Industry & Academia Networking Day 2025

Sustainable Advanced Materials and their Associated Manufacturing Processes

Dr Matthew Thornton MBA BSc (Hons) CEnv FIMMM

Commercial Manager

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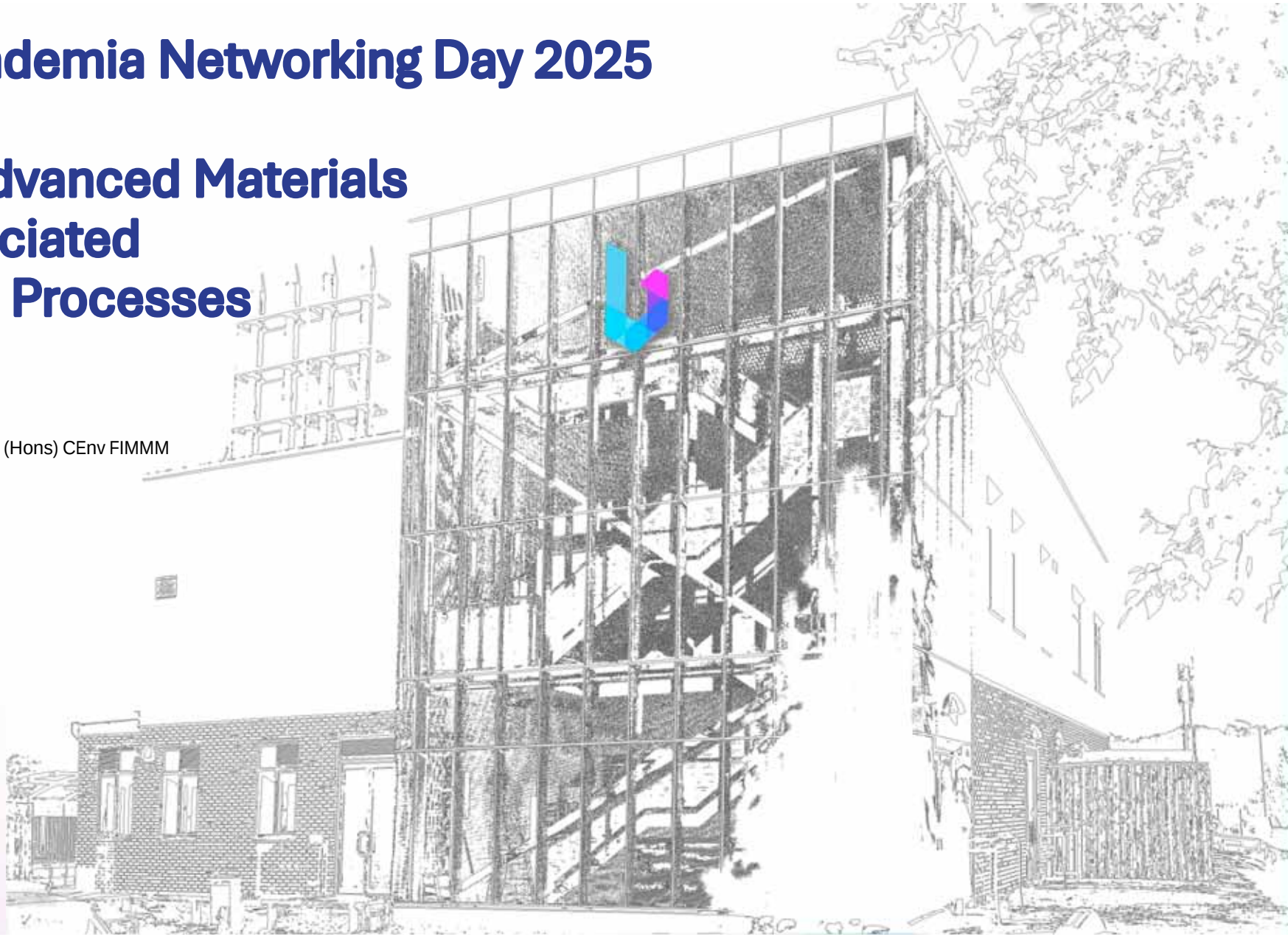

BRIDGING BUSINESS WITH INNOVATION

- Bridge operates from the University of Lincoln and has a dedicated team of R&D project specialists working alongside the University's academic community.
- We help businesses access technologies and methods at the forefront of research to create R&D solutions, and drive innovation.

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European Union
European Regional Development Fund

Greater Lincolnshire
MIDLANDS ENGINE

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formula
SAINT-GOBAIN
TELEDYNE
Teledyne Microwave UK
MinebeaMitsumi
Passion to Create Value through Difference
microclean
QUALITY TODAY · INNOVATION TOMORROW
CATCH
SIEMENS
energy
Poly
materia
QINETIQ
AFM
WORKSHOP
Fenner
PRECISION POLYMERS
A Michelin Group Company
SHD
composites
advanced composite materials
UK Atomic
Energy
Authority
NHE
LUXUS
LTD
Bringing new enhanced life to plastics
HHinnovations
Eminox
MURFITTS
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Analytical Ltd.
B-hive
ALARIS
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reckitt
CLEAN TECH
A PLASTIPAK COMPANY
MICROMETRIC
Laser Processing, Cutting, Welding, Drilling, Marking +
Green
Lizard
Technologies
Surepharm
RootExtracts
Powered by B-hive
Puraffinity
DYNEX
Power through Innovation
iBOXiT
Singleton
Birch
seneye
BRIDGE


Watch the video at https://youtu.be/NG85PwuL-Js?si=F1qgz0si6C96Y4r_

- Visit our website for a virtual walkthrough of the Bridge at https://www.thebridge-lincoln.org/

- Follow us on:
  - https://www.linkedin.com/company/thebridge-lincoln
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  - https://www.instagram.com/bridge_lincoln/

- E. mthornton@lincoln.ac.uk

Thank You for Listening

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Agenda

- Introduction, Aims & Objectives
- Industry Challenges
- Finding Funding and Support with Innovate UK
- Lunch and Networking
- Research Solutions
- Consortia Building
- Close and Depart at 15.00

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Aims and Objectives

- **Our Aims for Today**
  - **Foster Collaboration**: To spark innovative partnerships between industry leaders and University of Lincoln's world-class academic experts.
  - **Drive Innovation**: To bridge the gap between academic research and industry challenges, turning cutting-edge ideas into real-world solutions.
  - **Unlock Growth**: To create a dynamic network that supports regional and national economic growth through shared knowledge and strategic alliances.
- **Your Objectives for the Day**
  - **Discover Opportunities**: Identify and explore specific grant funding streams and collaborative research opportunities available to you.
  - **Build Partnerships**: Connect with key researchers and business professionals to form valuable, long-term partnerships.
  - **Access Expertise**: Learn how to leverage the University's state-of-the-art facilities and tap into our pool of exceptional student talent.
  - **Initiate Projects**: Start conversations that lead to tangible, funded projects that address your organisation's specific needs.

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Industry Challenges

- Microclean
- 2M Manufacturing
- Eminox
- PowerUp Off-Grid Services
- iBoxit
- Puraffinity
- Saint Gobain Formula
- Bac-Cel
- Advanced Plastics Group

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Davey Stoker – Micronclean

- The challenges of sustainable products in the highly regulated world of pharma technical requirements

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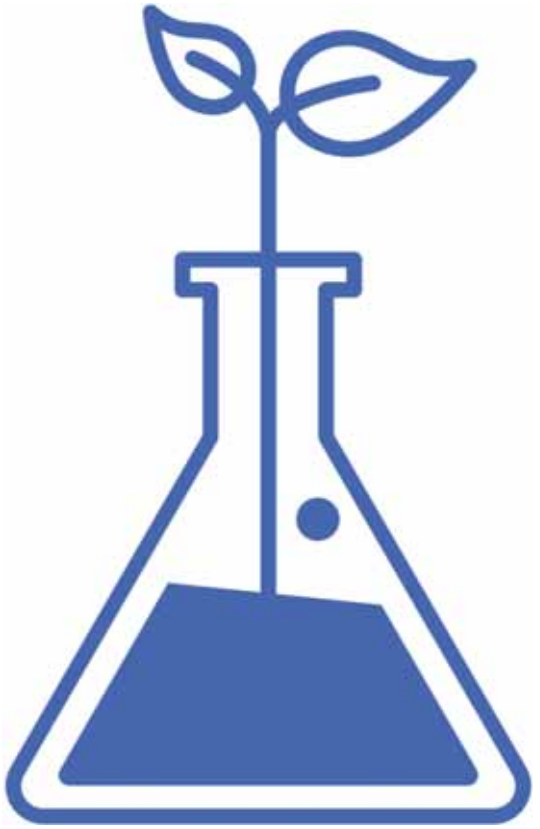
DR DAVEY STOKER
Innovation Director

Innovation in Sustainable Advanced Materials and their Associated Manufacturing Processes

What sustainability material challenges does Micronclean have?



micronclean
QUALITY TODAY - INNOVATION TOMORROW

Gamma Irradiation Sterilisation

High Grade Sterile Cleanroom Products

Must maintain:

- Strength
- Shelf Life (2 Years)
- Function
- Particulate emission

Must maintain high grade technical requirements throughout its life, be able to withstand gamma irradiation and then be sustainable as well.

Most sustainable options are the opposite properties to those that withstand gamma irradiation.

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Double Bagged

Almost everything that enters a cleanroom is either double or triple bagged for clean transfer.

Micronclean sent out 13.5million plastic bags in 2024 globally.

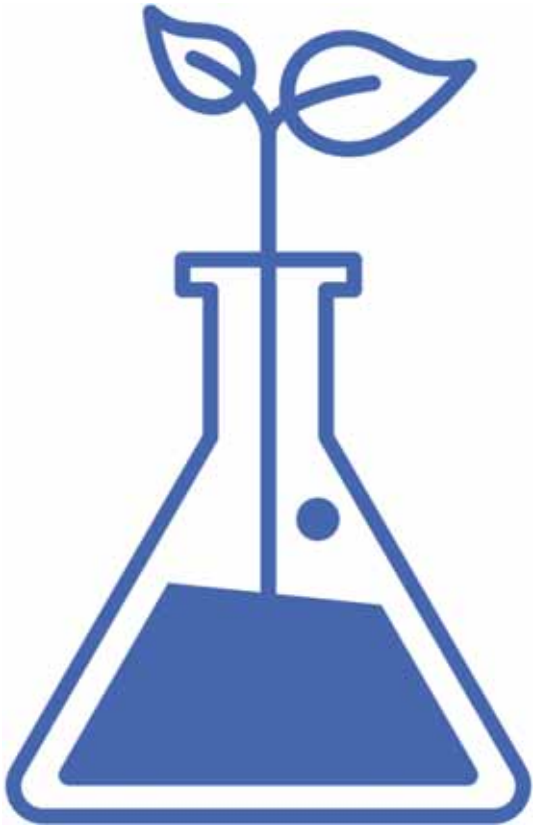
These were all virgin plastic with a zero tolerance for inclusion.

The reality is that most of these won't be recycled and end up in clinical incineration or land fill.

We are actively looking for alternatives but these must:

- have Zero inclusions
- be able to withstand gamma irradiation (min. 40kGy cycle)
- Maintain a sterile seal for 2 years
- Transparent (see the item inside)
- Low particulate emission

I look forward to hearing your ideas!



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James Nelson and Jaime Battye – 2M Manufacturing

- Sticking to Sustainability – Bioadhesives for Future Packaging Solutions

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www.2m-holdings.com | info@2m-holdings.com

2M Group of Companies

Sticking to Sustainability

Bioadhesives for Future Packaging Solutions

2M LAURICHEM · 2M Equest · 2M Manufacturing · 2M Services · Banner Chemicals Group · BREGAGLIO Personal Care · Chemir · C3 TROCKENEIS

CRAFTED · Ingretech · MP Storage & Blending · PRADY FRAGRANCES&COSMETICS · SampleRite · Stowlin · Surfachem

2M Group of Companies

Our mission is to help the industry and supply chain bring to market future-proof sustainable packaging, for a better life today and a better world tomorrow.

2M Group of Companies

Challenge & Current Technology

The Challenge

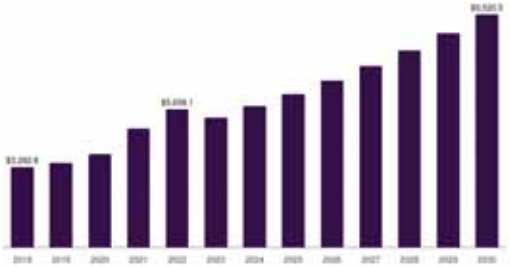
- Plastic-based adhesives (e.g., PVOH, EVA, PU) are non-biodegradable
- Contaminate recycling streams
- Release harmful substances, harming air quality and health
- Face EPR tax penalties for non-sustainable components
- Limit the opportunity of fully circular packaging

Current technology overview

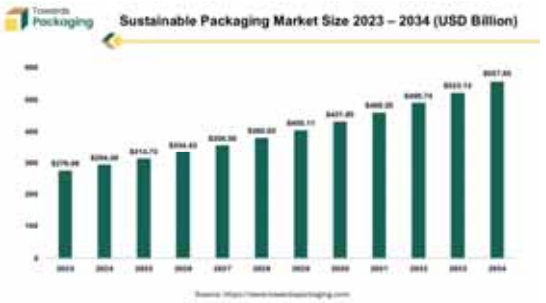
Adhesive Type	Examples	Pros	Cons
Hot Melt	EVA, PVOH, PU	Strong, high barrier performance, heat resistant	Fossil-based, non-recyclable, non-biodegradable
Water-Based	Modified starch, dextrin, PVOH, acrylics	Lower VOCs, some bio-based	Mostly fossil-based, all still plastic by EU definition

Opportunity

EU packaging adhesives market: **$5.7B** (2022), growing at **6-7% CAGR**



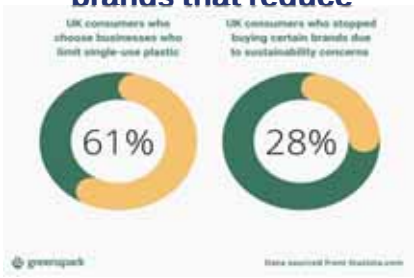
Increasing demand for **sustainable packaging solutions** worldwide



Governments are driving strict **regulations to reduce plastic/increase recycling rates**

Brands are **creating ESG plans** and taking action to replace plastic

Consumers are **choosing brands that reduce**



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What is the market looking for?

- **Efficient manufacturing:** Drop-in technology compatible with existing converting machinery
- **Functional performance:** Parity or better performance to existing technology with similar technical properties (solids, rheology etc)
- **Sustainable choices:**
  - Fully biodegradable (home & industrial)
  - Compatible with existing waste recycling streams
- **Safety & Compliance:**
  - Free from hazardous chemicals
  - Direct & Indirect food safe
  - Oven able stability (no migration of components)
- **Innovation Areas:** Novel bio-polymers, additives & green chemistry technologies

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Partnering for success

Academic Partnership to:

- Co-develop novel bio-adhesive formulations
- Validate the science behind performance
- Explore innovative biodegradable chemistries and materials

What We Offer

- Manufacturing and supply chain expertise
- Commercial market insights
- Access to scale-up facilities and pilot production infrastructure
- Testing in real-world packaging applications
- Proven experience with scaling new technology

Contact

James Nelson

Business Director

jnelson@2m-holdings.com

2M Group of Companies

Jaime Battye

Technical Development Associate

jbattye@2m-holdings.com

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John Gueritz – Eminox

- Comparing Polycrystalline Alumina Fibre Material Properties

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Eminox

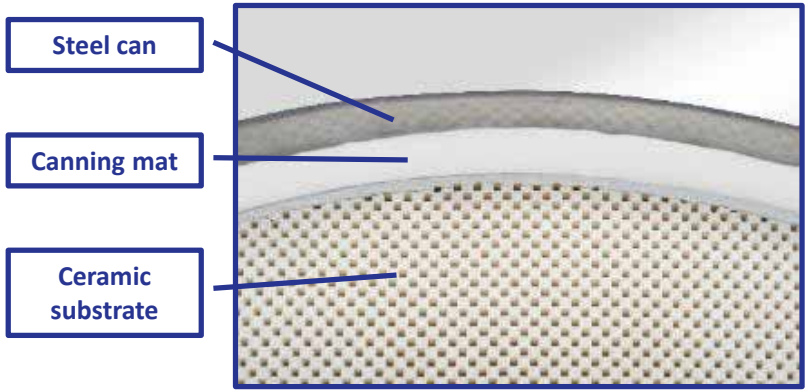
COMPARING POLYCRYSTALLINE ALUMINA FIBRE MATERIAL PROPERTIES

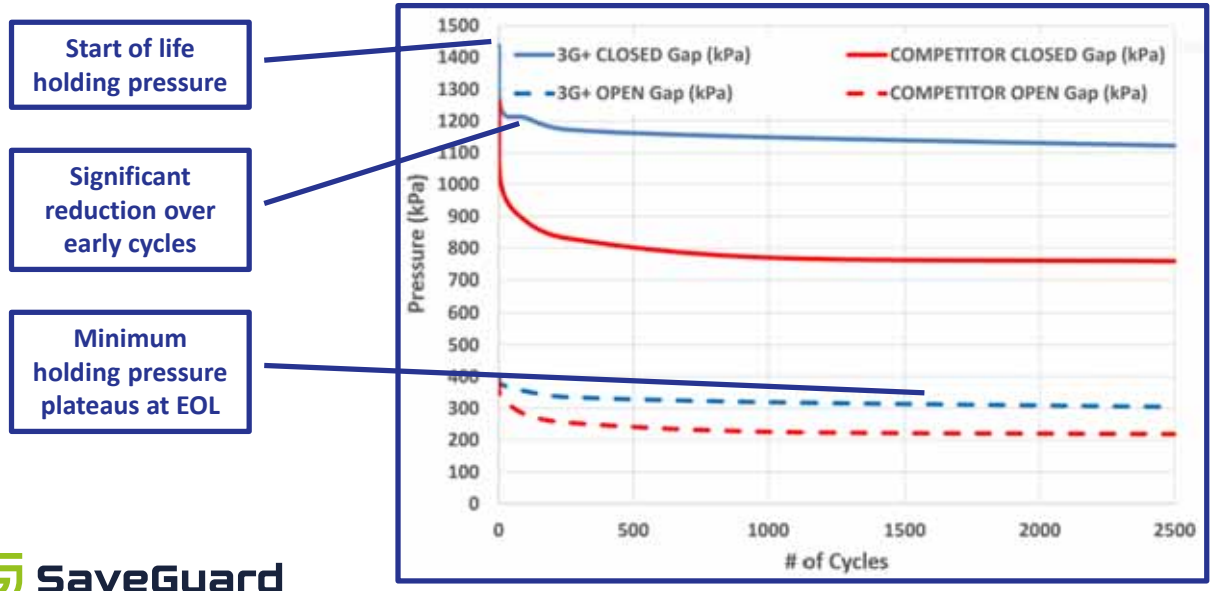
24th June 2025

EMx Powered
Technologies for a greener planet

BACKGROUND

- SaveGuard manufacture PCF canning mats for the automotive industry
- Canning mats are used to retain ceramic substrates during the life of the exhaust aftertreatment system
- The canning mats imposes a pressure on the substrate which varies as the outer steel can expands and contracts through heat cycling
- The resultant end-of-life holding pressure is lower than at the start of life





