Newsletter

December 2021

Network Updates

The Carbon Recycling Network: is one of 6 BBSRC NIBB Phase II Networks. The network will promote those aspects of carbon recycling that support the re-use and exploitation of single carbon (C1) greenhouse gases, CO, CO_2 and CH_4. The focus is on gas fermentation, primarily using chemoautotrophs, and seeks to explore the potential of anaerobic digestion (AD) as a gas fermentation feedstock generator. The Network provides a cross-sector forum with the goals to foster and enhance collaboration between industry and academia; develop skills and expertise; share best practice; define common research priorities; and target funding opportunities in this area.

Progress: Our membership continues to grow and currently stands at 600 with 97 from Europe and 58 International, including: USA, India, & Brazil. We have 729 followers on Twitter. To date, we have funded 8 Proof of Concept awards (POCs) and 1 Business Interaction Voucher (BIVs). Over the past year we have a hosted an online international conference, two policy workshops, x4 outreach activities and held an RRI workshop.

Network Funding

BUSINESS INTERACTION VOUCHERS - OPEN

UKRI-BBSRC NIBB Business Interaction Vouchers up to **£10K, 100% costed** will be used to encourage and support collaboration between academic partners and industrial partners **within the** Carbon Recycling Network framework**.** They will be awarded to undertake a defined piece of work by the academic partner for the industrial partner. The industrial partner will be expected to at least match the value of the awarded voucher, either through a cash or in-kind contribution.
Grant awardees will have to submit a final expenditure claim upon completion of their BIV, and BBSRC will then release the funds to the NIBB RO at the next available quarterly pay run.

This is an open call - there is no deadline to apply

UP TO £10K PER VOUCHER, 100% COSTED

All participants named on the application **must be members of The Carbon Recycling Network** and **based in the UK**

To apply for a BIV, visit: https://carbonrecycling.net/funding-opportunity/

New collaborations and those aiming to move research up the Technology Readiness Levels will be prioritized. Individual BIV projects should last no longer than **6 months** and the project must begin within **3 months** of receipt of the offer letter.

THE CARBON RECYCLING NETWORK

UKRI Biotechnology and Biological Sciences Research Council

Other Funding Calls

Industrial Biotechnology (IB) Funding round-up:

https://ktn-uk.co.uk/news/industrial-biotechnology-funding-round-up

UKRI: Funding round up:

https://www.ukri.org/opportunity/

CO2 Removal Hub (CO2RE Hub) Pathfinders Call 1 **18 January 2022**

IBioIC Funding:

PhD Funding Call IBioIC Open Call for 2022 PhD Projects **12 December 2021**

Two 50% funded and four 80% funded studentships are available via application from HEI's across Scotland

ERC 2022 Call deadlines

Starting Grant – 13 January 2022; Consolidator Grant – 17 March 2022; Advanced Grant – 28 April 2022

FEMS Research and Training Grants **1 January 2022**

European Horizon Funding:

Horizon: Europe Sustainable biodegradable novel bio-based plastics: innovation for sustainability and end-of-life options of plastics **15 February 2022**

Funding from other NIBBs:

BBNET Business Interaction Vouchers (BIVs) **Open Call**

EBNET Travel Bursary

E3BNET BIV Call **19 January 2022**

Algae-UK: Developing the (UK) roadmap for industrial applications of algae for food and novel food ingredients **21 January 2022**

Biomass Policy Fellow Update

By Joanna Sparks

Over the past couple of months, I have been gathering input from Carbon Recycling Network members to inform our ongoing policy engagement. We ran a Carbon Recycling Network policy workshop, and a policy session for ECRs along with BBNet, the High Value Biorenewables Network, and the Supergen Bioenergy Hub. Network members have also been making use of a mural page (online discussion board) to input on various policy related questions. Some of the key messages coming out of these discussions are listed here:

- The discussions included C1 gases from biological and non-biological processing of biomass, as well as glue gases and gases from DAC.

