

Responsible Innovation: Industrial Biotechnology and Engineering Biology

Monday, 25 January 2021
10:30am - 2pm GMT



The ENGICOIN project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 760994.



Contents

Introduction	3
Programme	4
Convenors and Speakers	6

Introduction

Responsible Innovation: Industrial Biotechnology and Engineering Biology

*An online event hosted by the **Carbon Recycling Network**, the **Nottingham BBSRC/EPSRC Synthetic Biology Research Centre**, and the **ENGICOIN** project, in collaboration with the **Institute for Science and Society**, University of Nottingham.*

Dear Participant,

Thank you for registering for Responsible Innovation: Industrial Biotechnology and Engineering Biology. We are delighted that you can join us and we look forward to welcoming you on Monday!

This pack includes:

- The final programme
- The convenors' and speakers' short biographies
- A list of participants [redacted in public version]

The event brings together the **BBSRC Networks in Industrial Biotechnology and Bioenergy**, the wider synthetic biology, industrial biotechnology and responsible innovation communities, and eminent speakers from across disciplines and sectors to explore current developments, challenges and opportunities for responsible innovation in industrial biotechnology and engineering biology.

Responsible innovation, also known as responsible research and innovation (RRI), has rapidly become an important mode of research and innovation governance and practice, aiming to more closely align science and technology with societal and environmental values, needs and priorities. Research funders in the UK, the EU and beyond increasingly require that research and innovation projects, training programmes and institutions include RRI in their activities. RRI is also becoming an important governance framework in **private sector contexts**. Meanwhile, changes are underway in synthetic biology governance, funding and research in the UK, the US and beyond, including an ongoing shift towards **engineering biology**.

The event aims to introduce RRI and related practices in industrial biotechnology and synthetic biology, to consider the shift towards engineering biology, and to explore future prospects for these fields.

We look forward to any questions or comments you wish to make! If you use social media, the event hashtag is **#RRIEngBio** and please include the twitter handle **@CRecycle_Net**.

Thank you for your interest and we hope that you enjoy the event!

- **Eleanor Hadley Kershaw**, Senior Research Fellow, Synthetic Biology Research Centre – Nottingham
- **Louise Dynes**, Network Manager, The Carbon Recycling Network
- **Nigel Minton**, Director, Synthetic Biology Research Centre and The Carbon Recycling Network
- **Dimitris Papadopoulos**, Director, Institute for Science and Society

Programme

Part 1: Responsible Research and Innovation in Industrial Biotechnology and Synthetic Biology			
Time (GMT)	Speaker	Topic	
10:25-10:30	<i>Joining time</i>		
10:30-10:32	Nigel Minton, Synthetic Biology Research Centre, University of Nottingham	Welcome & opening words	
10:32-10:50	NIBB Directors: <ul style="list-style-type: none"> - Saul Purton, Algae-UK - Simon McQueen Mason, BBNet - Nigel Minton, Carbon Recycling Network - Nigel Robinson, E3B - Sonia Heaven, EBNet - Ian Graham, HVB 	Introduction to BBSRC Networks in Industrial Biotechnology and Bioenergy <ul style="list-style-type: none"> - Algae-UK: Exploiting the algal treasure trove - BBNet: Biomass Biorefinery Network - Carbon Recycling Network: Converting waste derived GHG into chemicals, fuels and animal feed - E3B: Elements of Bioremediation, Biomanufacturing & Bioenergy: Metals in Biology - EBNet: Environmental Biotechnology Network - HVB: High Value Biorenewables Network 	
10:50-11:05	Phil Macnaghten, Professor in the Knowledge, Technology and Innovation Group, Wageningen University	Responsible Innovation: Translating Research Policy into Research Practice	
11:05-11:10	Q&A	Q&A	
11:10-11:45	Eleanor Hadley Kershaw, Senior Research Fellow in RRI, SBRC-Nottingham	Work to date in Responsible Research & Innovation, Industrial Biotechnology and Synthetic Biology	Responsible Research and Innovation in the Synthetic Biology Research Centre - Nottingham
	Lotte Asveld, Assistant Professor in Biotechnology and Society, TU Delft		Responsible Innovation for synbio companies: lessons learned
	Joyce Tait, Co-Director of Innogen Institute, University of Edinburgh		Helping Companies to Innovate Responsibly
	Neil Parry, Research Programme Director, Biotechnology & Biosourcing, Unilever		Unilever "Clean Futures" and sustainable sourcing of ingredients through Biotechnology
11:45-12:00	Q&A / discussion	Q&A / discussion	
12:00-12:30 Lunch break			

