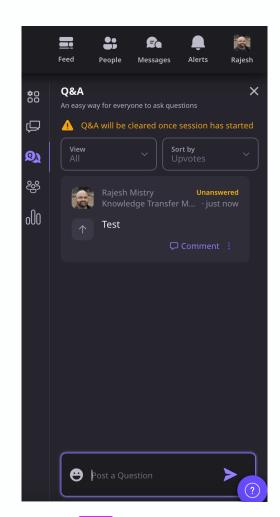
# Sustainable bio-based materials and manufacture- CR&D Competition Briefing

**Rajesh Mistry** 



### Housekeeping

- All participants are muted throughout the webinar
- Please use the Q&A function to submit questions to the panel
- Please use the chat box for any technical issues with sound/visuals etc.
- The webinar will be recorded and published online
- Through AirMeet you can direct message other delegates and hold (or schedule) one-to-one meetings
- Platform will be available to schedule meetings from 12:25 onward for ~24h. Direct Messaging will remain available throughout this period.
- Register your profile for a better networking experiance





### **Agenda for Today: 10:00 am – 13:00 am**

10:00 - 10:05 Welcome and Introduction (5 min) - Raj Mistry (Innovate UK KTN)

10:05 - 10:25 Overview of the Sustainable bio-based materials and manufacture: Collaborative R&D (CR&D) Competition (20 mins) - Paul Bello (Innovate UK); Rebecca Cheesbrough (EPSRC) & Rachel Harris (BBSRC)

10:25 - 10:50 Competition Process Recording (25 min) - Dawn Manser (Innovate UK)

10:50 - 11:15 **Panel Q&A** (25 min)

11:15 - 12:15 Quick fire Pitches (3 min each back -to-back)

12:15 - 12:20 Innovation Networks & Poll (5 min) - Michael Burnett (Innovate UK KTN)

12:20 - 12:25 Intro to AirMeet (5 min) - Raj Mistry (Innovate UK KTN)

12:25 - 13:00 Networking via. AirMeet

13:00 **Close** (Please note, networking may continue after the event is officially closed. AirMeet will remain open until 15:00 with fewer Innovate UK personnel available to answer any competition specific questions).







### **About Us**

**Innovate UK KTN** exists to connect **innovators** with new **partners** and new **opportunities** beyond their existing thinking - accelerating ambitious ideas into real-world **solutions**.



### **Innovate UK KTN - Key Information**

# Delivering key components of Sustainable Bio-based Materials and Manufacture Programme.

Future Activities (e.g. Innovation Networks)

### How can we support you?

- We can help innovators find new partners for their project proposal –
  we can facilitate introduction to key stakeholders across several
  sectors including Chem and IB, Materials and Manufacturing.
- We can also review draft proposals if you are new to IUK funding and provide guidance.







### Get in touch!

Unsure which funding opportunity is best suited for you? We warmly recommend joining the events, where our team will be able to support and advise you further

- Raj Mistry | Industrial Biotechnology | Rajesh.mistry@iuk.ktn-uk.org
- Dana Heldt | Synthetic Biology | Dana.heldt@iuk.ktn-uk.org
- Catherine Julia Mort | Industrial Biotechnology | catherine.mort@iuk.ktn-uk.org
- Michael Burnett | Chemistry | Michael.Burnett@iuk.ktn-uk.org
- Ajay Kapadia | Materials | Ajay.ikapadia@iuk.ktn-uk.org

Materials, Manufacturing, KTN Chem and IB Newsletter's – sign up!



## Introductions

### **Paul Bello**

Innovation Lead for Industrial Biotechnology, Innovate UK

### **Rachel Harris**

Senior Portfolio Manager, BBSRC

### Rebecca Cheesborough,

Portfolio Manager EPSRC





# Introduction to UKRI



# **UK Research and Innovation**

We work with the government to invest over £7 billion a year in research and innovation by partnering with academia and industry to make the impossible, possible. Through the UK's nine leading academic and industrial funding councils, we create knowledge with impact.



**UK Research** and Innovation



# **Background & Scope**



# Reimagining materials and manufacturing together Desired outcomes







**UK** being internationally competitive

## Three strategic imperatives



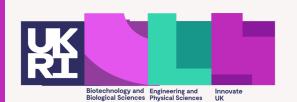
Net zero, resource efficient



Resilient, responsive



Technologically advanced, digital



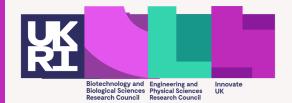
### Sustainable Bio-based Materials & Manufacture

### **CR&D** Competition

- Up to £12 million total funding
- Project costs between £300,000 and £1 million
- Project duration between 12 and 24 months



- Applications must be collaborative
- To lead a project your organisation must be a UK registered: business of any size, academic institution, research organisation, research and technology organisation (RTO);
- Applications must involve an SME
- For research organisations conducting fundamental research you could get funding for your eligible project costs of up to 50% of total project costs



#### **Definitions** (<u>UKRI</u>) **Industrial research**

This means planned research or critical investigation to gain new knowledge and skills. This should be for the purpose of product development, processes or services that lead to an improvement in existing products, processes or services.