- Many different products can be made, including high value chemicals, feed, and fuels, but it was suggested that making platform chemicals or intermediates could be a priority, as these could then be converted into many different products.
- The sector could deliver many benefits such as carbon savings, alternative carbon sources for manufacturing, jobs, resource security, and new products, but we need data/ evidence to back these claims up.
- Barriers to the development of the sector include technical barriers, but also lack of investment/ support for scale up, cost, lack of awareness outside the sector, and lack of incentives for C1 gas utilisation.

If you think there is something missing from this or you disagree with one or the points, then please add them to the mural page *here* or drop me an email on j.sparks@aston.ac.uk. It is also really important that we have examples and evidence to back up what we are saying, so please feel free to suggest reports or literature we can use for this (there is a link in the mural page). The input and evidence members of the Carbon Recycling Network are providing will be essential for informing our policy engagement, in particular our regular conversations with policy makers, and two pieces of work we have planned on bio-based products and carbon recycling.

Network Engagement

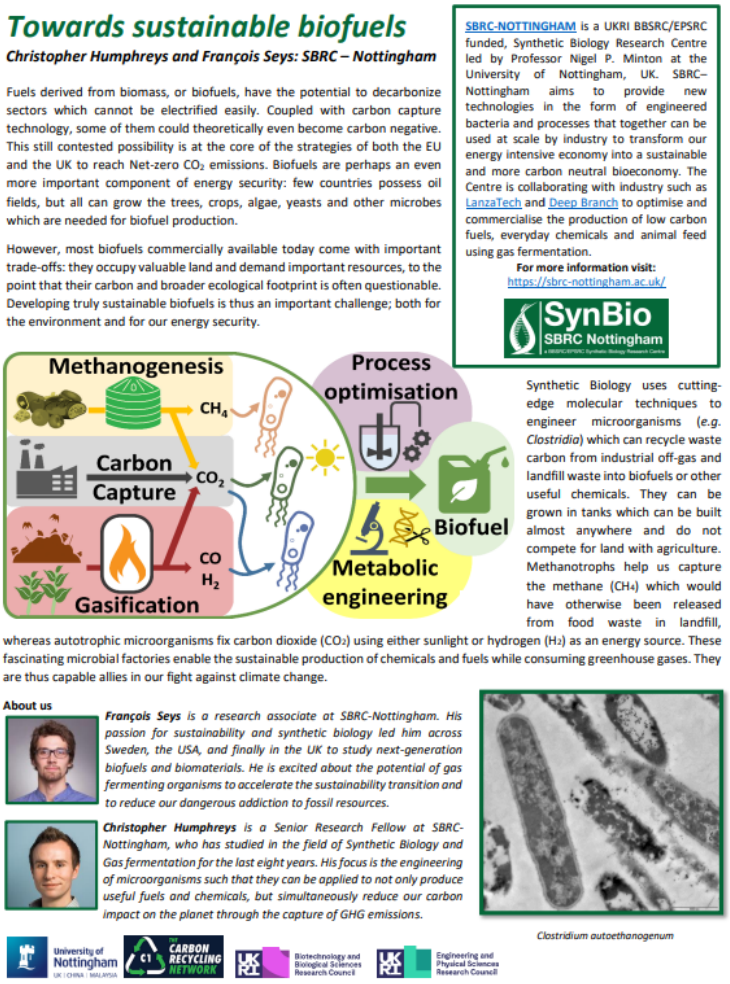
Early Career Researchers write articles for New Scientist Magazine

To coincide with COP26, we invited some of our Network's Early Career Researchers to write a one page article for publication in New Scientist Magazine during November to coincide with COP26, a PDF of the articles published can be found below:

Towards sustainable biofuels

by Christopher Humphreys and François Seys

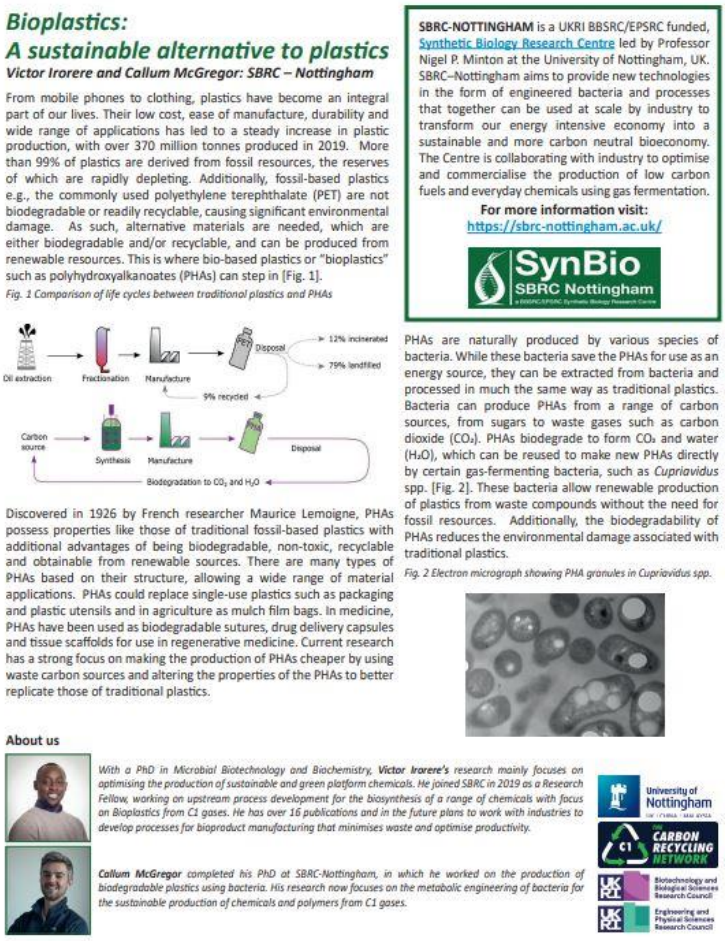
'Synthetic Biology uses cutting edge molecular techniques to engineer microorganisms (e.g. Clostridia) which can recycle waste carbon from industrial off-gas and landfill waste into biofuels or other useful chemicals'



Bioplastics: A sustainable alternative to plastics

by Victor Irorere and Callum McGregor

'Alternative materials are needed, which are either biodegradable and/or recyclable, and can be produced from renewable resources. This is where bio-based plastics or "bioplastics" such as polyhydroxyalkanoates (PHAs). PHAs are naturally produced by various species of bacteria. While these bacteria save the PHAs for use as an energy source, they can be extracted from bacteria and processed in much the same way as traditional plastics'.



Bioplastics:
A sustainable alternative to plastics

Victor Irorere and Callum McGregor: SBRC – Nottingham

From mobile phones to clothing, plastics have become an integral part of our lives. Their low cost, ease of manufacture, durability and wide range of applications has led to a steady increase in plastic production, with over 370 million tonnes produced in 2019. More than 99% of plastics are derived from fossil resources, the reserves of which are rapidly depleting. Additionally, fossil-based plastics e.g., the commonly used polyethylene terephthalate (PET) are not biodegradable or readily recyclable, causing significant environmental damage. As such, alternative materials are needed, which are either biodegradable and/or recyclable, and can be produced from renewable resources. This is where bio-based plastics or "bioplastics" such as polyhydroxyalkanoates (PHAs) can step in [Fig. 1].

Fig. 1 Comparison of life cycles between traditional plastics and PHAs

Discovered in 1926 by French researcher Maurice Lemoigne, PHAs possess properties like those of traditional fossil-based plastics with additional advantages of being biodegradable, non-toxic, recyclable and obtainable from renewable sources. There are many types of PHAs based on their structure, allowing a wide range of material applications. PHAs could replace single-use plastics such as packaging and plastic utensils and in agriculture as mulch film bags. In medicine, PHAs have been used as biodegradable sutures, drug delivery capsules and tissue scaffolds for use in regenerative medicine. Current research has a strong focus on making the production of PHAs cheaper by using waste carbon sources and altering the properties of the PHAs to better replicate those of traditional plastics.

SBRC-NOTTINGHAM is a UKRI BBSRC/EPSRC funded, Synthetic Biology Research Centre led by Professor Nigel P. Minton at the University of Nottingham, UK. SBRC–Nottingham aims to provide new technologies in the form of engineered bacteria and processes that together can be used at scale by industry to transform our energy intensive economy into a sustainable and more carbon neutral bioeconomy. The Centre is collaborating with industry to optimise and commercialise the production of low carbon fuels and everyday chemicals using gas fermentation.

