Inter*Actions is a society within the Department of Chemistry at York open to all staff and students. The society aims to create an inclusive atmosphere, provide opportunities for people to get to know each other and to celebrate the diversity of the Department by running regular events for all. The RSC has been very generous in supporting our events, enabling us to run these events in the last year:

Networking Event: *Develop your elevator pitch and speed networking session*

Professor Sir John Holman, RSC President: *A Career Teaching Chemistry to Young and Old*

Dr Jonathan Lawson, Cancer Research UK: *More than Research: Alternative Jobs in Science*

Dr Dominique Young, University of California: *A post-doc in the USA*

Dr Calvin Smith and Dr Joy Singarayer, University of Reading: *Introducing Unconscious Bias to Undergraduates* including networking lunch to share good practice.

Professor Elena Rodriguez-Falcon, University of Sheffield: *Yes #ILookLikeAnLGBTEngineer...but I am much more!*

International Picnic: Bring food from your region or home country, celebrate the diversity of staff and students in the Department.

Professor Dave Smith, University of York: *Raising your Profile: Professional Scientific Networking Skills in the Internet Age*

The group is run by volunteers within the Department including staff and students, but as people come and go we would always welcome new members to join the team to offer ideas for future events and / or some help in organising them. It does not have to be an onerous task; staff support is there so you would not be expected to arrange large events on your own. We are just looking for ideas and enthusiasm!

The group is open to everyone – staff and students in all categories. If you would like to find out more, please email the group at chemical-interactions-group@york.ac.uk.

March for Science

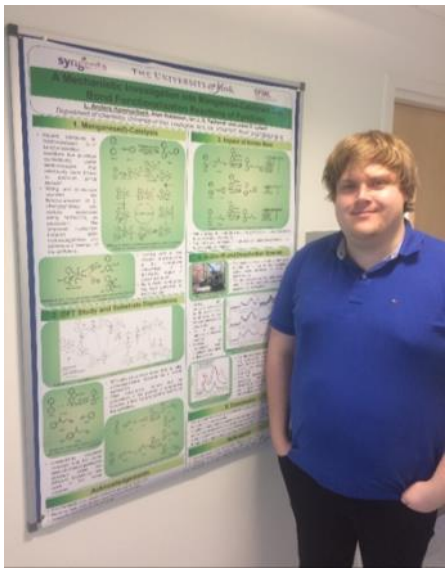
Dr Meghan Halse and Professor Robin Perutz joined the March for Science in London on Saturday 22 April which wound its way from the South Kensington Museums to Parliament Square via Piccadilly and Whitehall. This was one of many marches that took place across the world both to celebrate the success of science and to protest at policies that fly in the face of established scientific evidence. We departed under the gaze of visitors to the Science Museum on one side and the Church of Latter Day Saints on the other. The marches were endorsed by major scientific organisations such as the American Association for the Advancement for Science. We were pleased that there was a strong diversity message both about gender diversity and international diversity in the speeches by science communicators such as Helen Czerski and Robin Ince. The March for Science received a good deal of media attention and let's hope the message got through that the world needs solutions based on science. Do you know of any other Yorkies who went on the march in London or the one in Manchester?