Programme

Part 2: Futures of Engineering Biology and Responsible Innovation		
Time (GMT)	Speaker	Topic
12:30-12:32	Dimitris Papadopoulos, Institute for Science and Society, University of Nottingham	Welcome back
12:32-12:42	Rowan McKibbin, Associate Director: Frontiers and Foundations, BBSRC	Background and information on the National Engineering Biology Programme
12:42-12:52	Lionel Clarke, Co-Chair of the Engineering Biology Leadership Council	The EBLC perspective on the transition from Synthetic Biology to Engineering Biology
12:52-13:00	Q&A	Q&A
13:00-13:35	Susan Molyneux-Hodgson, Professor of Sociology, University of Exeter	Thoughts on the transition from Synthetic Biology to Engineering Biology, and provocations on future possibilities for Engineering Biology, Industrial Biotechnology and Responsible Innovation
	Nigel Minton, Director, SBRC-Nottingham	
	Sean Simpson, Co-Founder and Chief Scientific Officer, LanzaTech	
	Megan J. Palmer, Executive Director of Bio Policy & Leadership Initiatives, Stanford University	
13:35-13:57	Open discussion	
13:57-14:00	Eleanor Hadley Kershaw and Dimitris Papadopoulos	Closing words

Convenors



Eleanor Hadley Kershaw

Senior Research Fellow in Responsible Research and Innovation, University of Nottingham

Eleanor Hadley Kershaw is Senior Research Fellow in RRI in the Synthetic Biology Research Centre at the University of Nottingham, where she leads a programme of social science research across several UKRI- and EU-funded projects. Her expertise spans science and technology studies and environmental humanities, with interests in science and innovation governance, sustainability, and multispecies relations. In 2015 she was a visitor at the Harvard Program on Science, Technology and Society, and from 2006-2012 she was a writer and project manager with various international arts and research policy organisations, including the International Social Science Council. She holds a PhD in Science and Technology Studies from the University of Nottingham and an MA in English from the University of Cambridge.



Professor Dimitris Papadopoulos

Director, Institute for Science and Society, University of Nottingham

Dimitris Papadopoulos is Professor of Science, Technology and Society and Director of the Institute for Science and Society at the University of Nottingham. He is also the founding director of EcoSocieties, one of the University of Nottingham's Interdisciplinary Research Priority Clusters. Papadopoulos is currently a Leverhulme Fellow and has been an Alexander-von-Humboldt Fellow in the Office for History of Science and Technology, University of California Berkeley. He is currently completing a monograph on Chemical Societies and Reparative Justice and his most recent book is *Reactivating Elements: Substance, Actuality and Practice from Chemistry to Culture* (Duke University Press, 2021). www.nottingham.ac.uk/sociology/people/dimitris.papadopoulos



Louise Dynes

Network Manager, The Carbon Recycling Network

Louise is the Network Manager for The Carbon Recycling Network – UKRI BBSRC Network in Industrial Biotechnology & Bioenergy (Phase II NIBB). Her role involves managing an international network of academia and industry to encourage the growth of Industrial Biotechnology. Louise has over 10 years' experience of event & project management, including extensive experience of managing and organising outreach events to a range of different audiences. Louise is a BSc graduate in Environmental Science with certificates in AXELOS Managing Successful Programmes - MSP® and PRINCE2®. She also holds a Level 3 Award in Leadership and Management (ILM).