It can include the creation of component parts to complex systems and may include prototypes in a laboratory or environment with simulated interfaces to existing systems, particularly for generic technology validation.

### **Experimental development**

'Experimental development' means acquiring, combining, shaping and using existing scientific, technological, business and other relevant knowledge and skills with the aim of developing new or improved products, processes or services.

This may also include, for example, activities aimed at the conceptual definition, planning and documentation of new products, processes or services.

Experimental development may comprise prototyping, demonstrating, piloting, testing and validation of new or improved products, processes or services in environments representative of real life operating conditions.

The primary objective is to make further technical improvements on products, processes or services that are not substantially set. This may include the development of a commercially usable prototype or pilot which is not necessarily the final commercial product and which is too expensive to produce for it to be used only for demonstration and validation purposes.

Experimental development does not include routine or periodic changes made to existing products, production lines, manufacturing processes, services and other operations in progress, even if those changes may represent improvements.

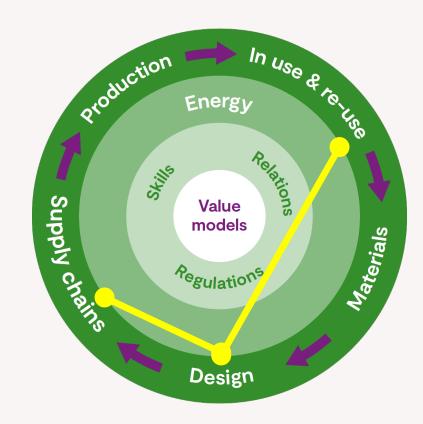


### √ Focus on the core areas

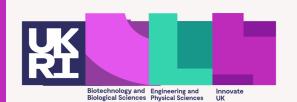
future economy materials
smart design
resilient supply chains
world-class production
longer in use & re-use

✓ Do not focus on the enabling areas

clean energy
proactive regulations
future skills
networked relations
evolving value models



- √ Join the dots
- ✓ Collaborations with academics, research organisations and (SMEs) particularly encouraged!



Projects **must** address the **challenge** of developing innovations in sustainable biomanufacturing processes. This can be by:

- increasing the use of bio-based feedstocks
- developing alternative bio-based chemical replacements
- enhancing the sustainability profile of biotechnology processes
- innovative use and re-use of renewable feedstocks
- biotechnology based manufacture processes for sustainable and circular products

Projects must focus on one or more of the following themes:

- improving extraction of existing bio-based feedstocks and optimising these processes
- using biological systems for developing alternatives to traditional manufacturing processes including processing and catalysis for sustainability
- the design and development of future advanced bio-products with improved or differentiated properties
- the discovery of novel or optimisation of enzymes to whole organisms for biomanufacturing
- securing value from waste streams
- improving manufacturability and consistency at scale and progressing the development and adoption of biotechnology across multiple manufacturing industries and sectors

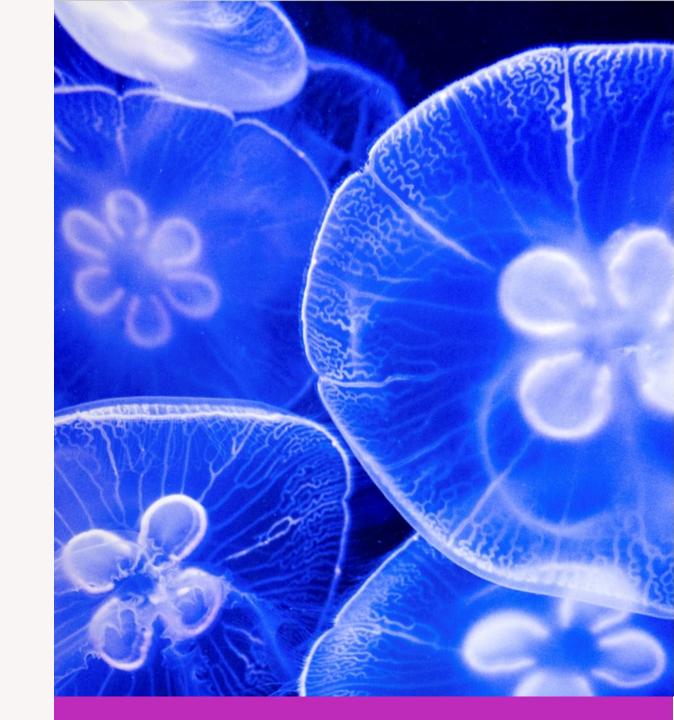
### Out of scope:

- focussed on enabling areas such as energy, regulations and policy, skills and relations
- focused on value models
- focused on incremental improvements of sustainable biomanufacture processes
- biopharmaceuticals for diagnosis or therapeutics, including recombinant protein,
   or nucleic acid-based vaccines or antimicrobials
- microbiomes towards human health therapeutics

### Out of scope (cont):

- sustainable aviation fuel
- alternate protein sources (food and beverage)
- carbon capture and storage technology, however the use of captured carbon as a feedstock is in scope

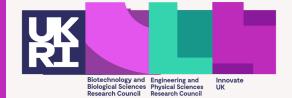
# Scope Q&A





# **Application submission**





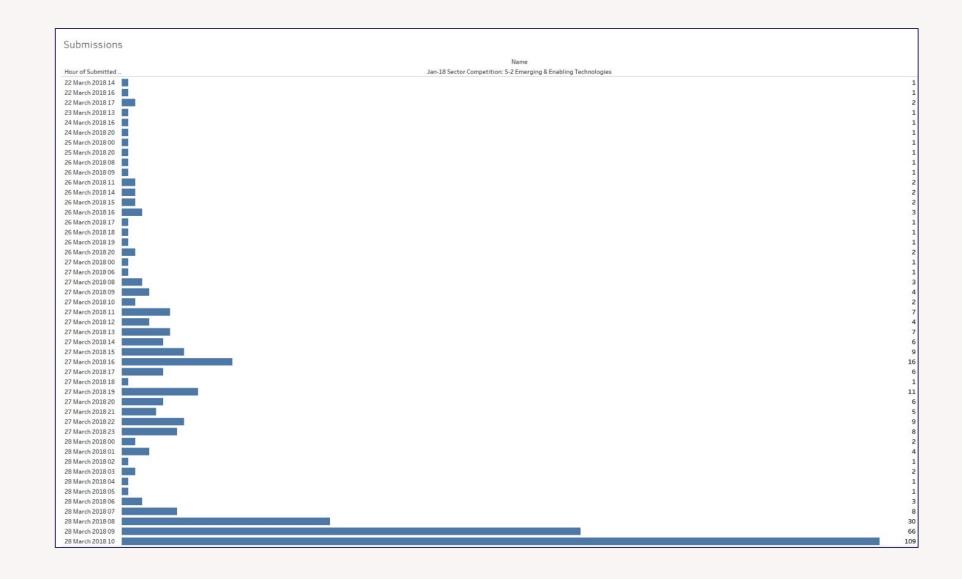
# Eligibility criteria and Innovate UK IFS submission process

\*\*A FULL recorded presentation will be provided separately to ALL registrants

Do's	Don't
<ul> <li>VIEW the recorded presentation</li> <li>Understand the competition eligibility, scope &amp;</li> </ul>	
remit HOLISTICALLY  • ENSURE all eligibility criteria required are met	<ul> <li>Forget to view the presentation!</li> </ul>
i.e. competition close date**, total project costs' maxima & financials, project duration, collaboration and partner types, resubmission, number of applications submitted, subsidy control, check	<ul> <li>Assume competition eligibility, scope &amp; remit</li> <li>'Cherry Pick' key scope words or theme/s to fit to your application</li> </ul>
<ul><li>READ and the application questions!</li><li>CONTACT us for any support</li></ul>	

## \*\*Submit your application early!

Customer Support can help resolve any issues you might have when submitting but only if they are contacted before the deadline.
Once the deadline has passed, your application cannot be submitted.





## **Available Support**

# Innovate UK Customer Support Services

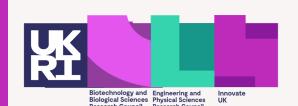
0300 321 4357 (Monday - Friday 9-5pm)

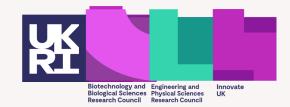
support@iuk.ukri.org

**BBSRC** 

Business.Unit@bbsrc.ukri.org







# Thank You

- @InnovateUK
- Innovate UK

in Innovate UK

@weareinnovateuk

**Sustainable Biobased Manufacturing and Materials:** 

**Quick Fire Pitch Presentations** 

**Rajesh Mistry** 



### **FlexSea**

Mattia Parati

m.parati@flex-sea.com

FlexSea develops seaweed derived home compostable bioplastics. Our technology revolves around solvent casting and extrusion, with both being patented. Differently from our competition we also valorise all waste fractions of our process

FlexSea supplies raw material and/or their technology to plastic manufacturers

FlexSea would like to collaborate with different institutions in order to displace a plastic product starting from the full seaweed. This will involve using hydrocolloids for extrusion pellets and valorising the rest of the biomass, to create a circular bioprocess.