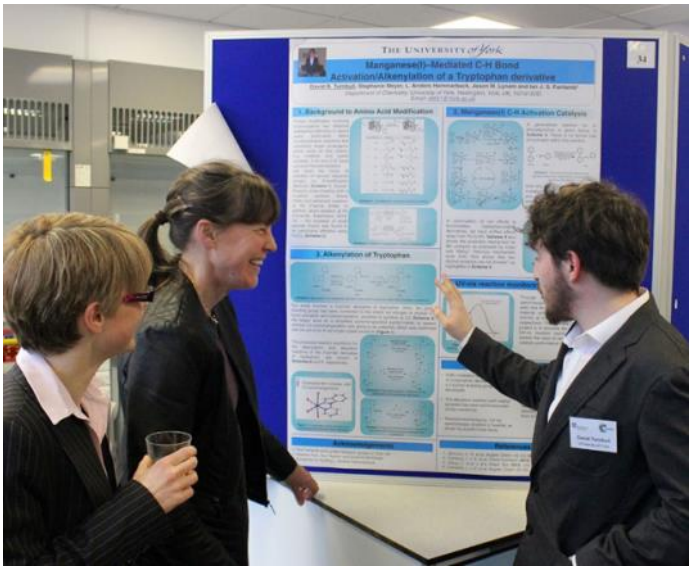
- Professor Robin Perutz

Manganese C-H Bond Activation Chemistry Gathering Momentum in York

In April, Anders Hammarback (year 2 PhD student), from the Fairlamb and Lynam groups (project sponsored by EPSRC/Syngenta CASE), won a poster prize (photo left) at the Physical Organic Chemistry Conference held at Astra-Zeneca in Macclesfield (UK). Well done Anders!

In March, David Turnbull (MScR student) from the Fairlamb group won first prize at the Royal Society of Chemistry Organic Regional Meeting at Durham University for his poster (photo right) entitled "Manganese(I)–Mediated C-H Bond Activation/Alkenylation of a Tryptophan derivative". Well done David!





New Starters

Adam Vaughan, WACL PDRA with JDL
Room: A029/A031; Extension: 4758; Email: adam.vaughan@york.ac.uk

Dr Joyashish Debgupta, PDRA with RED
Room: E014; Extension: 4587; Email: joyashish.debgupta@york.ac.uk

Dr Mike Newland, WACL PDRA with ARR
Room: WACL/G116; Extension: 4759; Email: mike.newland@york.ac.uk

Leavers

Catherine Jardine (YSBL Group Administrator) has moved to a new job in the Research & Enterprise Office.

Eliza Bonello (HR Administrator) has moved to a new job in Learning & Development / HR.

Elizabeth Wells (YSBL Admin Assistant) is moving to a new job with the Civil Service.

We wish them all well with their new ventures!

Polymers for providing tools in regenerative medicine and for combating antimicrobial resistance

An evening lecture organised jointly by the
Royal Society of Chemistry, Central Yorkshire Section and the
Royal Society of Biology, Yorkshire Branch

to be given by

Professor Stephen Rimmer

Head of School of Chemistry and Forensic Sciences,
University of Bradford

Wednesday 17th May 2017
in the Chemistry Department, University of York,
room A122 at 19.00 hrs

Functional polymers are important tools in regenerative medicine, cell culture, protein purification/analysis and more recently in the fight against antibiotic resistance. The lecture will show how stimulus responsive polymers are synthesised and how they have been used by us to purify recombinant proteins and to manipulate and of culture human cells. Similar polymers have been applied by us to develop new cost effective detection systems for microbial infections. Finally, the talk will describe results showing how hydrogel functional polymers can be used to produce selective substrates for cell culture that only support epithelial cells.

Light refreshments will be available from 18.00. There is no charge for admission or refreshments but prior registration is requested.

Further details from Dr Brian Grievson, Department of Chemistry, University of York, Heslington, York, YO10 5DD. Tel: (01904) 324543 e-mail: brian.grievson@york.ac.uk

Royal Society of Biology
Registered Charity Number: 277981
www.rsb.org.uk/regional-activity/england/yorkshire

Royal Society of Chemistry
Registered Charity Number: 207890
www.rsc.org

Green Manufacturing for the 21st Century Chemical Industry:

Case studies, methodologies and tools

24th May 2017 10:00 - 17:00

Green Chemistry Centre of Excellence, Department of Chemistry, University of York, UK

Increasing demand for chemicals worldwide, depleting resources, stricter legislation and the rising cost of waste disposal are placing increasing pressure on the chemical and related industries. For any organisation to survive in the current climate, the issue of sustainability must be fundamental to the way it operates.