- PCF raw material is source direct from the manufacturer in bales
- Raw material is processed into canning mats in the UK using a wetlaid process

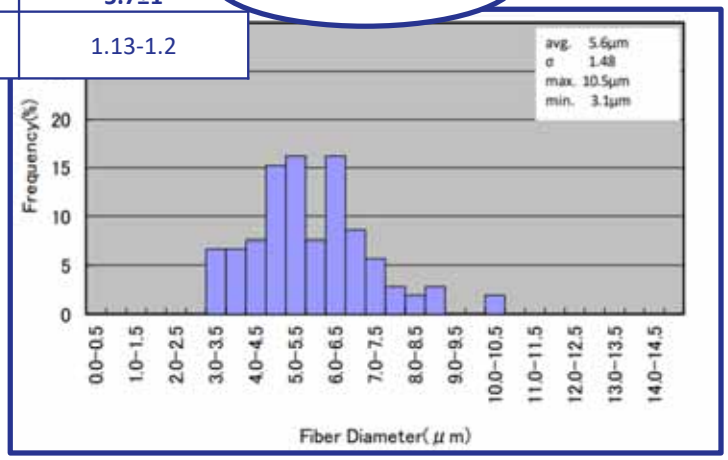
PROBLEM STATEMENT

- Raw PCF material has been sourced from Supplier A for approximately 10 years
- Supplier B introduction in progress with material sourced for production/performance trials
- Supplier A raw material produces a superior grade of canning mat
- Canning mats produced using Supplier B raw material show significantly lower performance
- **We need to understand the difference between the two materials**

WHAT WE KNOW

Supplier A

Classification Temperature		1600°C
Chemical Composition	**Al2O3**	**73%**
	SiO2	**27%**
	Mullite	<5%
Fibre Diameter (µm)		**5.7±1**
Specific Heat Capacity (kJ/(kg ·K))	Not specified	1.13-1.2



Supplier B

Classification Temperature		1600°C
Melting Point		>1800°C
Chemical Composition	**Al2O3**	**72%±1**
	SiO2	**28%±1**
	Al2O3+SiO2	>99%
Fibre Diameter (µm)		**5-7**
Thermal Conductivity (W/(m·K)	600°C	0.064
	800°C	0.094
	1000°C	0.169
	1300°C	0.25
	1500°C	0.45
Specific Heat Capacity (kJ/(kg ·K))	1090°C	1.315

OUTCOMES

- Our primary outcome is to establish the difference between material from Supplier A and B

- Using this information, we would like to identify material analysis techniques for the following purpose:

1. Material assessment process for selecting new materials
   - Detailed analysis – XRD, microscopy etc
   - Higher cost, infrequent requirement

2. Inbound quality screening for each production batch
   - Quick assessment of material quality
   - Lower cost, weekly requirement

Eminox

Through our empowered workforce and robust engineered solutions we will deliver a greener planet, together

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2020

David Collinson – PowerUp Off-Grid Services

- Collaborating on Harmonics: Unlocking Advanced Insights for Sustainable Energy Systems

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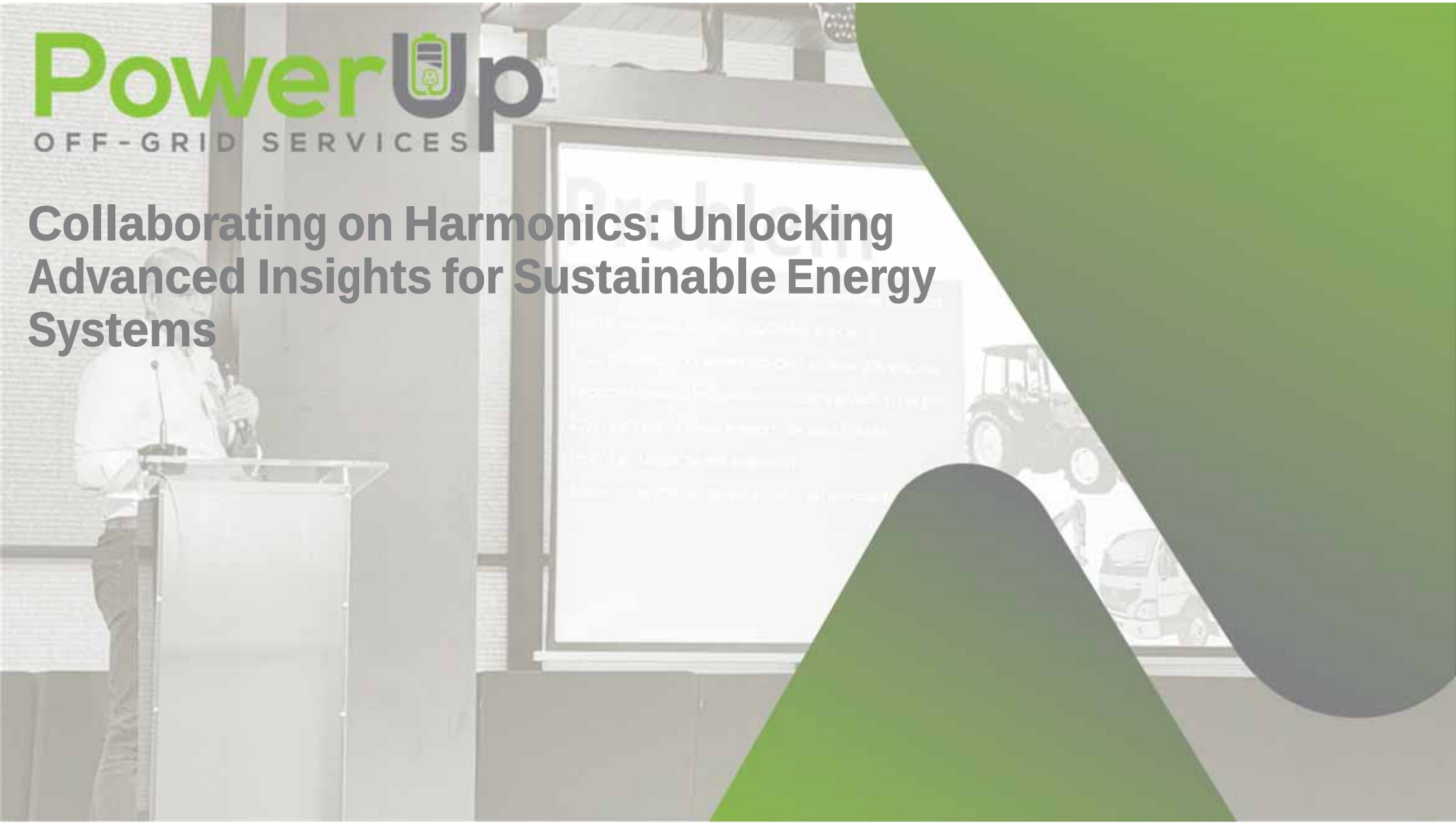


PowerUp
OFF-GRID SERVICES

Collaborating on Harmonics: Unlocking Advanced Insights for Sustainable Energy Systems

No Transition Without Transmission

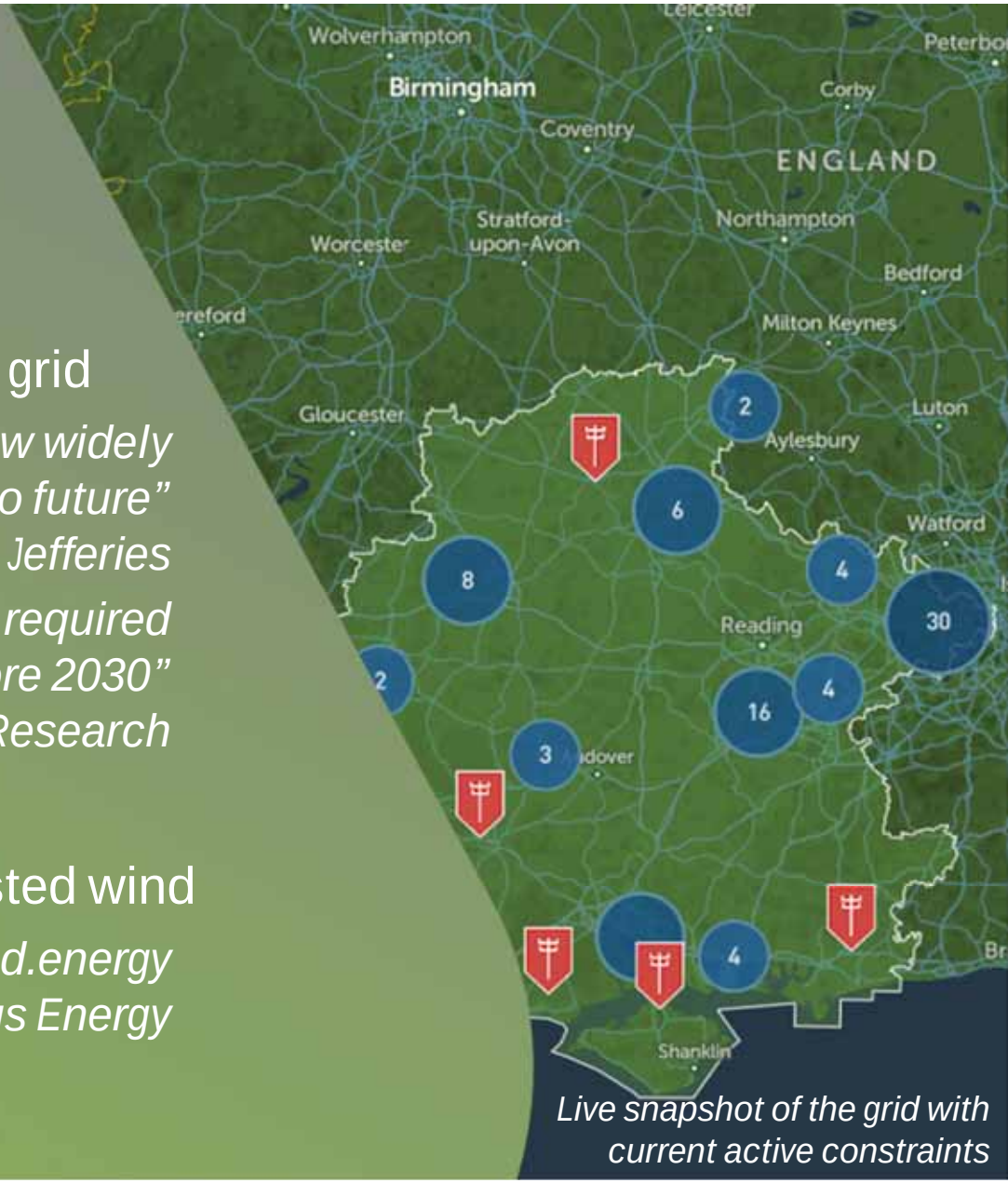
Electricity demand is outstripping growth in the grid

"upgrading and expanding the grid is now widely acknowledged as the biggest obstacle to a net-zero future"
- Jefferies

"$3.1 Trillion of grid infrastructure investments are required globally before 2030"
- Rystad Energy Research

Britain has spent nearly £600M this year on wasted wind

wastedwind.energy
- Robin Hawkes @ Octopus Energy



Live snapshot of the grid with current active constraints

The Right Energy, at the Right Place, at the Right Time

We need true decentralisation and lots of data

Battery Energy Distribution System (BEDS)

Physically distribute and swap on a just in time basis

Use AI to learn behaviours and tasks

Energy usage becomes visible and granular

Future Research & Collaboration

Working with Prof. Chris Bingham

What are the limits of harmonic detection?

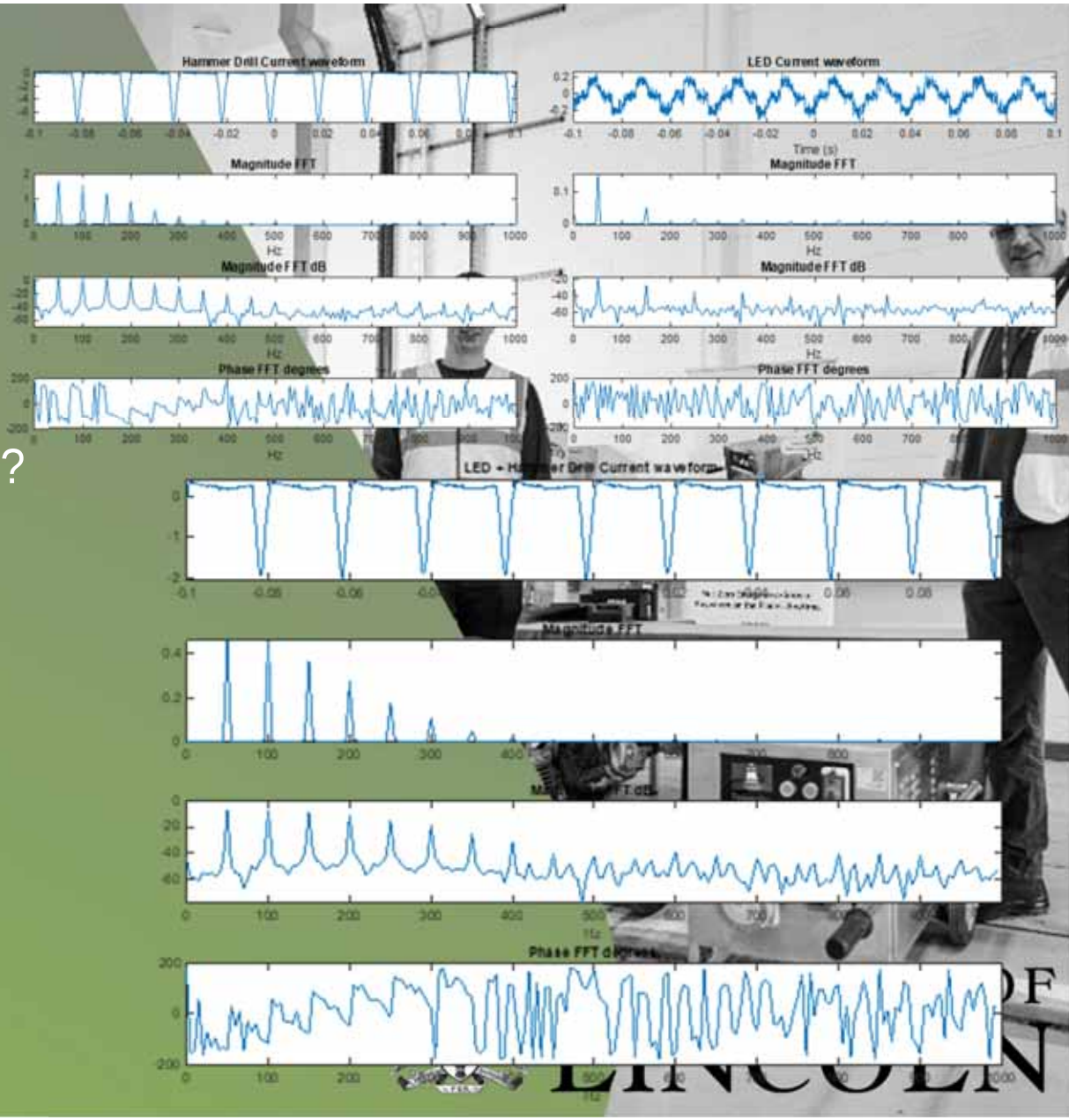
Granular operational insights

Fault detection & predictive maintenance

Distributed grid harmonic monitoring

Intelligent voltage optimisation

User identification




Up
www.PowerUp-Services.co.uk

Fergus Christie - iBoxit

- Single Use Biofoam Box

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iBoxit
Single Use Bio-Foam Box

Innovate UK project 10072196

Challenge Overview :

The Problem:

Although the ideal is to REUSE boxes there are many applications where the return of the EPS containers is not feasible -

1. Although theoretically recyclable the suggested outcomes at end of life are:

    - 15% recycled into building insulation
    - 65% energy from waste
    - 15% landfill
    - 5% general waste stream/lost to the environment

2. Additional problems with EPS

    - Contamination inhibits recycling applications
    - EPS is easily damaged during the packing and transit processes
    - EPS boxes generate approx. 6kg of carbon emissions per 200g of EPS

- Based on the feedback from end-users iBoxit are now adding an additional sub-contractor to the project (The Bridge Material Science Centre @ University of Lincoln) to carry out formula development and testing for a bio-foam suitable for a single-use shipping box.