Academics to improve/optimise:

- Extrusion
- Extraction of hydrocolloids Plastic companies:
- To provide a suitable product target, technical data sheet, access to injection moulding/testing facilities









## **Evolutor**

Joe Price

j.price@evolutor.bio

### What we do:

Using proprietary microbe evolution technology to develop powerful microbial strains to convert a wide range of feedstocks into bio-chemicals, fuels, materials and beyond.

### Where you sit in the supply chain?

Upstream from biomanufacturers. We develop and optimise biology through our Accelerated Evolution Platform.

### What is our project idea or innovation challenge:

- Evolving **existing microbial production** hosts to capture new, renewable feedstocks.
- Developing new microbial production systems to replace existing fossil-derived products.
- Evolving microbial systems for flexible feedstock
   use to increase supply chain robustness.

### Partner(s) required:

- Existing biomanufacturers wanting to explore the potential to use new feedstocks.
- Traditional manufacturers wanting to build new biomanufacturing processes.









## Manchester Metropolitan University

lan Ingram

i.ingram@mmu.ac.uk

#### What we do:

- Bio-based monomer and polymer synthesis
- Sustainable plastics additives (plasticisers, fillers, functional additives)
- Recycling and circular waste management
- Low-carbon fuels
- Additive manufacturing (PrintCity)
- Catalysis
- Microplastics research

Where you sit in the supply chain?: Innovation, research, knowledge transfer. Facilities include chemical/molecular characterisation, organic and inorganic synthesis, 3D printing, polymer processing, and materials testing.

What is our project idea or innovation challenge:

We are seeking partners to contribute innovative solutions and enable development of a number of novel concepts in sustainable materials and circular economy challenges. We aim to work with industry to transfer knowledge and skills between a network of participants to bring sustainable products to market for mutual benefit and that of the wider society.

Partner(s) required?: Yes!

If yes what type?:

Manufacturers for scale-up, compounders, processors and testing facilities, to deliver technical solutions. Along with providers for customers to develop a supply-chain, connecting a complete route to market for sustainable products.





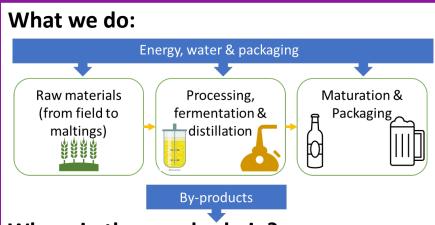




## ICBD, Heriot-Watt University

Jane White

j.white@hw.ac.uk



### Where in the supply chain?

Research at every stage:

- Water and energy use
- Climate resilience of manufacturing process
- Alternative materials and processes
- Product quality and stability
- Circularity of by-products and packaging

### What is our project idea or innovation challenge:

Innovation at any stage in supply chain including:

- Flavour development in distilled spirits and peat alternatives
- Bio-based materials for active packaging for beer and antimicrobial and stability impacts
- By-products as biobased feedstocks and valorisation of non-food components
- Molasses-based by-products and alternative processing

# Towing and Distilling

nternational Cen,







### Partner(s) required? Yes

Industry or academic partners including:

- Maltsters, brewers & distillers
- Fermentation specialists and yeast suppliers
- Agri-stream suppliers and surplus food stocks
- Packaging producers and bioactive components for use in beer packaging
- Equipment manufacturers including filtration and pasteurisation

## University of Suffolk – Life Sciences



Your Name: Dr. Nick Tucker

Email Address: <a href="mailto:nick.tucker@uos.ac.uk">nick.tucker@uos.ac.uk</a>

#### What we do:

#### **Chassis strain:**

- Selection
- Optimisation
- Characterisation.

### Our organisms:

- <u>Pseudomonas putida</u>
- Escherichia coli
- Saccharomyces cerevisiae

#### **Our Methods:**

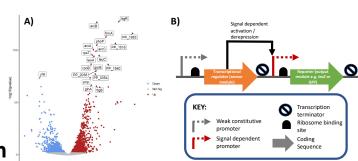
- Genomics
- Transcriptomics
- Bioinformatics

Where you sit in the supply chain?