Professor Nigel Minton

Director, Synthetic Biology Research Centre - Nottingham and The Carbon Recycling Network

Nigel has an international reputation for excellence in advanced molecular methods for the study and exploitation of microbial chassis. He is the Director of the BBSRC/EPSC Synthetic Biology Research Centre (SBRC) which seeks to engineer microbial chassis for the sustainable manufacture of chemicals, fuels and materials, with an emphasis on single carbon (C1) feedstocks. His research activity ranges from combating bacterial pathogens, through the development of novel cancer therapies to the sustainable production of chemicals and fuels from C1, C3 and C5/C6 feedstocks. A recent holder of holder of a Royal Society Wolfson Research Merit Award, is directly funded by a number of pharmaceutical companies and he is the PI on a wide range of grants awards, funded by the BBSRC (Newton, IB Catalyst, iCASE), Innovate_UK, NIH and Europe (HORIZON 2020, SNSF, ERA-CoBioTech). He has served on many national committees, is regularly invited to speak at international conferences and has filed 21 patents. He has supervised >40 PhD students, published >200 articles (ca.30,000 citations) and has an Google Scholar h-index of 65.

Speakers (in order of appearance)



Saul Purton
Professor of Algal Biotechnology,
University College London
Director, Algae-UK

Saul is Professor of Algal Biotechnology at University College London. His research focusses on the biology of the algal chloroplast, and the genetic engineering of microalgae and cyanobacteria for the production of novel products including vaccines, anti-microbials and bioactive metabolites. As Director of the Algae-UK NIBB, he leads efforts to create a thriving network of UK researchers and other stakeholders interested in the development of microalga, macroalgae and cyanobacteria as sustainable resources and industrial biotech platforms. <https://www.algae-uk.org.uk/>



Professor Simon McQueen Mason
Chair in Materials Biology, University of York
Director, BBNet: Biomass Biorefinery Network

Simon McQueen-Mason left school at 17, and worked in boat yards in Southern California, before returning to the UK as a professional fisherman, eventually owning his own boat. At 26 he returned to education, obtaining a 1st class honours degree in Biological Sciences from Portsmouth Polytechnic. He received a PhD in Plant Physiology from the Pennsylvania State University in 1993, and returned to the UK to take up a Royal Society University Research Fellowship at The University of York in 1994. In 2001 he became Chair of Material Biology in the Centre for Novel Agricultural Products (CNAP), at York, and served as CNAP Director from 2014- 2020. His research encompasses understanding the biosynthesis and mechanical properties of plant cell walls, and the use of waste biomass to produce low carbon fuels, chemicals and materials. He is currently Director of the BBSRC-funded Biomass Biorefinery Network (BBNet).



Nigel Robinson
Professor of Biomolecular Sciences, Durham
University
Director, E3B: Elements of Bioremediation,
Biomanufacturing & Bioenergy

Professor of Biomolecular Sciences, Department of Chemistry and Department of Biosciences, Durham University (2011 to the present day). Fellow of the Royal Society of Chemistry (2013). Professor of Genetics (Molecular Genetics) in the Medical School of Newcastle University (1994 to 2011). Royal Society University Research Fellowship, Durham and Newcastle Universities (1987 to 1995). Postdoctoral staff member and Postdoctoral Fellow (Natural Environment Research Council Fellowship and Directors-funded Fellowship) Los Alamos National Laboratory, USA (1984 to 1987). Liverpool University, UK, Ph.D. Biochemistry (1981-1984) and B.Sc. Life Science (1981).