- The properties of this new box are outlined in the following slides – we believe that by making the change whilst there is still time left in the project we will be able to add value to the final output of our R&D by introducing a novel solution to the ongoing requirement of single-use insulated packaging.

- We have a costed R&D proposal from The Bridge which is funded by the balance of our alt materials funding from within the project.

Requirement:

1. To increase the uptake of the recycling of the single-use box
2. To reduce or ideally eliminate the carbon emissions
3. To improve the strength and rigidity of the box to limit damage in service

Problems to overcome:

1. Low carbon bio-foams are typically hydroscopic
2. Bio-foams are no stronger than EPS foams
3. End of life applications need to be clarified

Prerequisites:

1. The bio-foam must:
    1. Be as close to net zero as possible (minimum is a reduction in GHG cf EPS)
    2. Offer equivalent thermal insulation to the current EPS
    3. Be fully biodegradable through green waste channels
    4. Provide a minimum of 4 days product-in-place water resistance
    5. PROVIDE A VIABLE MANUFACTURING PROCESS FOR VOLUME MANUFACTURING

Octavia Blackburn – Puraffinity

- Adsorbents for PFAS capture: challenges with material characterisation

BRIDGE

Puraffinity®

Adsorbents for PFAS capture: challenges with material characterisation

Dr. Octavia Blackburn,
Head of Product Development

24th June 2025

Puraffinity and PFAS

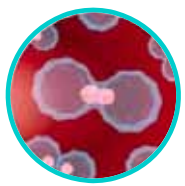
Who we are and what we do

- We are an SME specializing in the design, manufacture and supply of adsorbent materials for PFAS capture based in London
- Our mission is to improve human and environmental health by effectively removing PFAS from water

What are PFAS?

- PFAS (per and poly-fluoroalkyl substances), also known as Forever Chemicals, are widely used, long-lasting chemicals that break down very slowly over time
- They are found in water, air, animals, and soil at locations across the globe

PFAS exposure has been associated with:



Kidney and testicular cancer

Elevated cholesterol

Decreased fertility

Thyroid disease

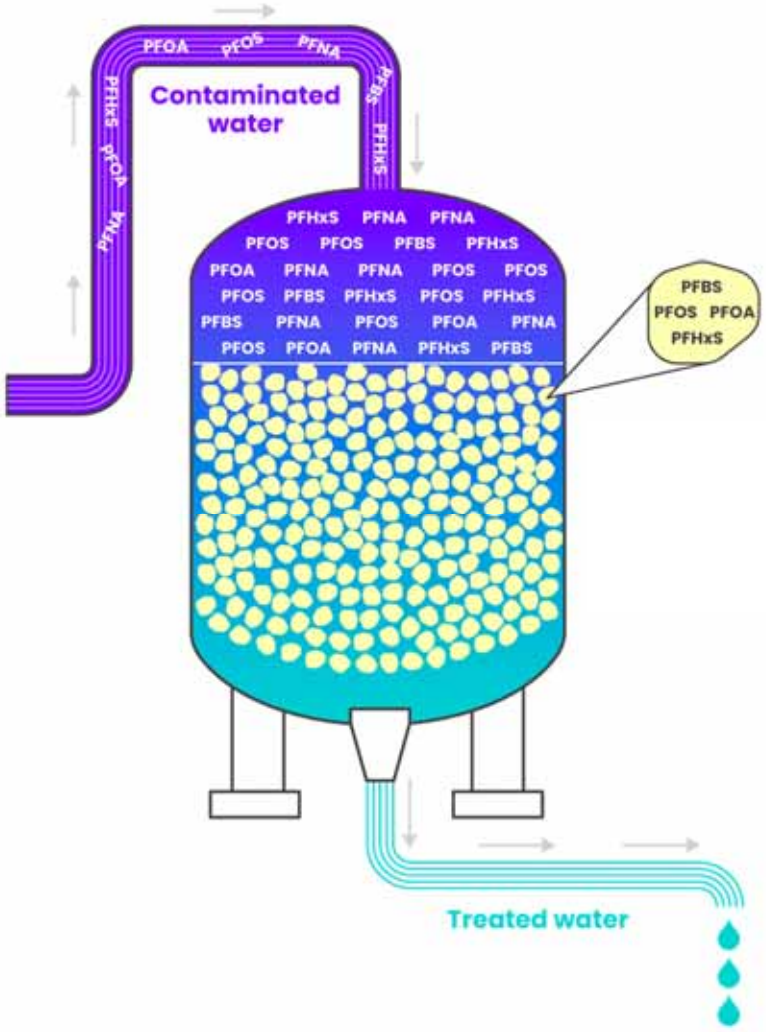
Decreased immune response to vaccines in children

Our Solution to the PFAS challenge:

Puratech® G400

- Granular adsorbent which captures PFAS through a combination of hydrophobic and electrostatic interactions
- Designed to be installed into vessels 1/10th of the footprint of the existing vessels leading to lower CAPEX
- Commercial manufacturing and sales of Puratech G400 commenced

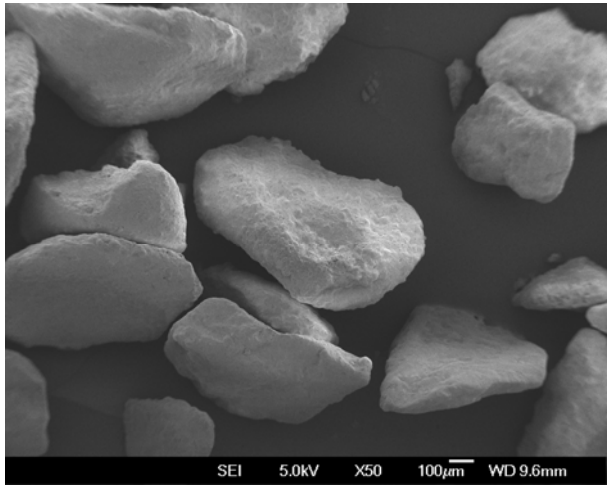
Puratech® process diagram



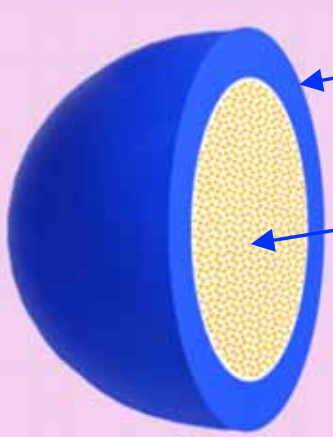
The Challenge

Aim: to establish structure-performance relationships which facilitate the development of new adsorbents with improved PFAS-removal performance

Challenge: establishing structural or mechanistic insights into material properties and interactions with PFAS



Puratech® G400



- Porous alumina substrate with patented surface coating
- Polymeric coating is covalently bonded to the porous scaffold.
- d50 ca. 600µm

Wish List

Examples of areas to investigate:

- Characteristics of polymer coating - distribution, homogeneity, thickness, morphology, chemical characterization, hydrophobicity/ hydrophilicity
- The role of pores in PFAS binding
- Penetration of PFAS and other contaminants into the particles
- Insights into mechanism of adsorption (and desorption)
- Competition between different PFAS
- The mechanism and impact of binding other water constituents
- Kinetics of PFAS binding and binding under flow conditions

Jen Lucas – Saint Gobain Formula

- From Waste to Worth: A Second Life for Gypsum Moulds

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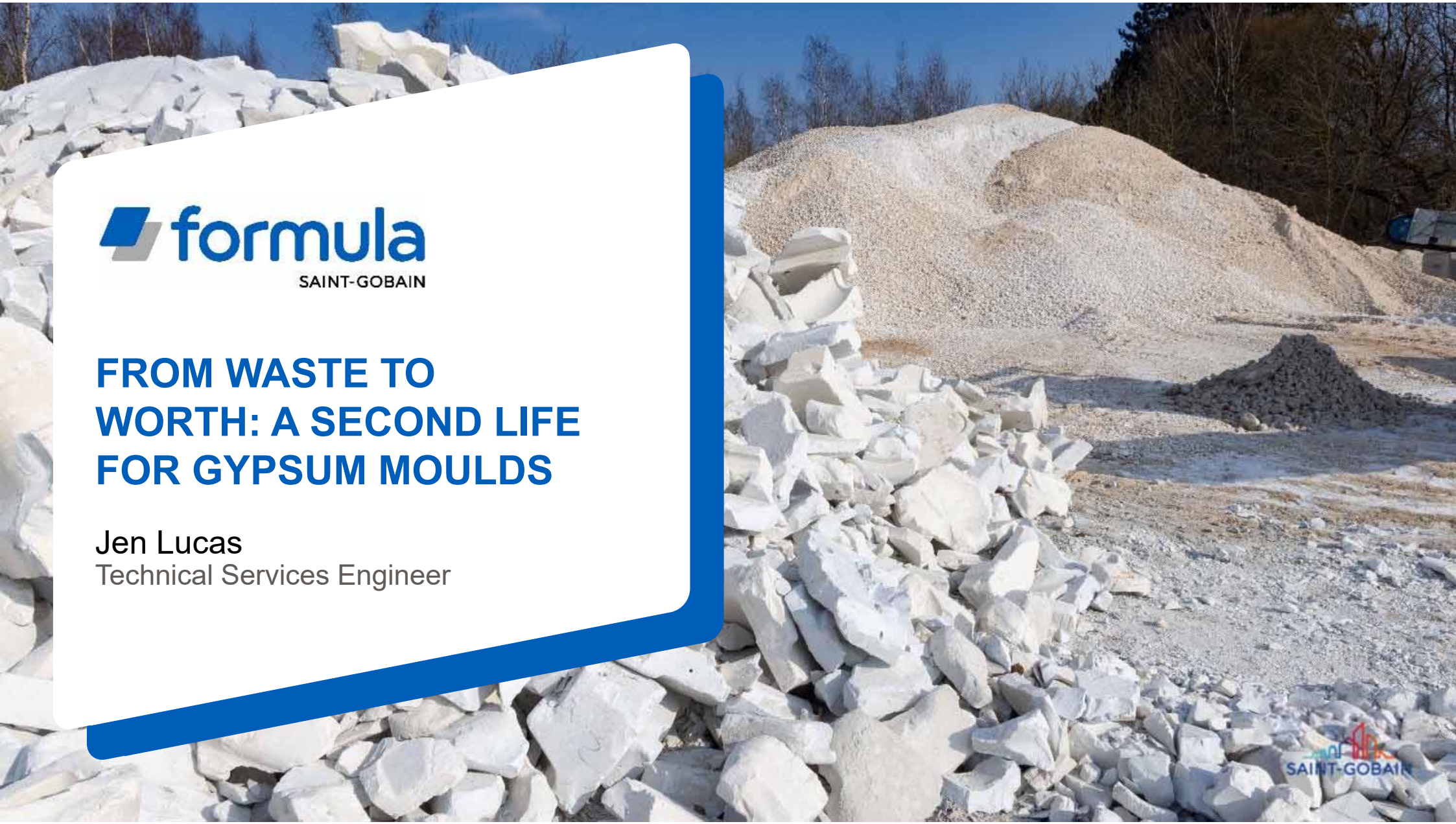


formula
SAINT-GOBAIN

FROM WASTE TO WORTH: A SECOND LIFE FOR GYPSUM MOULDS

Jen Lucas
Technical Services Engineer

SAINT-GOBAIN

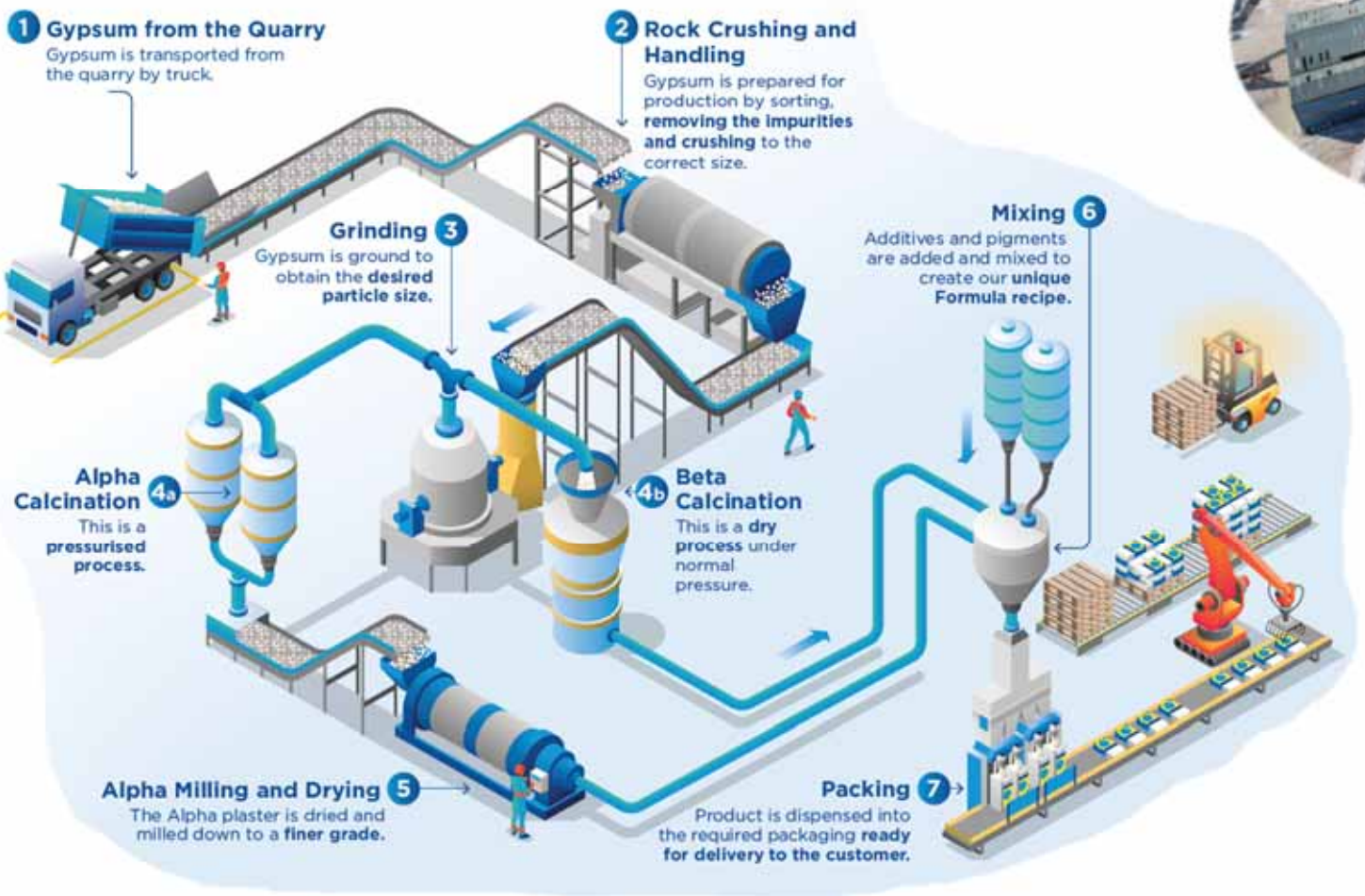
TABLE OF CONTENTS

ABOUT FORMULA

Who are we and what do we do?

formula
SAINT-GOBAIN

OUR PROCESS



$CaCO_3 \cdot 2\ H_2O$

$CaCO_3 \cdot \frac{1}{2}\ H_2O$

formula
SAINT-GOBAIN

SUSTAINABILITY GOALS

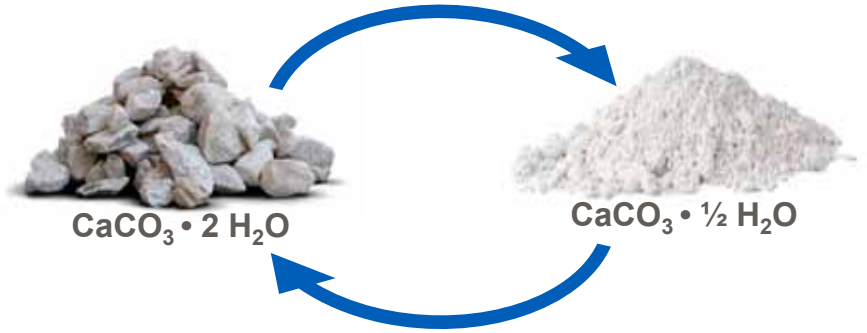
- Saint-Gobain goal for all businesses: Net Zero by 2050