For more information visit:
https://sbrc-nottingham.ac.uk/

SynBio SBRC Nottingham

PHAs are naturally produced by various species of bacteria. While these bacteria save the PHAs for use as an energy source, they can be extracted from bacteria and processed in much the same way as traditional plastics. Bacteria can produce PHAs from a range of carbon sources, from sugars to waste gases such as carbon dioxide (CO_2). PHAs biodegrade to form CO_2 and water (H_2O), which can be reused to make new PHAs directly by certain gas-fermenting bacteria, such as *Cupriavidus* spp. [Fig. 2]. These bacteria allow renewable production of plastics from waste compounds without the need for fossil resources. Additionally, the biodegradability of PHAs reduces the environmental damage associated with traditional plastics.

Fig. 2 Electron micrograph showing PHA granules in Cupriavidus spp.

About us

*With a PhD in Microbial Biotechnology and Biochemistry, **Victor Irorere's** research mainly focuses on optimising the production of sustainable and green platform chemicals. He joined SBRC in 2019 as a Research Fellow, working on upstream process development for the biosynthesis of a range of chemicals with focus on Bioplastics from C1 gases. He has over 16 publications and in the future plans to work with industries to develop processes for bioproduct manufacturing that minimises waste and optimise productivity.*

***Callum McGregor** completed his PhD at SBRC-Nottingham, in which he worked on the production of biodegradable plastics using bacteria. His research now focuses on the metabolic engineering of bacteria for the sustainable production of chemicals and polymers from C1 gases.*

University of Nottingham
C1 Carbon Recycling Network
Biotechnology and Biological Sciences Research Council
Engineering and Physical Sciences Research Council

Upcoming Events

KTN Events

Full round up

E3B Metals in Biology: Nuclear Magnetic Resonance Facility (Warwick University)

12 January 2022

Biochemical Society: Computational Enzymology: Structure, Function and Evolution of Enzymes

3 February 2022

E3B: An Introduction to Innovate UK/UKRI Funding

15 February 2022

World Biogas Expo

2-3 March 2022, NEC Birmingham

Global Research and Innovation in Plastics Sustainability conference (GRIPPS)

Online, 15-17 March 2022. Abstract by 3 December 2021

SfAM: Early Career Scientist Research Symposium 2022

30 March 2022, Cardiff

Microbiology Society Annual Conference 2022

4 – 7 April 2022, Belfast

Jobs and Training

IChemE: Practical Process Engineering

7 March 2022

National Horizons Centre

Full list of training courses

Find a PhD

Full list of opportunities available

The Final Word

BBSRC Impact Showcase 2021

In 2021, BBSRC, part of UK Research and Innovation (UKRI), invested £489 million in world-class bioscience. This collection of stories highlights the different types of impact that have been realised throughout the year, introducing some of the researchers and innovators who have made

this happen.

The stories include examples such as:

- a new test for COVID-19
- sustainable food production technologies
- cleaner and greener biomanufacturing processes
- the application of AI to solve grand biological challenges

Read the BBSRC Impact Showcase 2021

BBSRC ICURe Lean Launch

Secure your place on the pilot **BBSRC** ICURe Lean Launch programme! The leading online pre-accelerator in collaboration with **Innovate UK** to help biosciences researchers and technicians validate their business ideas.

Sign up: https://bit.ly/bbsrcuk

- Create real-world impact.
- Attend expert training from the excellent **David Bland** and **Stephen Chambers**
- Expand existing skillset into marketing and business.
- Explore new funding opportunities.
- Gain access to follow-on support and training in Investor Readiness, Licensing and other programmes.

BBSRC ICURe Lean Launch trains, funds, and supports UK research teams to determine whether there is a market for products or services that utilise their bioscience-based ideas, research, science, and technologies. Up to £3,700 of funding is available to 'get out of the lab' and validate commercially promising biosience ideas in the marketplace.

BBSRC ICURe Lean Launch is open to research teams in all UK universities, BBSRC-funded institutes and approved public sector research enterprises (PSREs).

Apply before **28th January 2022**

Contact

If you would like to share a story in the **next newsletter** please contact:

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