This **free workshop** provides an exciting opportunity to gain advice and scientific expertise, explore a broad range of cutting-edge case studies on green chemical manufacturing and learn about the methodologies and tools available to facilitate practical solutions. The workshop is open to all with an interest in the future of sustainable manufacturing.

The programme for the day includes:

- Industrial case studies across a broad range of the manufacturing spectrum including **Croda International plc, Thomas Swan & Co. Ltd, GlaxoSmithKline plc** and **Biome Bioplastics Ltd**
- Insight into Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050
- Drivers for change including the Business Case for Green and REACH
- Guidance on the transition to green manufacturing and circular economy
- Design and selection of greener solvents
- Platform Molecules: Using the Diverse Functionality of Bio-derived Building Block Chemicals for the Synthesis of Polymer and Solvents
- Online learning resources and associated tools including metrics and solvent selection
- Opportunities for knowledge transfer, discussion and networking

A one-day symposium on greener and more sustainable chemical manufacturing co-organised by CHEM21, the Chemical Industries Association and the Green Chemistry Centre of Excellence

Register your place for free by Wednesday 17th May 2017 at https://greenmanufacturing21.eventbrite.co.uk

CHEM21 is Europe's largest public-private partnership dedicated to the development of manufacturing sustainable pharmaceuticals and brings together six pharmaceutical companies (GlaxoSmithKline, Bayer, Janssen, Orion, Pfizer and Sanofi), 13 Universities and four small to medium enterprises from across Europe (www.chem21.eu). CHEM21 has received funding from the Innovative Medicines Initiative Joint Undertaking under grant agreement n°115360, resources of which are composed of financial contribution from the European Union's Seventh Framework Programme. (FP7/2007-2013) and EFPIA companies' in kind contribution. www.imi.europa.eu

WORLD FOODWASTE NETWORK

TRANSNATIONAL COOPERATION FOR RESPONSIBLE PRODUCTION FROM FOOD WASTE

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worldfoodwaste.org

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IT'S FREE TO BE A MEMBER

The World Food Waste Network facilitates the interactions of researchers and industry contacts across multiple disciplines including chemistry, biology, biotechnology, food technology and engineering in order to form a pool of experts aiming to develop the use of food supply chain waste for bio-chemicals, bio-materials and bio-fuels.

They work together on **over 120 different types of food waste** in the following areas: **Pre-treatment and Extraction; Bioprocessing; Chemical Processing; and Technical and Sustainability Assessment.**

@WorldFoodWaste

info@worldfoodwaste.org

GERMINATION OF THE NETWORK

In 2012 the Bio-waste Industrial Symbiosis Network (BIS) was initiated. It connected researchers and industry contacts who were aiming to develop the use of food supply chain waste for bio-chemicals, bio-materials and bio-fuels. In 2013 EU COST Action funding was awarded to BIS to facilitate a European-wide approach to developing sustainable valorisation chains for food waste. This network evolved into the World Food Waste Network in 2017.

COST is supported by the EU Framework Programme Horizon 2020.

The World Food Waste Network is based upon work from COST Action TD1203 FOOD WASTE VALORISATION FOR SUSTAINABLE CHEMICALS, MATERIALS & FUELS (EUBIS), supported by COST (European Cooperation in Science and Technology).

COST (European Cooperation in Science and Technology) is a pan-European intergovernmental framework. Its mission is to enable break-through scientific and technological developments leading to new concepts and products and thereby contribute to strengthening Europe's research and innovation capacities. It allows researchers, engineers and scholars to jointly develop their own ideas and take new initiatives across all fields of science and technology, while promoting multi- and interdisciplinary approaches. COST aims at fostering a better integration of less research intensive countries to the knowledge hubs of the European Research Area. The COST Association, an International not-for-profit Association under Belgian Law, integrates all management, governing and administrative functions necessary for the operation of the framework. The COST Association has currently 36 Member Countries.