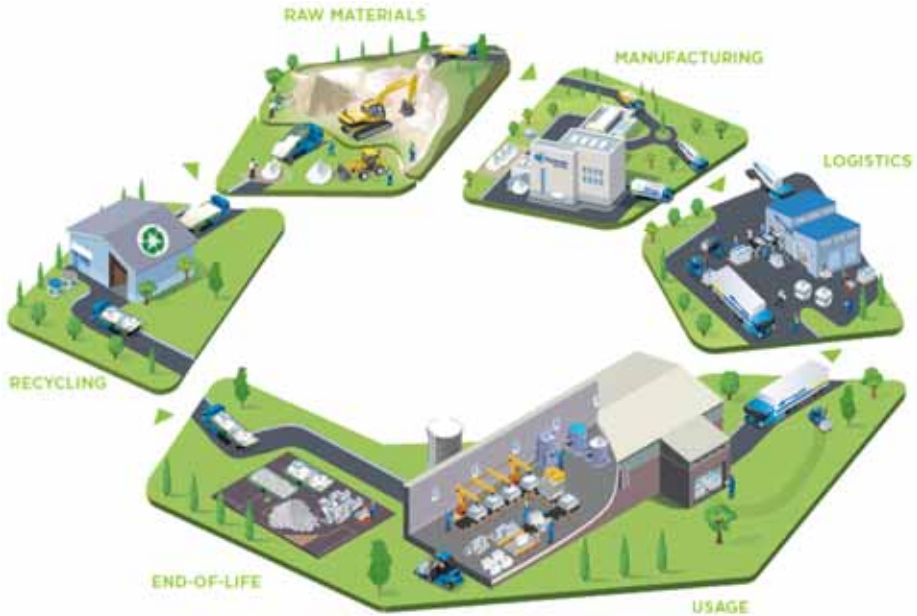
- Progress at Formula in Newark:
  - Heat pump installed
  - Diesel → electric forklift trucks
  - Modernising mixing & bagging process
  - Water treatment & recycling
  - Project Gypcycle

formula
SAINT-GOBAIN

PROJECT GYPCYCLE

- Gypsum is theoretically endlessly recyclable
- Benefits:
  - Reduce mining intensity
  - Reduce material to landfill
  - Valuable to customers
- Aim: Replace 3000T of virgin rock per year with recycled material
  - ~3% of average annual production volumes
- Key industries – ceramics, fibreshops, specialist industries





formula
SAINT-GOBAIN

PROJECT GYPCYCLE - CHALLENGES

- Key product selling points: gypsum purity and whiteness
- Contaminated moulds → processing and/or product quality issues
- Types of contamination:
  - Embedded foreign objects – e.g. plastic natches, metal pieces
  - Ingrained/surface impurities – e.g. clay, rust, dirt
- Currently only considering clean, natch-free moulds
  - Complicates customers' processes
  - Excludes some keen customers!

formula
SAINT-GOBAIN


formula
SAINT-GOBAIN
THANK YOU
SAINT-GOBAIN

Kevin Lindsey – Bac-Cel

- Scaling Up Biological based Processes

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Replacing oil based polymers

Dr Kevin Lindsey CEng FIMMM

Director

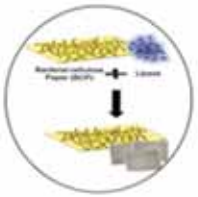
Kevin.Lindsey@bac-cel.com

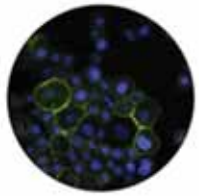
07901 550570

Challenge: How to scale a biological process

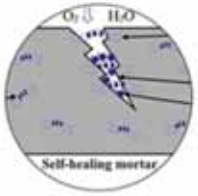

Antibacterial films

Bioremediation


Biosensors


Cell carrier

Coatings



Concrete reinforcement

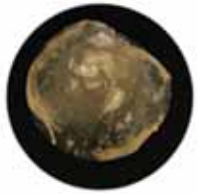
Cosmetics


Filtration membrane

Food additive


Functional foods

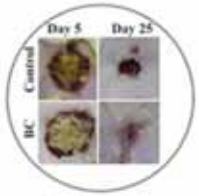

Packaging


Superabsorbents


Textiles


Tissue scaffolds

Wearable devices



Wound dressings

BAC-CEL

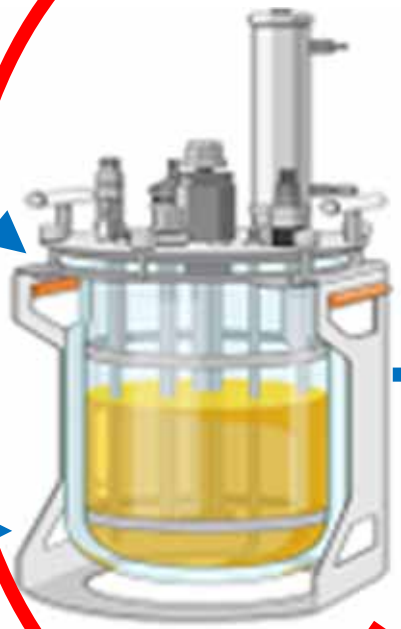
The Challenge:

how to scale up bacterial cellulose manufacturing cost effectively

Outline Process

BAC-CEL

Bacteria scale up



Reactor Design

Summary

- Bacterial cellulose has many uses and can eventually replace oil based plastics
- To replace oil-based plastics costs must be reduced
- Cost reduction using use of waste as a feedstock
  - Bac-Cel has a route to do this
- Cost reduction using improved reactor design and improved bacteria scale up
  - Bac-Cel needs help on this

Fergus Christie – Advanced Plastics Group

- Compostable Food Packaging Challenge

BRIDGE

Compostable Food Packaging Challenge

APG Design & Innovation
Advanced technical solutions in plastics

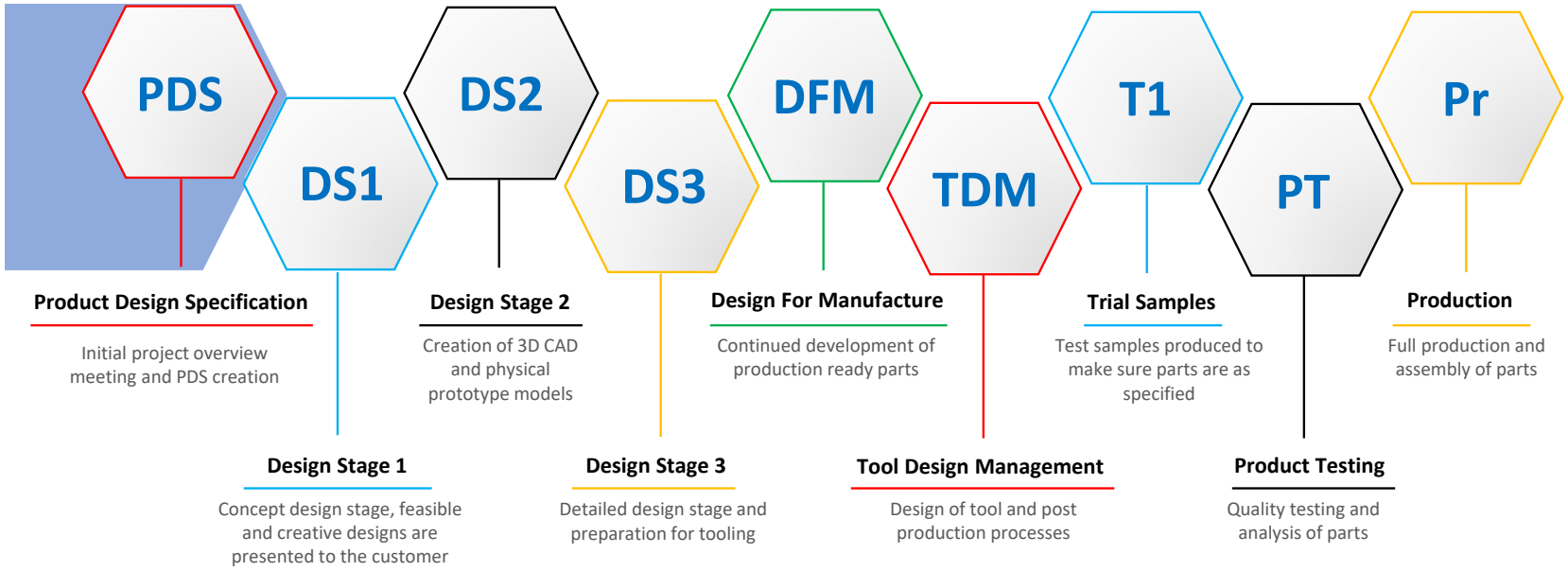
APG Design & Innovation
Advanced technical solutions in plastics

Challenge Description: Compostable Food Packaging

1. End user group want to eliminate single use PE/PP soft fruit packaging
2. Alternatives such as cardboard have been considered
3. APG are seeking materials that satisfy the sustainable packaging PDS

APG Design & Innovation
Advanced technical solutions in plastics

Design Process



APG Design & Innovation
Advanced technical solutions in plastics

Suggested Approach:

A three-stage process to take the concept to volume manufacture

1. **Prototype tool to confirm the limits of cycle-time, wall thickness and material formulation**

2. **Pilot production tool to validate final parameters and to allow for end user packaging and automation trials**

3. **Volume production tooling and product supply**

APG Design & Innovation
Advanced technical solutions in plastics

Stage One:

Prototype tool

- **We would create a simple mould of equivalent wall thickness / geometry to the punnet and use this to**
  - **Establish the most effective blend of material**
  - **Process cycle times**
  - **Wall thickness / part geometry**
  - **Weld trials with compatible bio-films to ensure the entire packaging BOM is compostable**

- **Output:**
- **High confidence of material and processing information to proceed to pilot trial**

APG Design & Innovation
Advanced technical solutions in plastics

Further APG Manufacturing Challenges

- **Welding/Joining of novel bio-materials**
- **Material certifications relating to the circular economy**
- **Printing / marking of novel materials**
- **RFID thermal monitoring and asset management**

Finding Funding Support with Innovate UK

James Silverward
Regional Manager – East Midlands
Innovate UK

BRIDGE

Finding Funding and Support with Innovate UK

James Silverward
Regional Manager – East Midlands
Innovate UK

Elaine Livera
Knowledge Transfer Manager – Manufacturing Technologies
Innovate UK Business Connect

Chris Woodward
Business Growth Delivery Manager
Innovate UK Business Growth

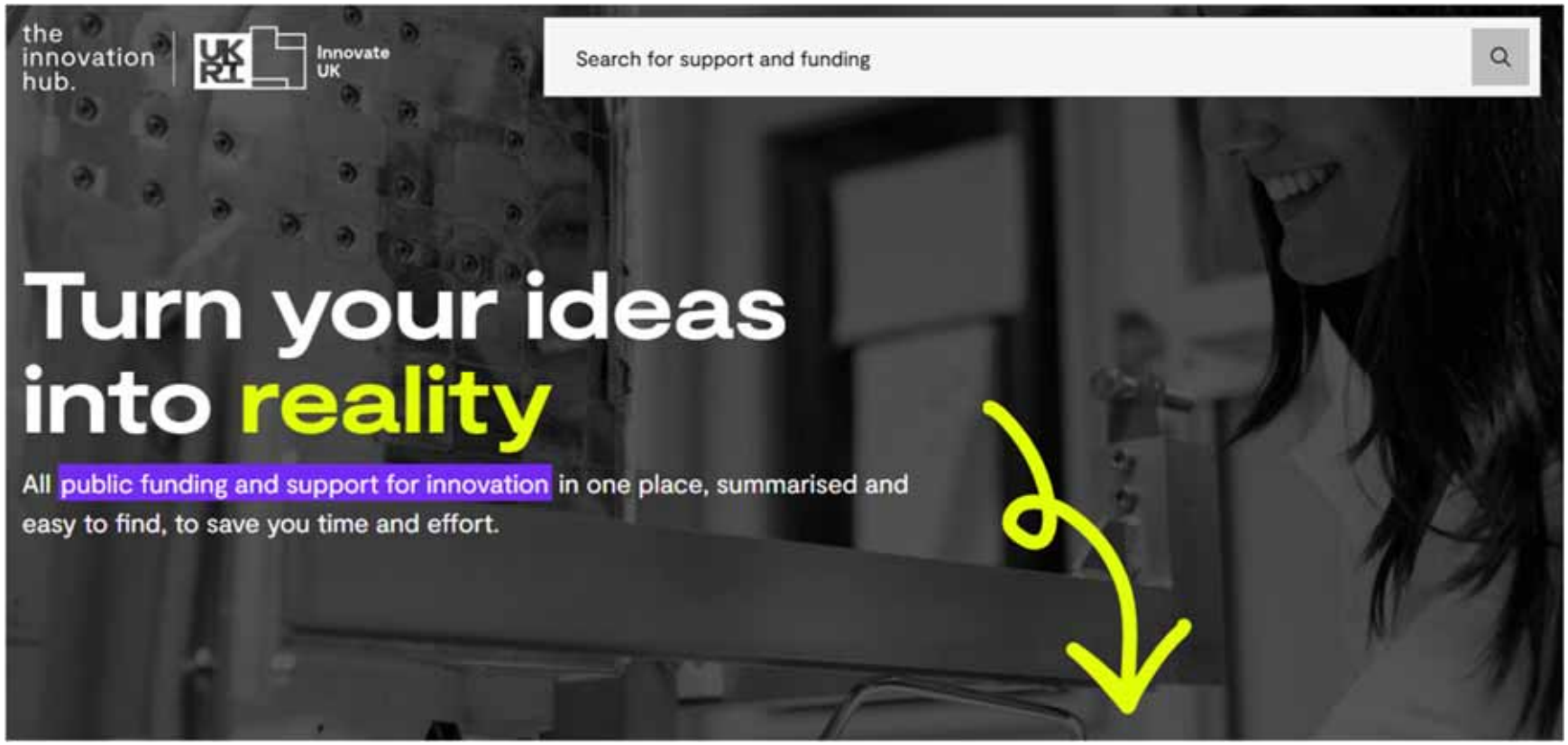
We are the UK’s innovation agency

Works 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, it creates **knowledge with impact**.

UKRI Innovate UK

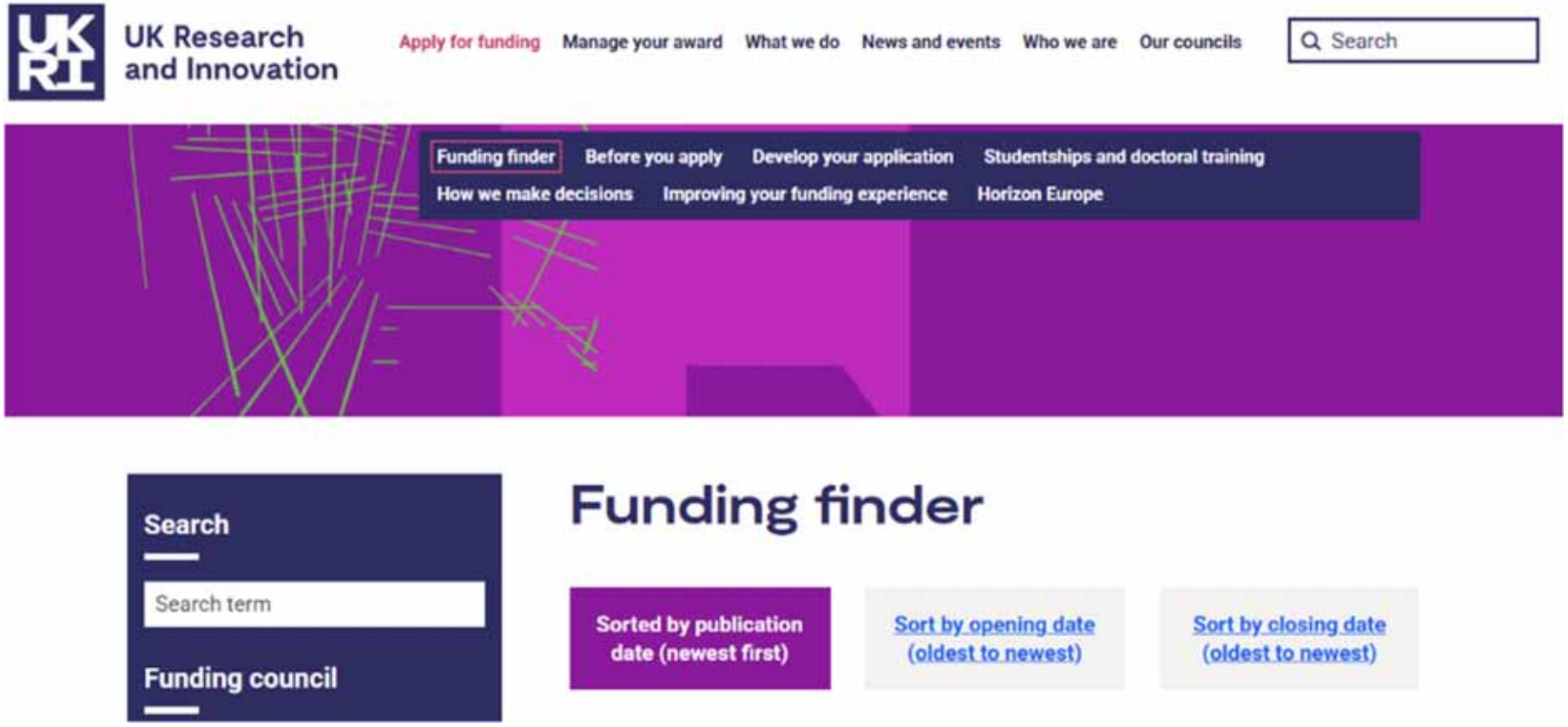
Innovation Hub

Bringing together all support backed by the UK's governments in one place, helping innovators navigate the funding & support landscape