R&D, Consulatnacy

What is our project idea or innovation challenge: **Every industrial bioprocess is different and must be optimised for:** 

- Feedstock
- Metabolic flux
- Product toxicity
- Product efflux
- Gene expression
- Biosensors







If yes what type?: Industrial, academic

- I have ten years experience working with the plastics & SynBio industries.
- Keen to interact with other sectors to understand their strain requirements.
- Can integrate with the Suffolk Sustainability
   Institute; Green infrastructure, sustainable
   communities, energy & resource management





### **Actemium Automation**

Steve McDermott

**Email Address** 

steve.mcdermott@actemium.co.uk



Pharmaceutical control systems for pilots and major plants. Digital models at early stages of the process design

Where you sit in the supply chain?

Supplier and consultant to the Process designer, DEPC or end user.

What is our project idea or innovation challenge:

To make a digital model of the process, this speeds up the "industrialisation" of the process and means less physical iterations of the process.





Partner(s) required? (Y):

If yes what type?:

Someone who needs to prove their process digitally or actually make a pilot plant/production plant.





### Materiom

Liz Corbin

Liz@materiom.org

What we do: Materiom is an innovation platform specialising in regenerative materials R&D. We support scientists, producers, and brands to design, produce, and use materials that have a net-positive impact on the planet.

Our open database and AI software streamline R&D by synthesising, testing, and optimising new biomaterials with minimal human intervention.

Where we sit in the supply chain: We support materials R&D as well as feedstock sourcing.

What is our project idea or innovation challenge: We aim to leverage our database and software to increase the innovative use and reuse of renewable bio-based feedstocks within the production of sustainable and circular products.

In particular, valorising underutilised organic byproducts and waste streams to develop high-performance bio-based packaging materials for the consumer packaged goods industry.



If yes what type?: We aim to partner with material manufacturers and/or consumer brands who would benefit from accelerating their biomaterial R&D processes through the use of our database and AI software.









## **Sterling Bio Machines**

Akshaya Ahuja

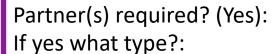
Akshaya@sterlingbiomachines.com

What we do:

Novel Bioreactor systems that are more <u>scalable</u> and <u>productive</u> than existing bioreactors for cell-culture and microbial processes

Where you sit in the supply chain? Bioreactor design and manufacture

What is our project idea or innovation challenge:
Build and test prototypes (physical and digital) of our novel bioreactor concept to demonstrate step change performance improvement over existing systems



- Commercial design partner test your bioprocess in our system
- Research partners to develop technical solutions for key enabling components and technologies









### **PHAsT** – Renewable Materials for Biomedical and Personal Care Applications



## Andrea Mele amele1@sheffield.ac.uk

What we do: We produce innovative, sustainable, and fully biodegradable biopolymers, called polyhydroxyalkanoates, via bacterial fermentation using renewable carbon sources for biomedical and personal care applications.

### Where you sit in the supply chain?

In the **biomedical market**, we are materials supplier, and therefore we operate a **B2B** business, buying the renewable feedstock to perform our manufacturing process, and selling our raw materials to converters in the field.

In the **personal care** arena, we are already able to be also part of the material conversion, by processing our materials into fundamental ingredients for the end products.

What is our project idea or innovation challenge: We want to provide the biomedical and personal care industries with sustainable biopolymers with high biocompatibility, tunable biodegradability and mechanical properties, in order to move away from fossil-based plastics. Our materials offer the whole range of disposing option, from recycling to home and industrial compostable, from fully biodegradability to incineration with low carbon emissions.

### Partner(s) required? (Y/N): Yes

If yes what type?: Brand owners in the biomedical and personal care fields, converters of polymeric materials, custom manufacturing companies of our products (initially), potential investors, and agencies to get regulatory approvals.







## Tensei Ltd

Annabelle Cox

Annabelle@tensei.co.uk

We develop new bio based materials from crop residues and food and drink biowaste.
We call this waste or rather new material

feedstock, The Second Harvest. Tensei are a licensed based company pioneering the Second Harvest.

We are upstream as the R&D company.

The innovation challenge is the adoption of Second Harvest as a mainstream raw material. It requires

behavioural change within the supply chain to create inflexion. To help this we need to develop:

- A local and consistent supply of processed raw material from The Second Harvest.
- Proof that these next gen materials offer best in class solutions within minimal operational disruption.
- A market willing to purchase these new bio based materials.