Sonia Heaven
Professor of Environmental Engineering,
University of Southampton
Director, EBNet: Environmental Biotechnology
Network

Sonia Heaven is Professor of Environmental Engineering within Engineering and Physical Sciences at the University of Southampton, and Head of the Water and Environmental Engineering Group. She has worked on the EPSRC-funded SUE Waste programme, the EU FP6 CROGEN project, and the EU FP7 All-Gas project, and was coordinator of the EU FP7 project VALORGAS: Valorisation of food waste to biogas. She is a Chartered Civil Engineer with 7 years' experience in the UK water and wastewater industry, and while employed by Southampton she spent 7 years in central Asia working on a wide range of environmental problems. She is a Member of the Chartered Institution of Water and Environmental Management and of the Chartered Institution of Waste Management.

Speakers (in order of appearance)



Professor Ian Graham FRS
Director of BioYork
Chair of Biochemical Genetics
Director, HVB: High Value Biorenewables Network

Ian is Director of BioYork, and Weston Chair of Biochemical Genetics, with his research team in the Centre for Novel Agricultural Products, University of York. He is also Director of the BBSRC funded High Value Biorenewables Network (<https://www.highvaluebiorenewables.net>) and is a member of UKRI-BBSRC Council. His research interests focus on the plant natural products such as noscapine (anti-cancer compound), codeine and morphine (analgesics), and artemisinin (antimalarial drug). Ian won the Biochemical Society's 2017 Heatley Medal and Prize for 'exceptional work in applying advances in biochemistry, and especially for developing practical uses that have created widespread benefits and value for society'.



Lotte Asveld
Assistant Professor in Biotechnology and Society, TU Delft

Together with her **research group** Lotte Asveld studies the societal aspects of biotechnological innovations. Her main research interests concern responsible innovation in the field of biotechnology and synthetic biology. Current projects focus on questions about inclusion in global biobased value chains, safe-by-design for biotechnology and the sustainable use of waste as a resource. Who is responsible for the inclusion, safety and sustainability of biotechnological applications and how can this responsibility be organised fairly and effectively?



Phil Macnaghten
Professor in the Knowledge, Technology and Innovation Group, Wageningen University

Phil Macnaghten is Professor in the Knowledge, Technology and Innovation Group, Wageningen University and Research. He is an interdisciplinary social scientist working at the interface of science and technology studies, public engagement studies, governance of emerging technology, and responsible innovation. Over the last 10 years he has published >30 peer reviewed journal articles and >40 contributions to edited collections. With colleagues Richard Owen and Jack Stilgoe, Phil has been central to the conception, development, diffusion and institutionalisation of the discourse of responsible innovation, both in the UK and internationally, playing formative roles in the development of the UK research council EPSRC framework, in monitoring and evaluating its diffusion across research projects and programmes, and in its development both in Brazil and mainland Europe. <https://www.wur.nl/en/Persons/Philipprof.dr.-PM-Philip-Macnaghten.htm>



Professor Joyce Tait CBE FRSE, D.Univ (Open)
Co-Director of Innogen Institute, University of Edinburgh

Joyce Tait (Co-Director, Innogen Institute, University of Edinburgh) also holds an appointment at Edinburgh's Global Academy of Agriculture and Food Security. She has an interdisciplinary background and works on development strategies for innovative technologies, regulation and standards, and stakeholder influences. Recent research has explored how regulatory adaptation and creative use of standards can contribute to more effective translation of new discoveries to innovative technologies, particularly the development of a standard for responsible innovation. Recent appointments include the Regulatory Horizons Council, the Prime Minister's Council for Science and Technology, and the Synthetic Biology Leadership Council (and Chair of its Governance Subgroup).

Speakers (in order of appearance)



Neil Parry

Research Programme Director, Biotechnology & Biosourcing, Unilever

Dr Neil Parry is R&D programme Director Biotechnology and Biosourcing (group emphasis: 'new ingredients with superior performance sustainably sourced'). Obtained first class degree in Biology at Portsmouth University in 1993. Completed PhD in Industrial Biotechnology in 1996. In early roles in Unilever he worked on enzymes and protein technology for both the chemical businesses and the antibody company Unipath. In 2005 / 06 moved to the Unilever Port Sunlight R&D lab to lead the Biotechnology expertise and science area. In 2012, took on the R&D programme Director role leading Disruptive Sustainability Technologies. In 23 years at Unilever, has successfully commercialised a range of new ingredients with suppliers in Unilever's product portfolio. Awarded Unilever scientist of the year in 2016/17. Inventor on 45+ patents.