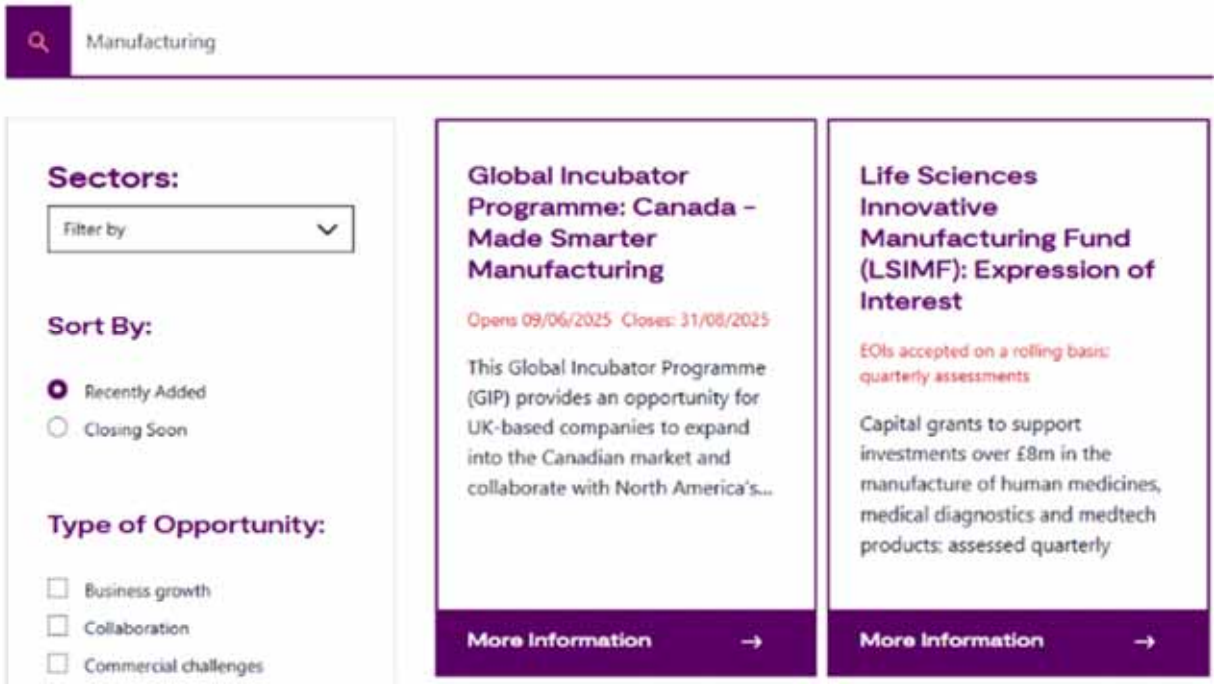
UKRI Funding Finder

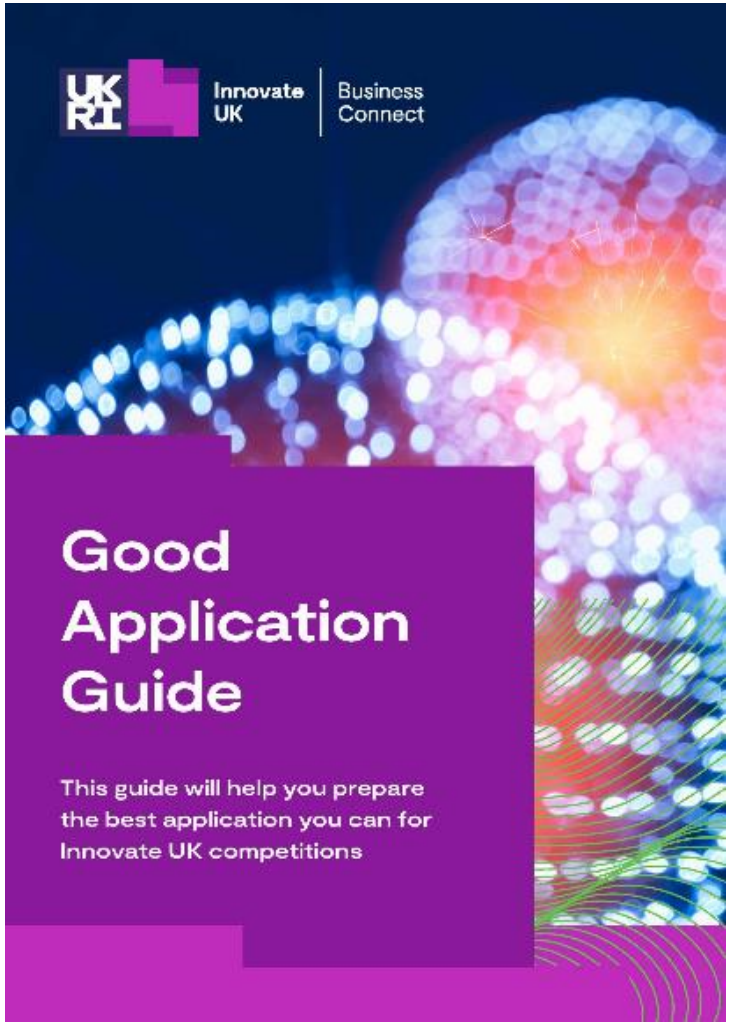
A one-stop shop for all UKRI opportunities and application advice, with pre-announcement and alert emails



IUK Business Connect

Bringing together opportunities and expertise from across the UK to understand market challenges and support you with the latest opportunities





A typical Innovate UK backed business raises

>30%

more money
from the
private sector

Than similar businesses. Since 2007

Direct business benefit

£3.61

For every £1 invested

Over a seven-year period. Based on the most recent independent evaluation.

Our purpose

We drive **productivity and economic growth** by supporting businesses to develop and realise the potential of new ideas, including those from the UK's world-class research base.

We **connect businesses to the partners, customers and investors** that can help turn these ideas into commercially successful products and services, driving productivity, and supporting business growth.

Our mission is to enable the creation and adoption of innovation across the UK.

Right Service, Right Sector, Right Place

Domains

Powering the race to net zero. Ensuring healthy lives and economic growth by supporting life sciences, food and agriculture. Leveraging digital and technology innovation for safe and sustainable productivity and economic growth.

Place

Working with partners, supporting regional development and international engagement. Enabling new skills and talent, and new collaborations to drive sustainable growth for businesses across the UK.

Products & Services

Investing funding, expertise and support in accelerating future economic growth. Meeting the changing needs of businesses, expand research opportunities and support communities.

We support businesses at all stages

From spin-outs and start-ups to growth and scale

Spin-Out

Support to **commercialise innovations**, patents or technologies being developed and to leverage intellectual property. **Making connections** with research expertise to bring **groundbreaking innovations** to market.

Start-Up

Support to mitigate risk, **validate business models**, secure **initial funding** and gain early customer traction. **Encouraging innovation** and iteration to help startups achieve **product-market fit**.

Growth

Expert advice to **improve market presence**, innovate product offerings, enter new markets and **enhance competitive positioning**. Support with innovative and **sustainable expansion**, productivity and customer satisfaction.

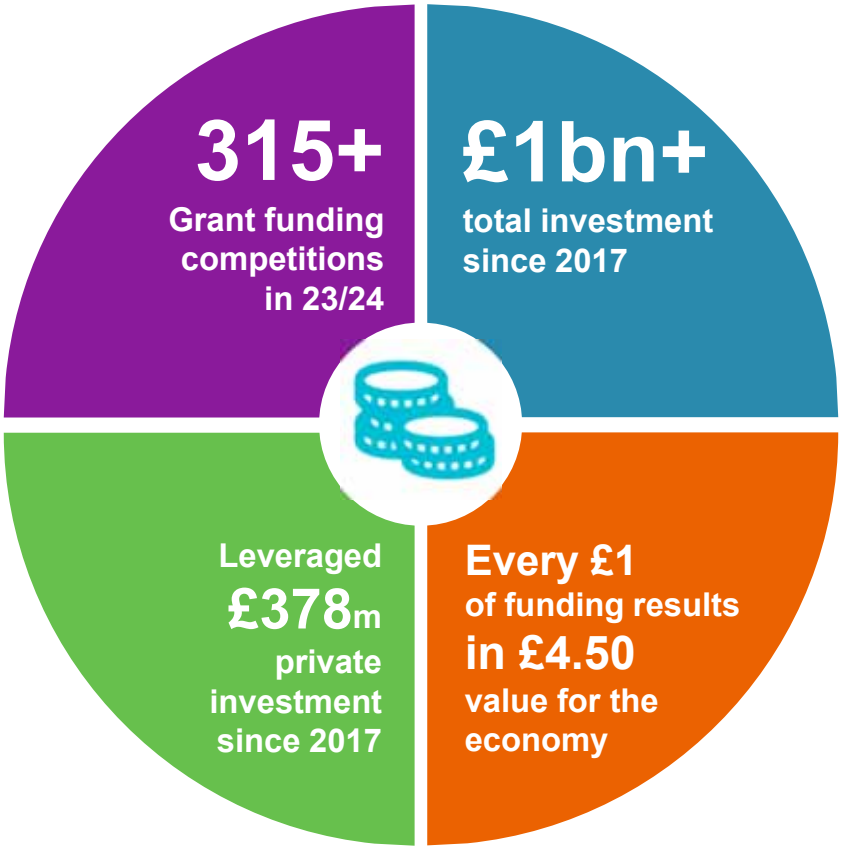
Scale

Advice to **increase productivity** and expand customer base by connecting to **sector expertise** and proven business models. Support for innovators on funding, **enhancing infrastructure** and **optimising processes** for growth.

Innovate UK innovation funding

Innovation grants support thousands of projects that enable businesses to undertake ambitious, disruptive research and development with a high potential for commercial success

Innovation Loans programme offers small to medium sized businesses flexible, affordable and patient repayable finance to support late-stage business R&D with a clear route to commercial success

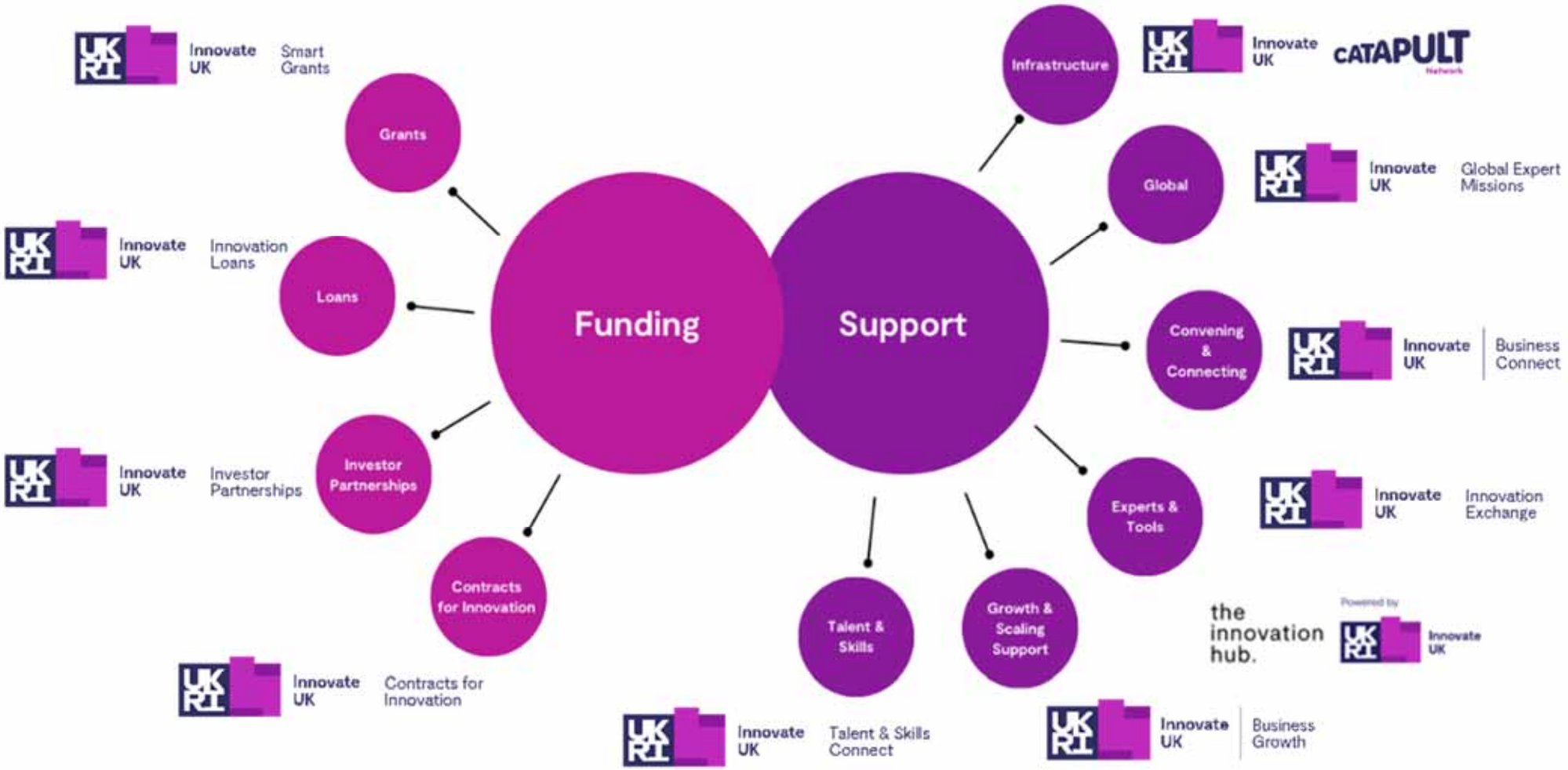


Investor Partnerships programme brings the benefits of early professional investor advice and capital to innovative businesses on a journey from concept to commercialisation, scale and growth

Contracts for Innovation help public sector organisations solve complex challenges by running a competitive funding opportunity, to develop and adopt new solutions and technologies

UKRI Innovate UK

Products & Services: portfolio of examples



UKRI Innovate UK

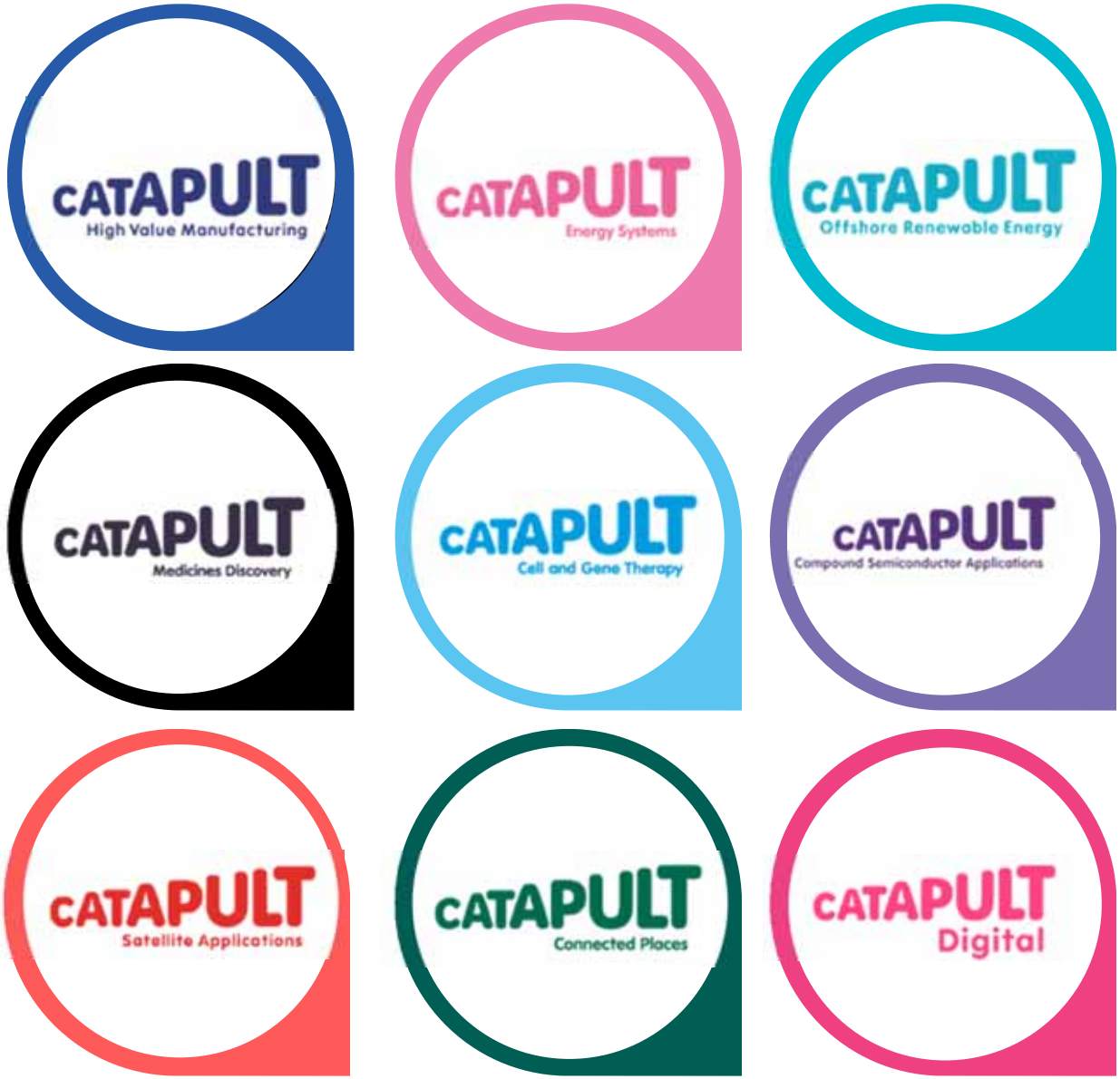
CATAPULT Network

Innovate UK established nine Catapults and co funds them to provide a unique combination of world-leading expertise facilities, and equipment to support business innovation and growth.

UKRI Innovate UK

CATAPULT Network

Each Catapult plays a critical role in delivering innovation across our domains, place and products and services. Catapults help to accelerate innovation, grow businesses, grow sectors, and stimulate additional private sector investment in research and development
in the UK.