### Partner(s) required? (Y/N): Yes

- Investors
- Academic partners and labs
- Material Manufacturer eg paper mill/ masterbatch producer/adhesive and chemical
- Raw material processor eg pulp producer/ milling and drying companies
- Companies interested in developing materials with Tensei for their own customers or markets
- Similar R&D companies we can collaborate with.









## Transformational Energy Limited

Chetan Laddha

chetan@transformational-energy.co.uk

### What we do:

- Converting CO<sub>2</sub> and waste products into useful chemical feedstocks
- Innovative strains and enzymes for carbon upcycling applications

Where you sit in the supply chain?

- Technology developer and manufacturer
- System integrator

What is our project idea or innovation challenge:

- Convert CO<sub>2</sub> emissions into chemical products such as Ethylene and Acetylene
- Energy independent process
- Modular and automated manufacturing in UK
- Produce products and cost parity with fossil fuels

Partner(s) required? (Y/N): Yes If yes what type?:

- Safety and certification agency
- Maintenance service provider
- Biological customs and transport specialist









# Matter.

**Rob Hemsley** 

rob.Hemsley@matter.industries

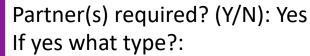
### What we do:

Matter is a technology company focused on capturing, harvesting and recycling microplastics into the circular economy.

Where you sit in the supply chain?
We capture waste that has the potential to become ingredients for novel circular materials.

### What is our project idea or innovation challenge:

Our filtration technology captures a mixed waste stream typically composed of organic and inorganic fibres. We are working on methods to valorise this waste stream to facilitate the reuse of microplastics from clothing and textiles. Our main area of interest is in non-woven fabrics, and we are on the lookout for a suitable resin/binder (organic or inorganic) to allow our fibres to be used in this way. We have particular interest in bio-based materials, such as mycelium, and have hopes for making a pressed plant-based leather that incorporates our waste stream as the fibre matrix.



We want to collaborate with organisations that have technology, facilities or aspirations to process recycled fibres into novel products and applications. We would love to speak with organisations already exploiting waste streams and looking for an opportunity to contribute towards closing the loop on textiles and clothing.









# MORF: Browser-based bioinformatics

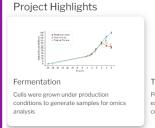


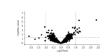
Joyce Bennett

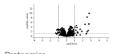
Joyce.bennett@york.ac.uk

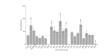
MORF is a web-based tool for storing, sharing and analysing complex biological data. From fermentations to multi-omics data, MORF can help to identify targets for engineering better strains for bioproduction. Currently part of the University of York, we provide a bioinformatics tool and service to enable researchers to get more from their data.

MORF allows remote partners to share and access data securely for easy interpretation: www.morf-db.org







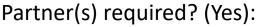


Proteomics

Changes in protein abundance were analysed alongside transcriptomics data to identify addional targets

Target screening

Mutant strains were screened for improved styrene production



If yes what type?:

Any partners generating fermentation or 'omics data. MORF specialises in microbial data but can also be applied to higher organisms.

Please get in touch to enquire.



www.linkedin.com /in/joyce-bennett/



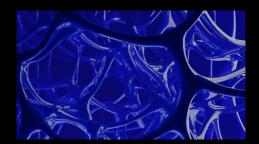
# RHEON LABS

### Sarah Karmel

### Sarah.karmel@rheonlabs.com

### What is RHE□N

- RHEON<sup>™</sup> is an ultra-high energy-absorbing polymer.
- It is soft and flexible in its natural state but absorbs high levels of energy by stiffening when subjected to force.
- The technology has made breakthroughs in impact protection (e.g. helmets) & in active muscle control (e.g. sport bras).



### What is our project idea or innovation challenge:

- Current formats: film and injection moulding.
- Film processing into garments creates 40-50% of waste material.
- Currently all raw materials are from petrochemical resources.

#### Aims:

- Development of sustainable materials using bio-sourced feedstock.
- Efficient recycling of film feedstock

### Partner(s) required? : YES

- Long term testing capabilities
- Recycling
- Carbon footprint assessment
- End users of technology









# CP

Your Name: Lynsey Blain

Email Address: Lynsey.Blain@uk-cpi.com

### What we do:

We are a leading independent technology innovation centre; member of the UK Government's High Value Manufacturing Catapult. Our Industrial Biotechnology Centre covers a wide range of capabilities such as strain engineering, process development (upstream and downstream), scale-up (up to 10,000L), process and safety engineering. We have a long track record of collaborative projects.

### Where you sit in the supply chain?

CPI is a provider of facilities and expertise to help companies to de-risk their process scale up e.g., from flask to fermenter with corresponding scales for downstream processing.