Professor Lionel Clarke OBE

Co-Chair, Engineering Biology Leadership Council

Co-chair of the UK Engineering Biology Leadership Council alongside Ministerial co-chair Lord Grimstone. Responsible for issuing the UK Synthetic Biology Roadmap (2012) and the Strategic Plan for UK Synthetic Biology 'Biodesign for the Bioeconomy' (2016). Contributor to the Royal Academy of Engineering report 'Engineering Biology' (2019). Member of the UK Bioeconomy Strategy Governance Group and actively engaged with numerous university programme advisory panels and company boards.

Director of bio-environmental consultancy 'BionerG', setup following a career in Shell, spanning research-to-deployment programmes ranging from the global phase-out of leaded gasoline through to the development of advanced biofuels.



Rowan McKibbin

Associate Director: Frontiers and Foundations, BBSRC

As Associate Director with responsibility for 'Frontiers and Foundations' within BBSRC, my role is to provide senior level strategic leadership and management across the Transformative Technologies, Rules of Life and Research Infrastructure sectors, as well as providing research oversight for BBSRC's responsive mode portfolio. These sectors play an important part in our mission to advance the frontiers of bioscience discovery and build strong foundations. Engineering Biology is a key component of the Transformative Technologies portfolio and cuts across many other areas of BBSRC and wider UKRI activity.



Susan Molyneux-Hodgson

Professor of Sociology and Associate Dean of Research, University of Exeter

Susan Molyneux-Hodgson is a sociologist of science, working in the field of science and technology studies (STS). Her overarching interest is in the everyday worlds of scientific work and how knowledge is produced through practices. She focuses primarily on communities of natural scientists and engineers - although intersections between those communities and the biorealm are increasingly prevalent. She has received funding from ESRC, NERC, EPSRC, BBSRC and InnovateUK and her research projects often include collaborations with scientists in academia and in industry. She is the University of Exeter Industrial Strategy Champion for the social sciences and works closely with colleagues in Innovation, Impact and Business (IIB) to ensure social sciences play a central role in all the University's work on industrial strategy, internally and externally.

<https://socialsciences.exeter.ac.uk/sociology/staff/molyneux-hodgson/>

Speakers (in order of appearance)



Sean Simpson

**Co-Founder and Chief Scientific Officer,
LanzaTech**

Sean Simpson is the Chief Scientific Officer and Cofounder of LanzaTech, the market leader in the commercialization of gas fermentation technology using steel mill off-gas for the production of low-carbon fuels that do not compromise food or land resources. Background in plant biochemistry and crop improvement. Over 20 publications and 400 patents in the field of gas fermentation.



Megan Palmer

**Executive Director of Bio Policy & Leadership
Initiatives, Stanford University**

Dr. Megan J. Palmer is the Executive Director of Bio Policy & Leadership Initiatives and an Adjunct Professor of Bioengineering at Stanford University. She leads integrated research, teaching and engagement programs to explore how biological science and engineering is shaping our societies, and to guide innovation to serve public interests. She currently co-chairs the World Economic Forum Global Future Council on Synthetic Biology. For the last ten years she has led programs in safety, security and social responsibility for the international Genetically Engineered Machine (iGEM) competition. Previous roles include Deputy Director of Policy and Practices for the multi-university NSF Synthetic Biology Engineering Research Center (Synberc) and Senior Research Scholar at the Center for International Security and Cooperation (CISAC) at Stanford.
<https://profiles.stanford.edu/meganjpalmer>