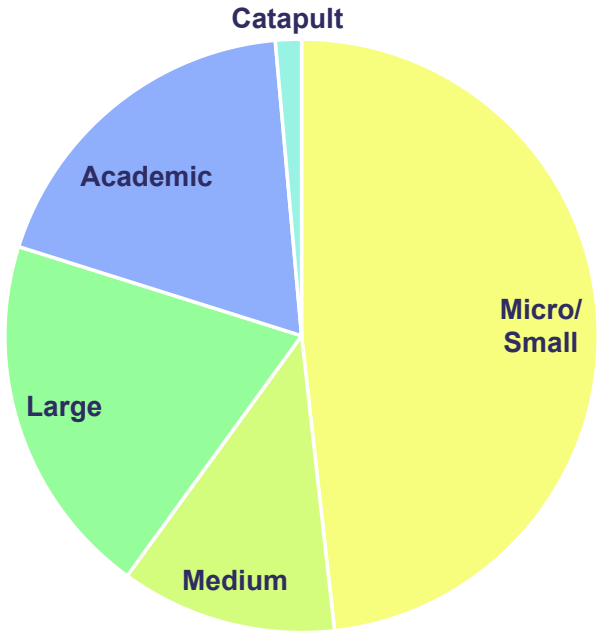


We are a UK-wide organisation

Innovate UK is unlocking new economic potential by leveraging local strengths, resources and expertise.

We connect local businesses, clusters, and supply chains, nationally and internationally, based on their strengths. This approach is designed to provide opportunities for growth and prosperity across all UK regions.

Innovate UK Funding in Greater Lincolnshire

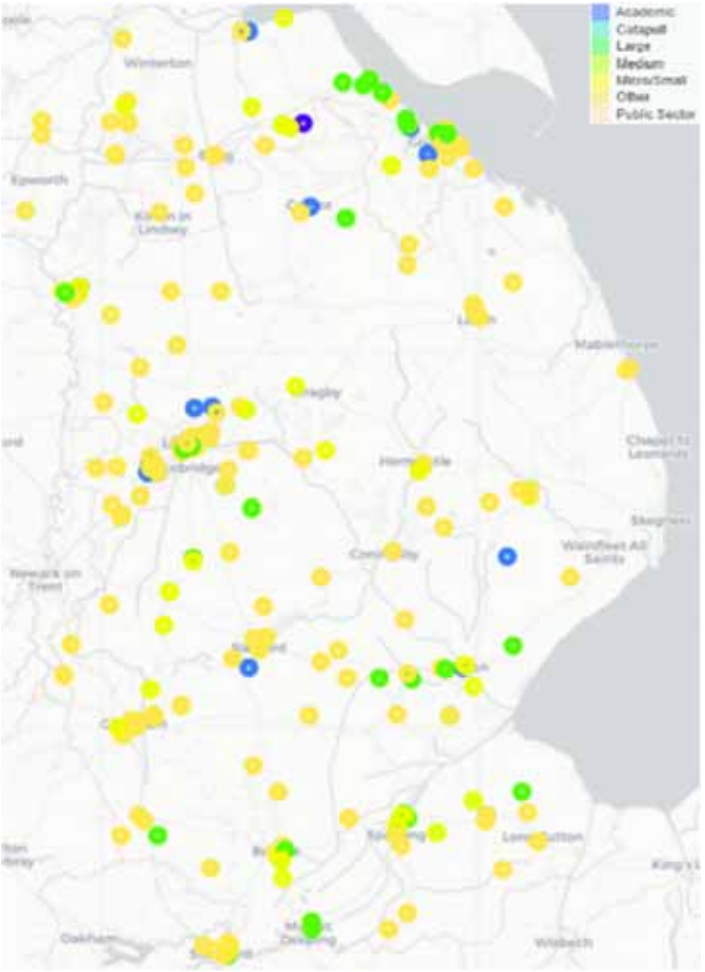


597 projects funded

£89.1m total grant awarded to date

Median award of over £50,000

57% of funding goes to SMEs



Innovate UK Business Connect

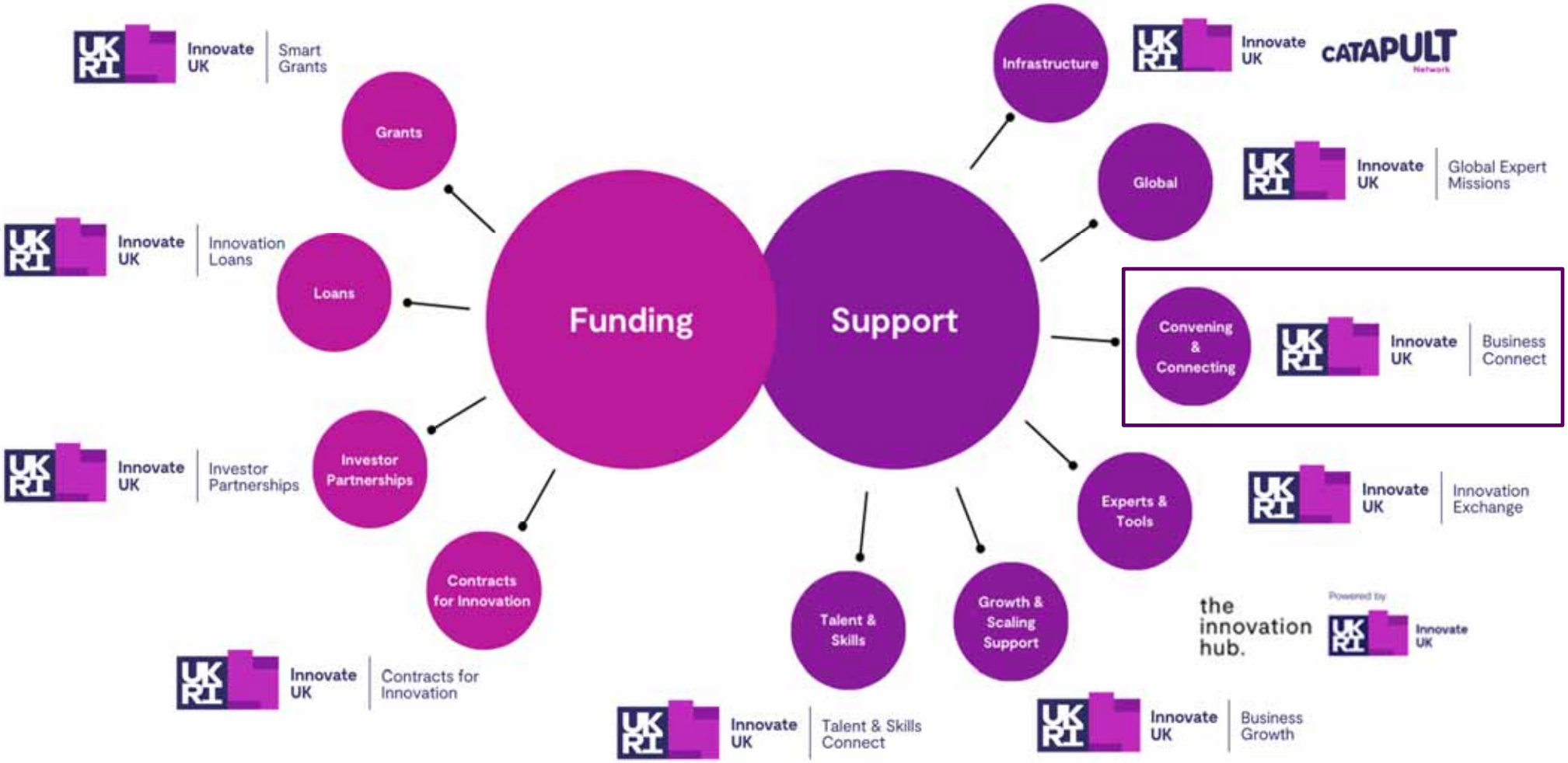
Dr Elaine Livera

Knowledge Transfer Manager – Manufacturing Technologies

Elaine.livera@iukbc.org.uk

UKRI Innovate UK | Business Connect

Products & Services: portfolio of examples



Our Purpose

We are part of Innovate UK, the UK's innovation agency.

We connect **businesses to the partners, customers and investors** that can help turn new ideas into commercially successful products and services.

UKRI Innovate UK | Business Connect

Our Network

46,229
Unique Organisations

72%
Small

15%
Medium

13%
Large

335,478
innovators

Every university in the UK

UKRI Innovate UK | Business Connect

Our Network

- **Facilitate Cross-Sector Collaboration**

▪ Agrifood	▪ Energy	▪ Quantum
▪ Biotechnology	▪ Geospatial	▪ Robotics & AI
▪ Chemistry	▪ Health	▪ Security & Defence
▪ Creative Industries	▪ Industrial Maths	▪ Sensors
▪ Computing	▪ Infrastructure	▪ Space
▪ Design	▪ Manufacturing	▪ Transport
▪ Digital	▪ Materials	▪ Water
▪ Electronics	▪ Photonics	▪ (Net) Zero

UKRI Innovate UK | Business Connect

Our Network

- Networking and Knowledge Transfer

Networking Events | Workshops | Showcases

- Programmes

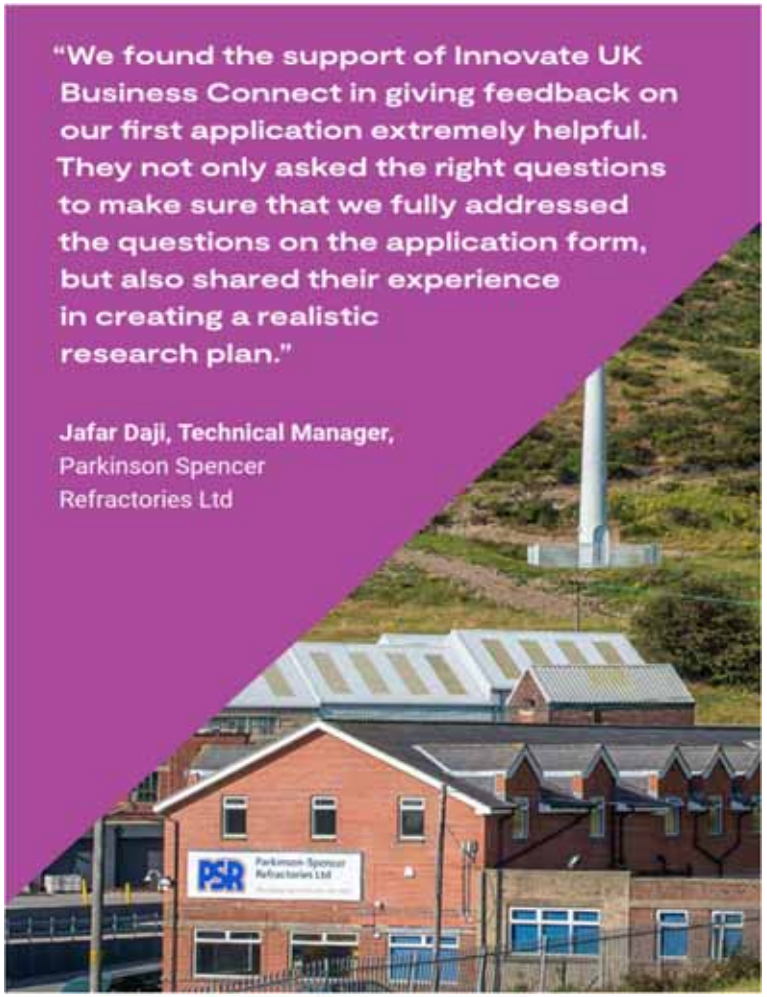
Knowledge Transfer Partnership (KTP) | Investor Partnerships | Innovation Exchange

UKRI Innovate UK | Business Connect

Support for Funding Applications

- **Signposting to relevant opportunities**
- **Connections to potential partners**
- **Guidance on applications**

https://iuk-business-connect.org.uk/



Current Funding / Training Opportunities

Business Connect Opportunities Page

- **Made Smarter Innovation – Improving energy or resource efficiency in manufacturing Feasibility Study**
- **Circular Critical Materials Supply Chains (CLIMATES) Investment Readiness Programme 2025**
- **Knowledge Transfer Partnership (KTP): 2025 - 2026 Round 3**
- **ICURe Discover Sprint cohorts**

UKRI Innovate UK | Business Connect

Materials & Manufacturing team

Robert Quarshie
Head of M&M

Ajay Kapadia
KTM Composites

Becky Bolton
KTM Advanced Manufacturing

Christopher Pilgrim
KTM Materials

Denise Goldsmith
KTM Marine Plastics

Elaine Livera
KTM Manufacturing Technologies

Lily Melody
KTM Materials

Lorelei Gherman
KTM Advanced

Mili Tharakan
KTM Smart

Neelam Mughal
KTM Advanced

Sally Beken
KTM Polymers

Contact: elaine.livera@iukbc.org.

Innovate UK Business Growth

Chris Woodward
Team Manager

UKRI Innovate UK | Business Growth

Inspire. Involve. Invest.

Innovate UK Business Growth

Tailored support that accelerates the growth of ambitious innovation-focused businesses

Over 400 innovation and growth specialists nationwide, supporting clients to make the best strategic choices and access the right resources to grow and scale.

We focus with you on the following priorities:

Honing your growth strategy

- Innovation strategy inc. IP & access to infrastructure
- Funding & finance strategy inc. investment readiness
- International markets & partnerships strategy inc. via EEN

Who do we work with?

- Innovation-focused businesses with new-to-market offerings, whether grant funded by Innovate UK or not
  - *Radical innovation or incremental innovation*
- Established and UK registered with up to 250 employees
- Targeted at later stage startups onwards with a 20%+ combined average growth rate, through to scaling businesses with a 50%+ CAGR
- Management committed to business growth

UKRI Innovate UK | Business Growth

Innovation Strategy

Strategic support to:

- **Manage innovation effectively**
- **Commercialise and scale more rapidly**
- **Access the right resources at the right time within the innovation ecosystem**

Support initiatives:

- Funded IP support and advice
- Participation in Peer Networks
- Funded access to RTOs and Catapults
- The Design for Growth scheme
- The BSI Standards for Growth scheme
- Funded NPSA security reviews

"I recommend Innovate UK Business Growth to any innovation-driven growth business Our dedicated specialist has made a decisive contribution to our success." **Neciah Dorh, FluoretiQ**

UKRI Innovate UK | Business Growth

Funding & Finance Strategy

Strategic support to identify your business objectives and determine which of the grant funding options and / or capital options will get you there.

Support initiatives:
If assessed to require equity financing, access **Invest-Ability**, our comprehensive investment readiness support including: Invest-Ability Intensive Training and Invest-Ability Pitch Panel.

Also benefit from our connections with other Innovate UK products and services plus partners such as London Stock Exchange, that give access to knowledge and opportunities to attract investment.

UKRI Innovate UK | Business Growth

"We're thriving in a disruptive sector with Innovate UK Business Growth support. Its strategic input has been invaluable to help grow our business." **Mark Hewitt, ICAX**

International Markets & Partnerships Strategy

Strategic support to:

- **Increase knowledge of international opportunities**
- **Reduce risk of exploring global markets**
- **Accelerate global growth and scaling**

Support initiatives:

- **Enterprise Europe Network** access: the world's largest business collaboration network
- Support to develop global innovation partnerships via Innovate UK initiatives e.g. **Global Business Innovation Programme**
- Access to focused brokerage activities
- Support accessing **Eureka** and **Horizon Europe** via Innovate UK's, **Horizon Europe Pump Initiative Priming**

UKRI Innovate UK | Business Growth

"Innovate UK Business Growth helped me grow my innovation-led business so we can create a new era of AI-enabled healthcare." **Peter Mountney, Odin Vision**

Scaleup Programme

Scaling companies have **opportunities and challenges on multiple fronts** as they prepare for **serious fundraising and international expansion** to become the next **champions for British innovation** on the global stage.