### What is our project idea or innovation challenge:

- Utilise industrial biotech to produce sustainable bio chemicals – seeking to replace petrochemical products.
- CPI has the unique capability to use C1 gas feedstocks within gas fermentation.

### Challenge

- Improve efficiency and economic viability in order to be competitive against fossil fuel chemicals.
- Bridge the gap between feedstock providers and industrial end users

Partner(s) required? (Y/N): Yes If yes what type?

CPI is seeking to work with partners:

- Who want to test their feedstock for microbial fermentation
- End users- who can provide product specifications and testing









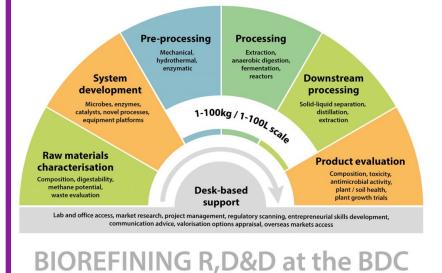
# Biorenewables Development Centre

Helen Shiels; Helen.Shiels@york.ac.uk

Gail.Shuttleworth@york.ac.uk

What we do, where do we sit in the supply chain?

- open-access RTO at the University of York working at the interface between academia and industry
- 10-year experience, >450 clients



What is our project idea or innovation challenge:

Addressing of the following innovation challenges:

- technological barriers incl. access to equipment, expertise, lab space
- emerging non-optimised processes
- scalability & reproducibility
- Cost
- Route to market

Partner(s) required? Yes If yes what type?:

Industry and research partners who are looking for the RTO to de-risk your innovation









# **Sustainable Biobased Manufacturing and Materials:**

# **Innovate UK KTN Innovation Networks**

Michael Burnett Rajesh Mistry



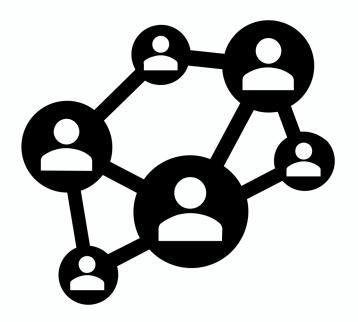
### Innovate UK KTN Innovation Networks

#### What is an Innovation Network?

- A network that brings interested parties together as a community to conduct activities to:
  - address a market failure
  - work on a topic of scale that is 'new' to the UK with strategic importance. Could even be a topic that has no obvious 'home' at present.
  - add value to the UK
  - benefit from Innovate UK KTN convening expertise

### **Features of an Innovation Network**

- Time bound activities
- Clear deliverables to achieve by project end
- Innovative
- Cross convening with cross disciplinary teams
- Include assessment (measuring capability and opportunity)
- 'New' to the UK with strategic importance
- Exit strategy





### **Innovation Networks Examples**

### **Examples of current Innovation Networks**

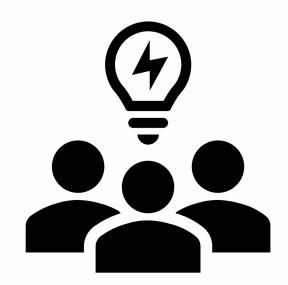
- Circular Economy
- Hydrogen Economy
- Battery Systems
- Made Smarter

### **Types of Activities**

- Conferences and workshops
- Sandpits
- Hackathons
- Roadmapping
- Desktop Studies
- Networking, partnering and brokerage events

### **Example Outputs**

- Formation of leadership groups
- Community building
- Self sustaining communities
- Action plans and roadmaps
- Development of UK strategies
- Thought leadership
- Podcasts
- Collaborations
- Recommendations for Investment





### **Innovation Network Poll**

Big ideas with strategic vision and high potential impact

Now we want your input and ideas



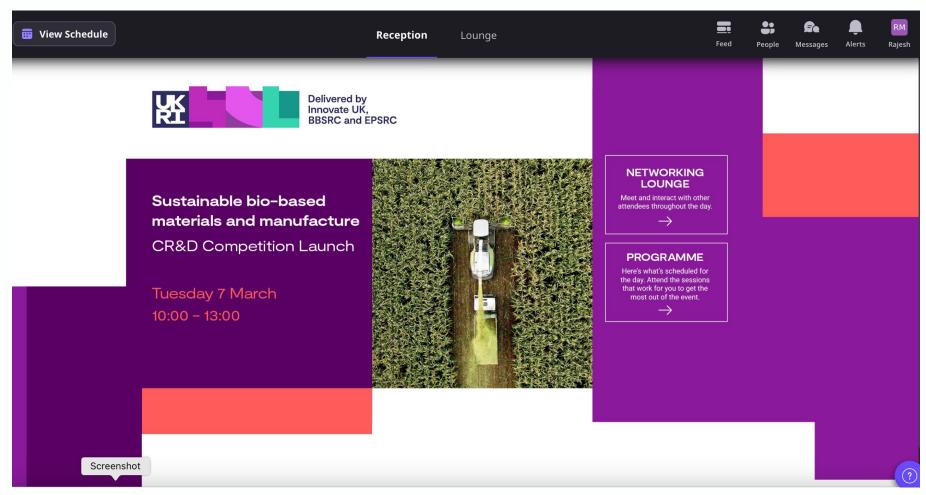
# Sustainable bio-based materials and manufacture- CR&D Competition Briefing