Innovate UK's Scaleup Programme is for **clients with the highest growth potential,** offering enhanced coaching from an **expert Scaleup Board and its extended connections.**

"Innovate UK Business Growth has brought my R&D-intensive business huge benefits. We have doubled in size this year and its scaling support has been critical." **Paul Holt, Photocentric**

UKRI Innovate UK | Business Growth

Research Solutions

- Dr Suneela Sardar, School of Engineering and Physical Sciences
- Dr Nick Tucker, School of Engineering and Physical Sciences
- Prof Matthew Goddard, School of Natural Sciences
- Prof Jeanette Rotchell, College Executive & Dr Nick Riess, Bridge
- Prof Jose Gonzalez-Rodriguez, School of Natural Sciences
- Dr Guzman Gil-Ramirez, School of Natural Sciences
- Dr Taghread Hudaib, School of Natural Sciences
- Dr Rob McElroy, School of Natural Sciences
- Dr Nikola Chalashkanov, School of Engineering and Physical Sciences
- Dr Souvik Roy, School of Natural Sciences
- Dr Graham Pattison, School of Natural Sciences
- Dr Lynda Skipper, Lincoln School of Humanities and Heritage

BRIDGE

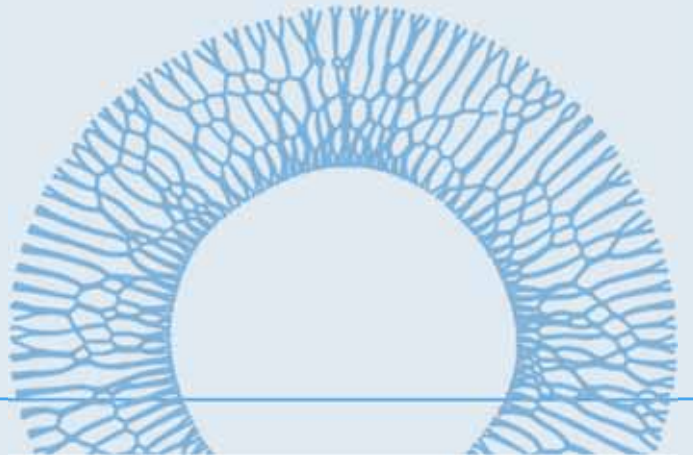
Dr Suneela Sardar

- Simulation of Thermophysical Properties of Advanced Molten Salts for Sustainable Energy Applications

BRIDGE

MOLTEN SALTS FOR ENERGY APPLICATIONS

Dr Suneela Sardar
Senior Lecturer in Chemical Engineering

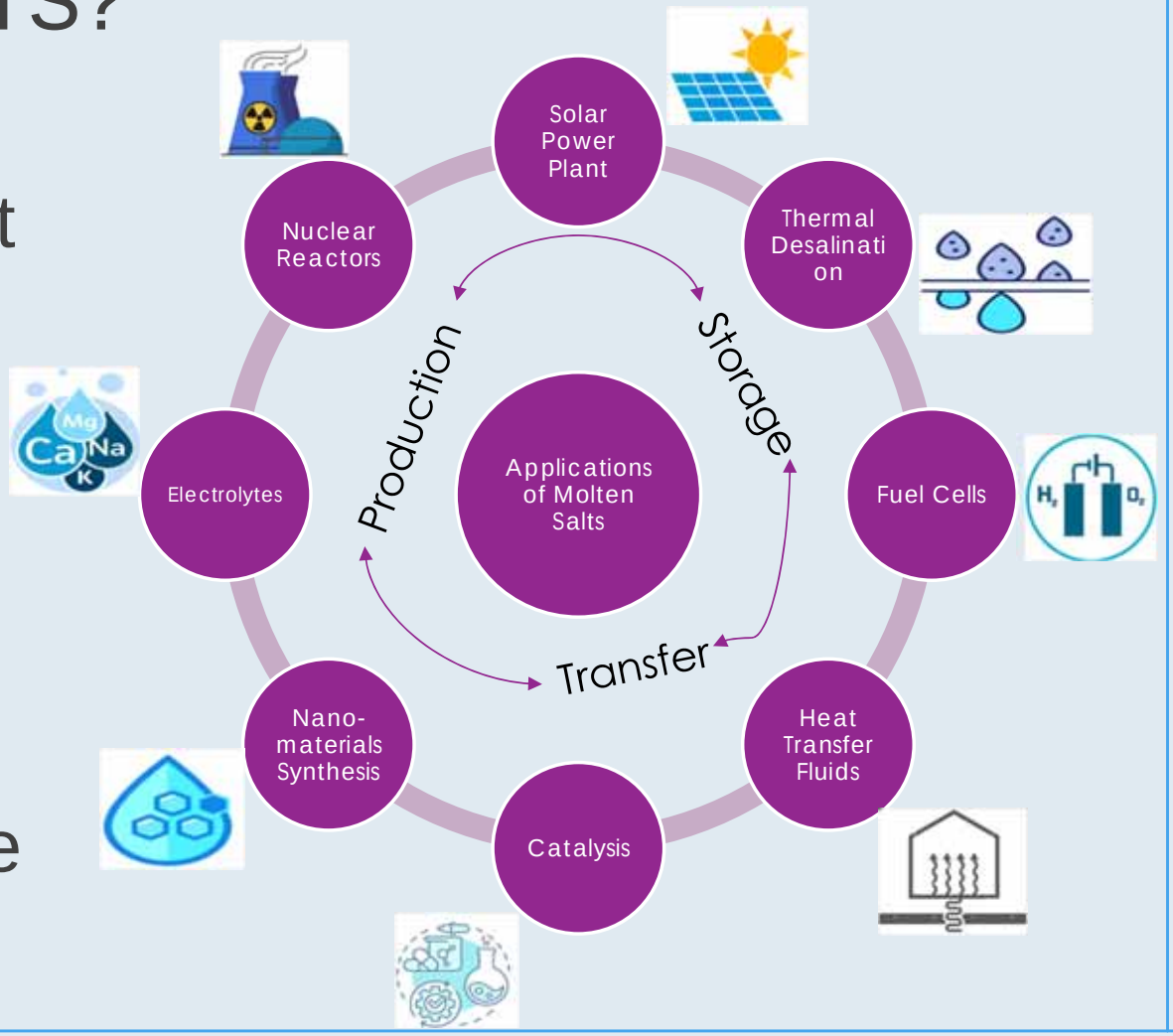


UNIVERSITY OF LINCOLN

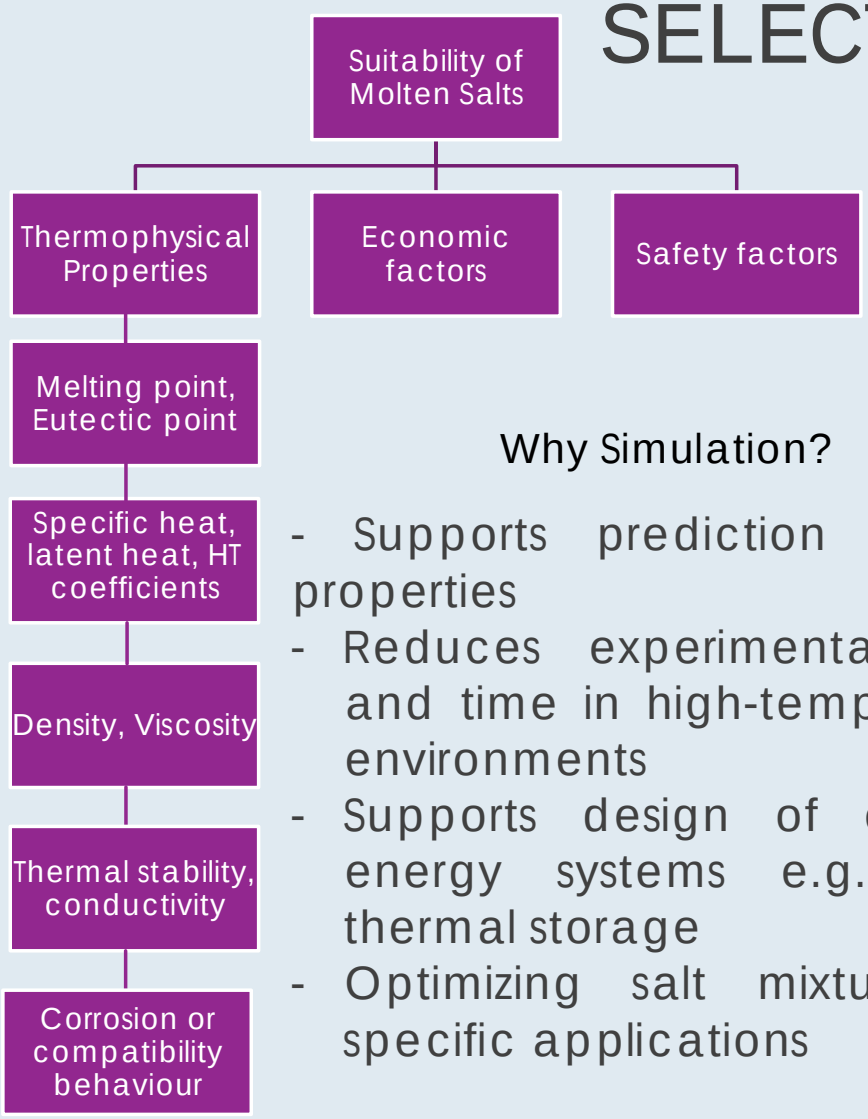
WHY MOLTEN SALTS?

Sustainability and Cost

- Inexpensive
- Abundant
- Recyclable
- Less environmental impact
- Supports sustainable infrastructure

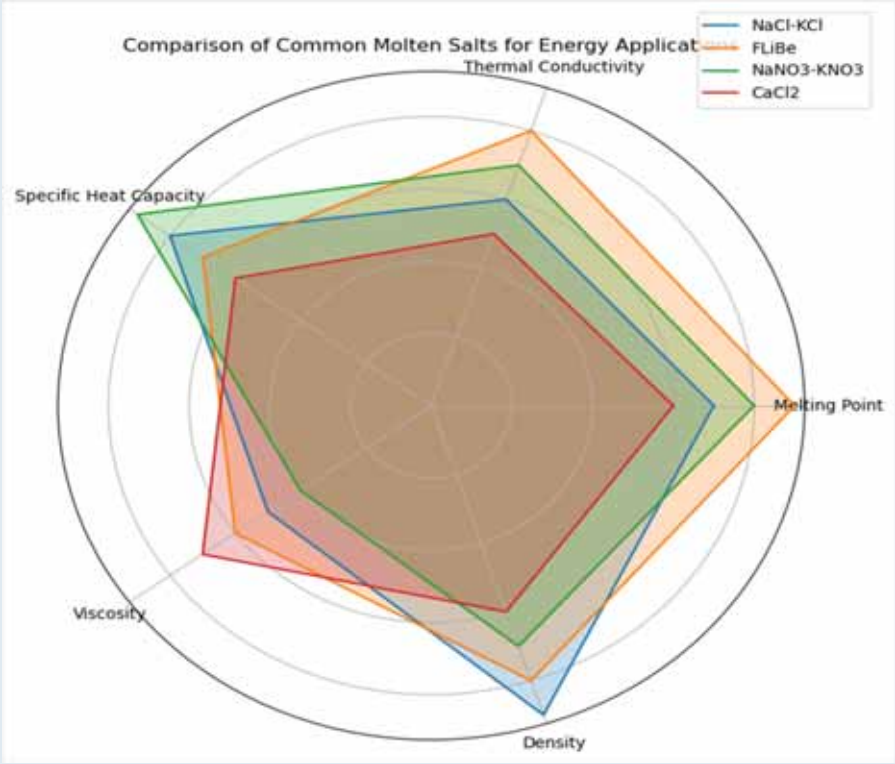


SELECTION OF MOLTEN SALTS

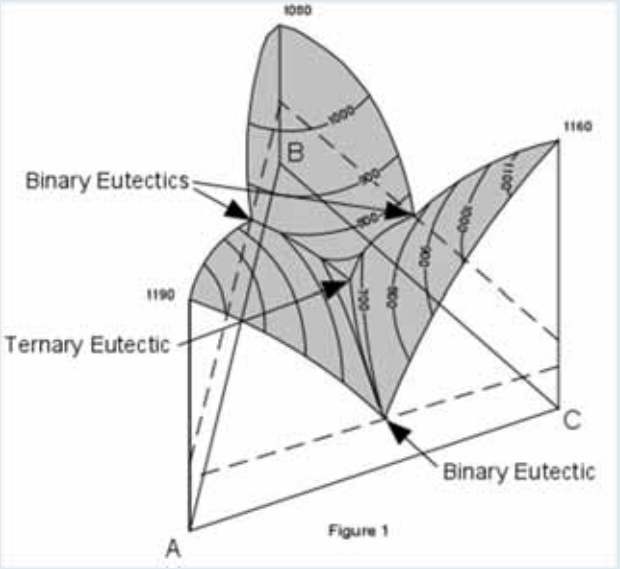


Why Simulation?

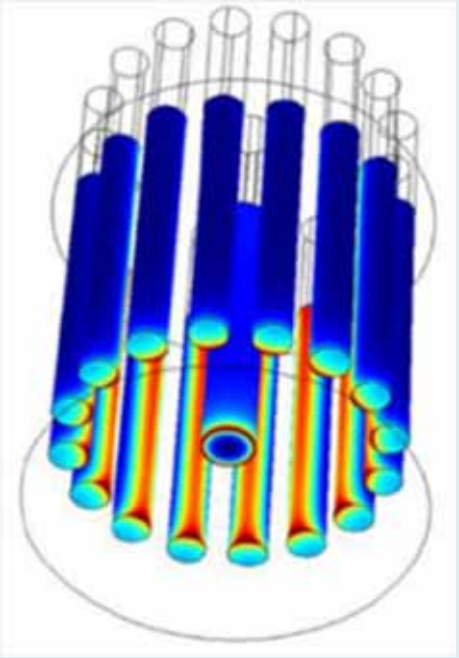
- Supports prediction of key properties
- Reduces experimental costs and time in high-temperature environments
- Supports design of efficient energy systems e.g. MSRs, thermal storage
- Optimizing salt mixtures for specific applications

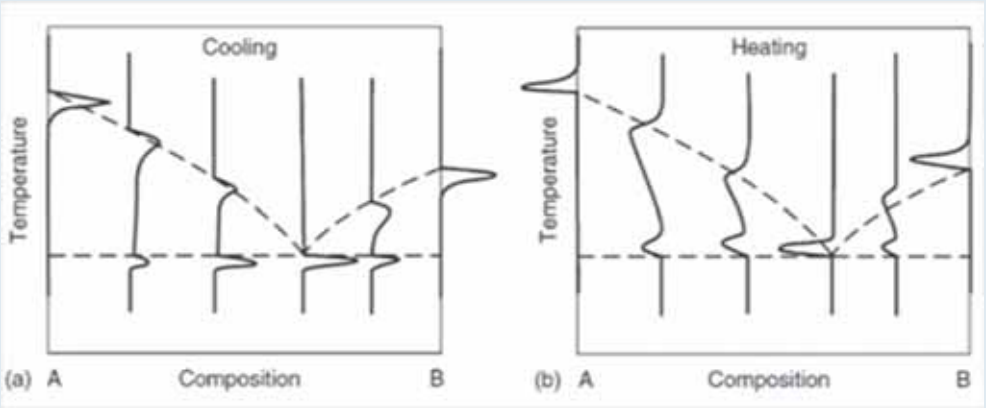


SIMULATION OF THERMOPHYSICAL PROPERTIES



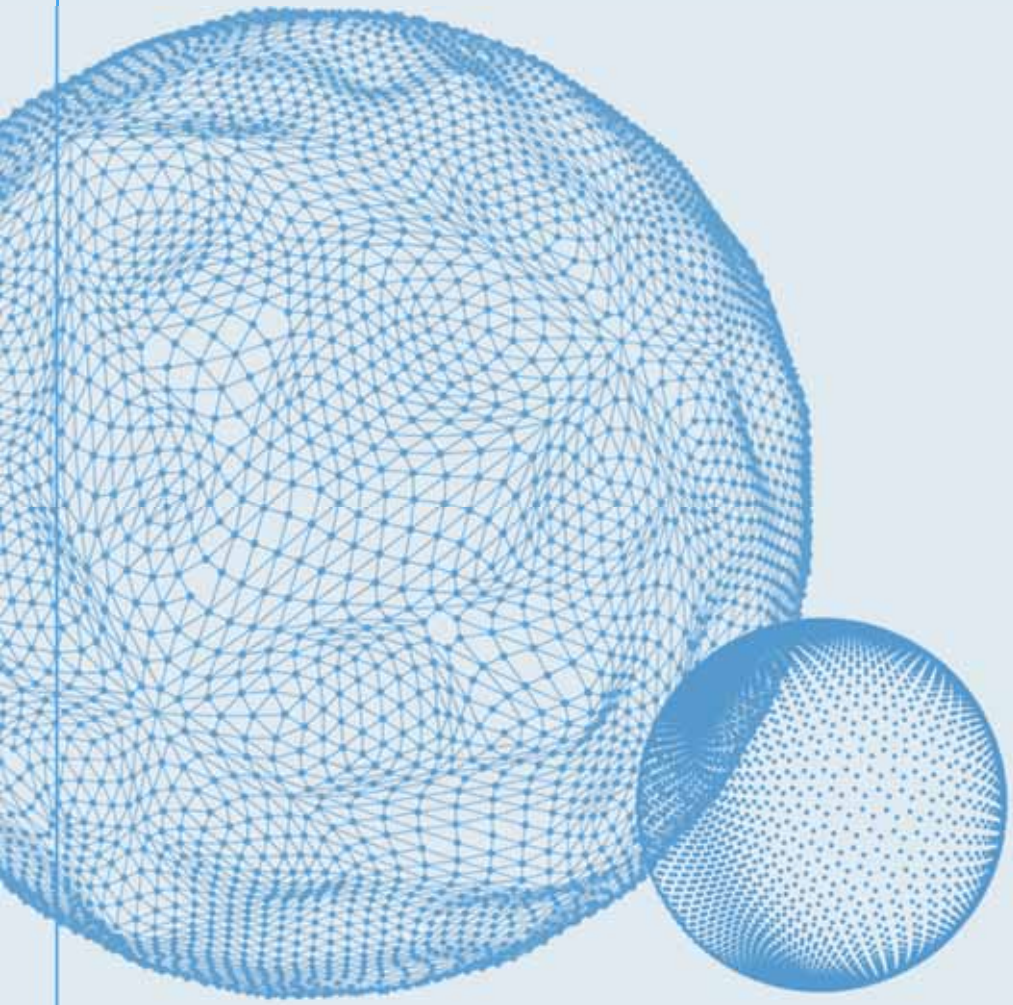
- Multiphysics modeling
- Thermal, electrical and mechanical simulations
- User-defined materials
- Customizable simulation environment





Electrical and Thermal Modeling of a Molten Salt Electro-Refiner using COMSOL

Thermodynamic Modeling through CALPHAD using FactSage



THANK YOU

SSARDAR@LINCOLN.AC.UK

Dr Nick Tucker

- Respiratory virus specific filters

BRIDGE

Future Filter

UNIVERSITY OF LINCOLN

Respiratory Virus Specific Filters : Materials and Manufacturing Research, Development, Commercialisation

Nick Tucker

Associate Professor - Manufacturing and Materials
School of Engineering and Physical Sciences
University of Lincoln

UNIVERSITY OF LINCOLN

Future Filter

Introduction to Virus Velcro

- In common with many universities, academics at the University of Lincoln, UK, formed groups to help in the struggle against the COVID-19 pandemic. A syndicate was drawn from the schools of design, engineering and pharmacy to develop an effective virus trapping filter. These filters are crucial in preventing further rising rates of coronavirus.