**Airmeet – Networking Lounge** 

Rajesh Mistry rajesh.mistry@iuk.ktn-uk.org



# **Networking Lounge**

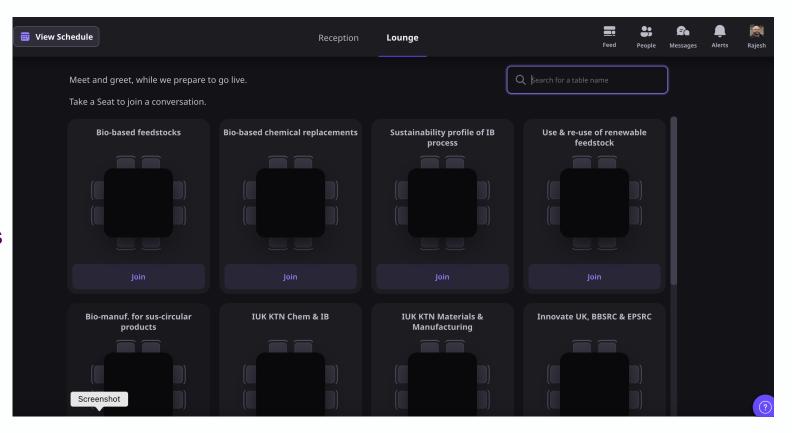




## **Networking Lounge**

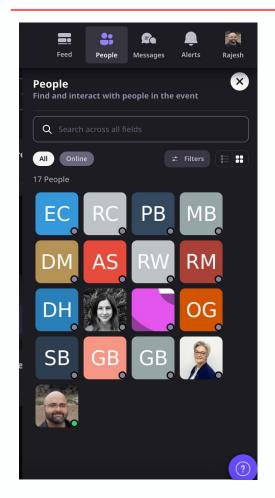
### **Table names**

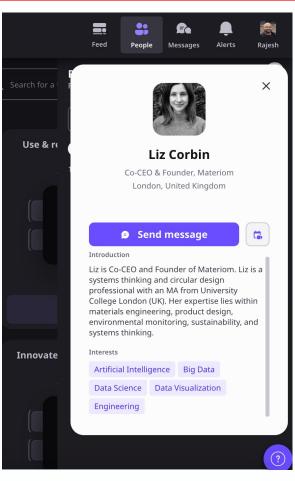
- Bio-based feedstocks
- Bio-based chemical replacements
- Sustainability profile of IB processes
- Use & re-use of renewable feedstocks
- Bio-manuf. for sus-circular products
- KTN Chem & IB
- KTN Materials & Manufacturing
- Innovate UK, BBSRC & EPSRC
- Generic networking tables

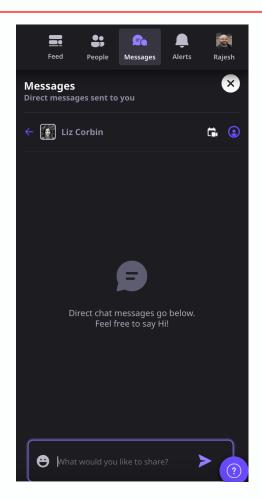


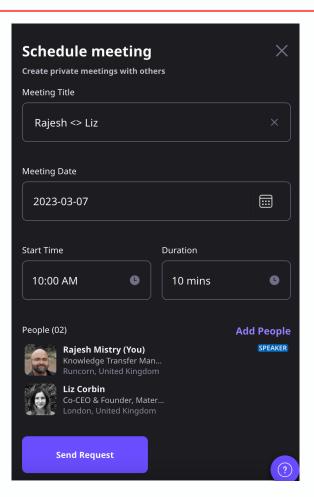


### **Networking Lounge**









So that's a whistle-stop tour of AirMeet!



# Thank You

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Materials, Manufacturing, KTN Chem and IB Newsletter's – sign up!

Please join us in the Networking Lounge