- For the wearer, the ideal face covering should offer low resistance to breathing. A low permeability is also desirable in that it allows free passage of breath through the covering, rather than around the edges.

- The technology is also applicable at the point of use to simple face masks

Future Filter

High Capture Percentage

- The group to assess the performance of the materials using an independent laboratory to perform tests to BS lSO 18184:2019 Textiles - Determination of the antiviral activity of textile products for antiviral properties. The material is being patented.

- This concept uses molecular biology and chemical mimicry to attract and entrap the virus on the filter fibres, meaning that physical entrapment by a mesh of fibres with a pore size smaller than the particle is not required.

- This method exploits the very advantage that viruses have when they mutate - they still stick to a common surface, namely the internal mucosal surfaces of the human respiratory tract.

- The results reveal better than 97% virus retention - the baseline for these tests was 55% for an uncreated filter substrate. These values indicate the proportion of the human Coronavirus 229E ATCC VR-740, Influenza H1N1, and Respiratory Syncytial Virus (RSV) virus that is immobilised by the treatment.

Future Filter

UNIVERSITY OF LINCOLN

Respiratory Virus Specific Filters : Materials and Manufacturing Research, Development, Commercialisation

Nick Tucker

Associate Professor - Manufacturing and Materials
School of Engineering and Physical Sciences
University of Lincoln

UNIVERSITY OF LINCOLN

Prof Matthew Goddard

- The commercial future of agri-food microbiomes

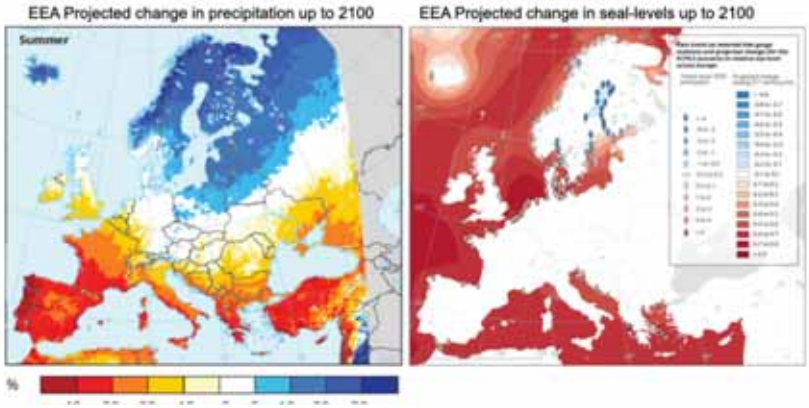
BRIDGE

Prof Mat Goddard

Local → **Global**

challenges

Climate change



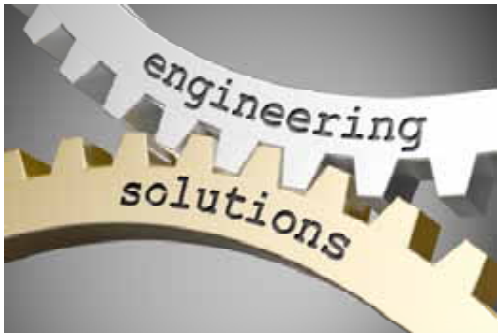
Habitat & biodiversity loss

Agriculture

Food security

National Food Strategy
Independent Review

Agriculture challenges

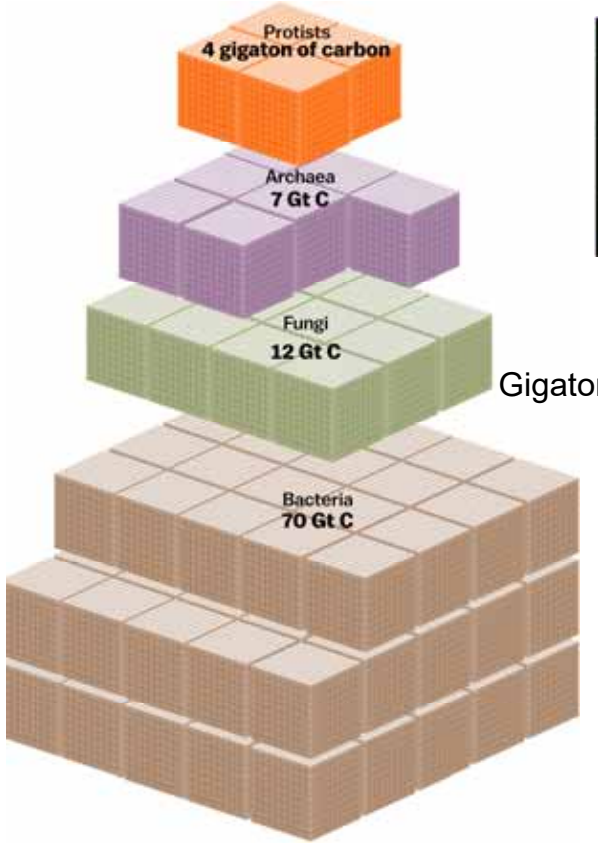


Biology has less focus, microbes even less, but they …

- underpin plant health, soil fertility and carbon sequestration
- cause disease (50% of production worldwide would be lost without the use of pesticides)

But its complicated: Microbes dominate biodiversity

~ 1 trillion species (most not described)



Gigaton = 1 billion tonnes

35 times more C in bacteria than in animals

There are more microorganisms in a kilo of soil than there are humans

If all the 1×10^{31} viruses on earth were laid end to end, they would stretch for 100 million light years

The importance of agri-food microbiomes:
The next agricultural frontier. We can potentially:

Better control negative impacts: disease

Harness positive impacts:
Soil fertility, structure, plant protection,

Previous funds used to

characterise and harness (i.e. commercialise)

adapt agricultural soil microbes to climate change

lab/research projects → **large scale commercial applications**

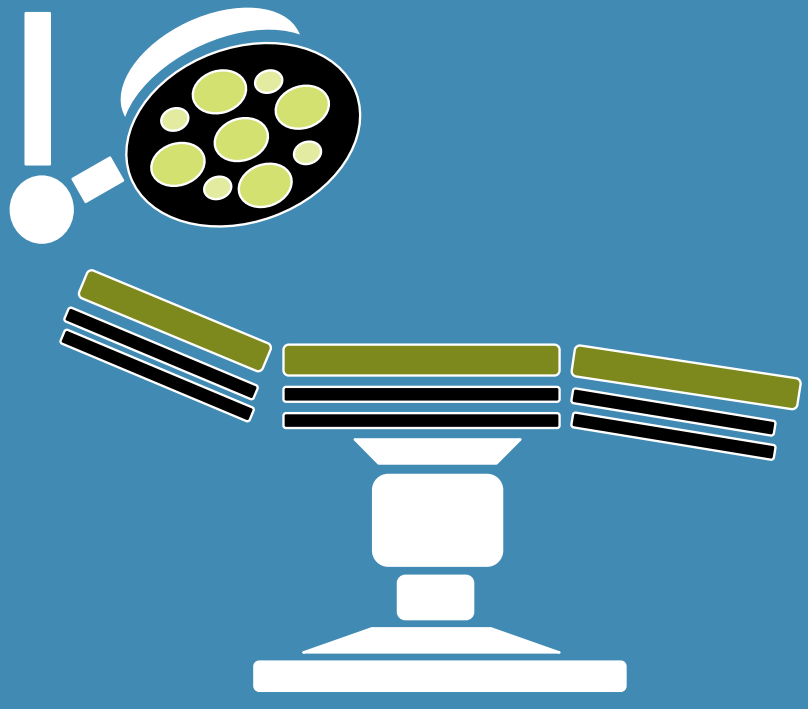
Prof Jeanette Rotchell (delivered by Dr Nick Riess)

- Microplastics and their additives in healthcare materials

BRIDGE

Microplastics in healthcare settings and equipment

Prof Jeanette Rotchell
Dr Nick Riess



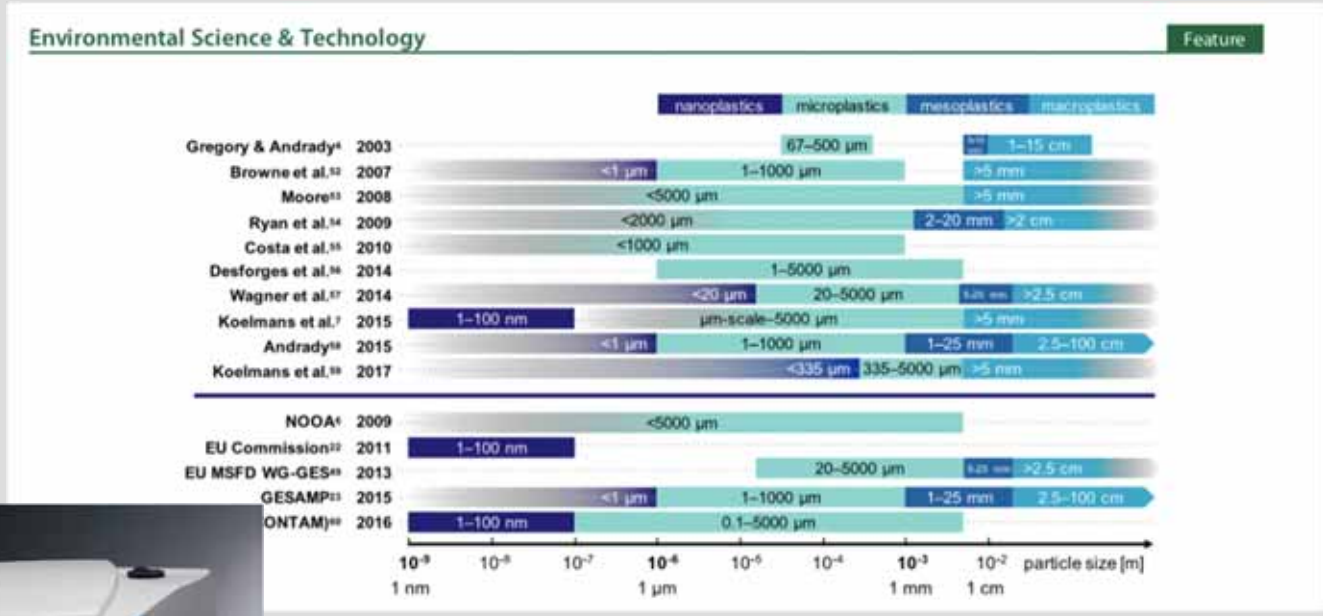
"MICROPLASTICS": WHAT ARE THEY?

- Size (we focus on 5 micron to 2 mm size range)
- Shape – fragment, fibre, sphere, film
- Colour
- Chemical characterization – many methods

No standardised methodologies (yet) but there are approaches that can add robustness to the datasets…

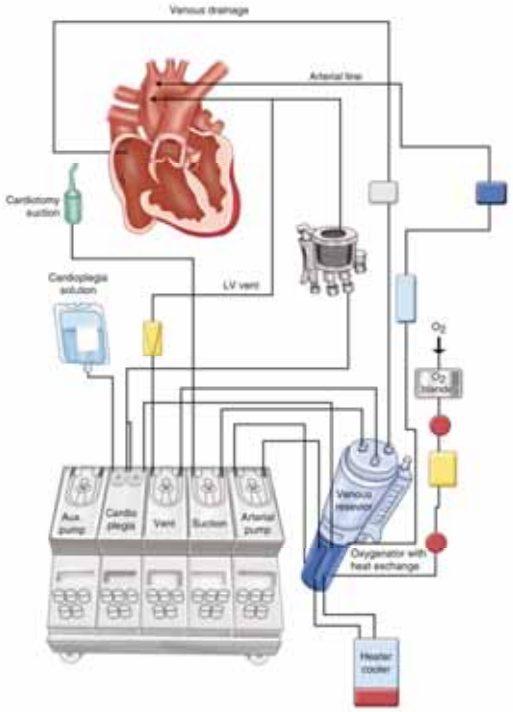
- Procedural blanks
- Reference materials
- LOQ/LOD calculations
- We use micro-FTIR to identify particles: polymer types, shape and size, as well as colour

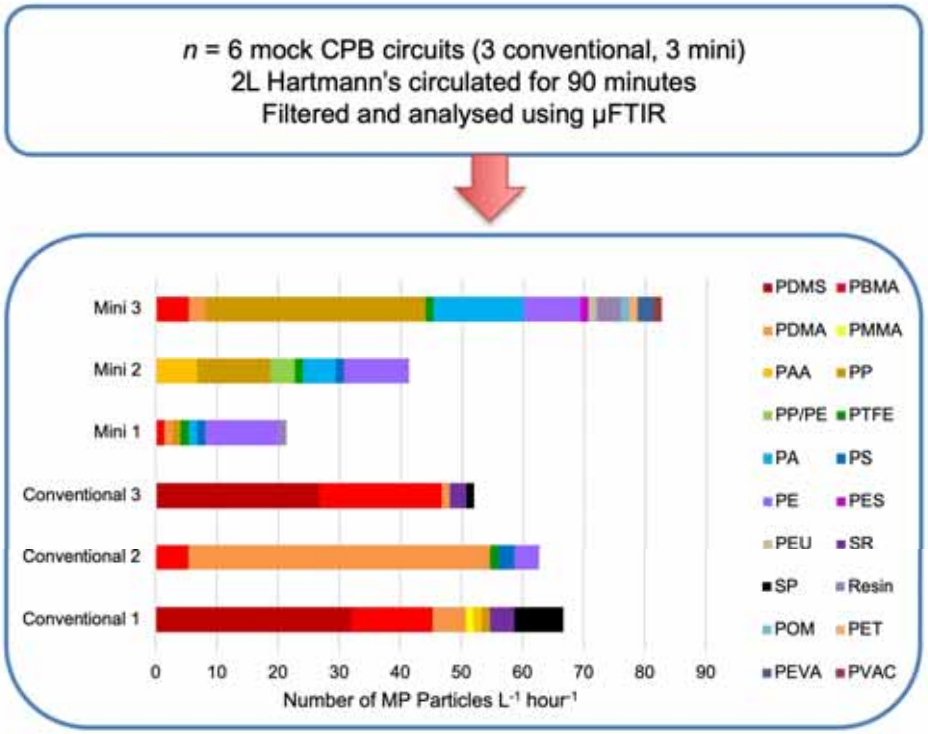
Figure: summary of studies and their size categorization definitions



Credit: from Hartmann et al., 2019

MPS: INTRODUCED VIA SURGICAL PROCEDURES?





3 hour bypass operation = ~150 MPs theoretically introduced into the body

Fragments of…

polydimethylsiloxane, >poly-decylmethacrylate>poly N-butylmethacrylate in conventional circuits.
For mini circuits – polypropylene> polyethylene>nylon

~90 v 60 µm x 30 µm

Also, note PTFE-containing particles (example of a PFAS 'forever chemical')

INDUSTRY CHALLENGE:
ARE THERE ALTERNATIVE MATERIALS THAT COULD BE DEVELOPED?
MODIFIED PLASTICS (WITHOUT ADDITIVES?)?

Prof Jose Gonzalez-Rodriguez

- Use of polymeric materials for the recovery of rare earths from industrial waste

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Chemistry @ Lincoln

LincolnChemistry@lincoln.ac.uk
Chemistry Twitter
Chemistry Linkedin

Jose Gonzalez-Rodriguez, PhD, FRSC

- **Professor in Forensic and Analytical Chemistry**
- **College deputy director of research (knowledge exchange)**
- **Programme leader MSc Forensic Science.**

Josegonzalezrodriguez@lincoln.ac.uk
https://selective–extractions.com

Research

Jose has been working in the field of analytical chemistry for over 25 years, generating £6.3 million in income and published 94 papers to date. He is the CEO of the university venture 'Environmental selective Extractions' dedicated to the recovery of valuable elements from waste and the elimination of contaminants.

Academic/Research Interests

- **Smart materials for environmental, forensic and defence applications**
- **Development of sensors for forensic and defence applications**
- **Use of analytical methods to improve chemical and biological analysis**

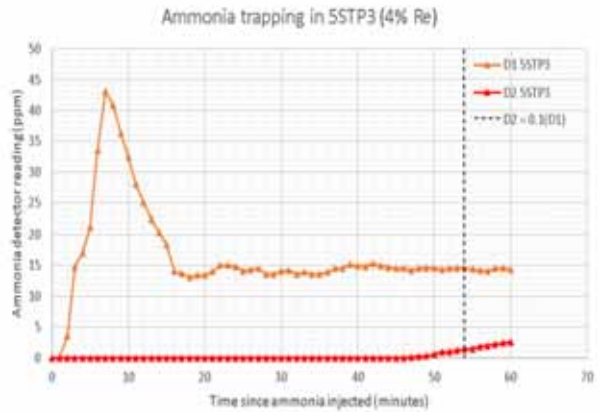
Current Projects

- Extraction of rare earths from industrial waste (IUK funded)
- Elimination of N compounds from air and water (DEFRA and Lincam awards)
- Elimination and destruction of chemical warfare agents (DSTL awarded)
- Analysis of cortisol in hair as a measurement of stress (WAI award)

Areas of Potential Collaboration

- Computational design and manufacturing of trapping materials through our venture ESE. We can extract valuable compounds / contaminants from liquids or gas industrial or environmental waste.

Optimum trapping



SBRI: Reducing pollution resulting from domestic burning or agricultural practices: Phase 1

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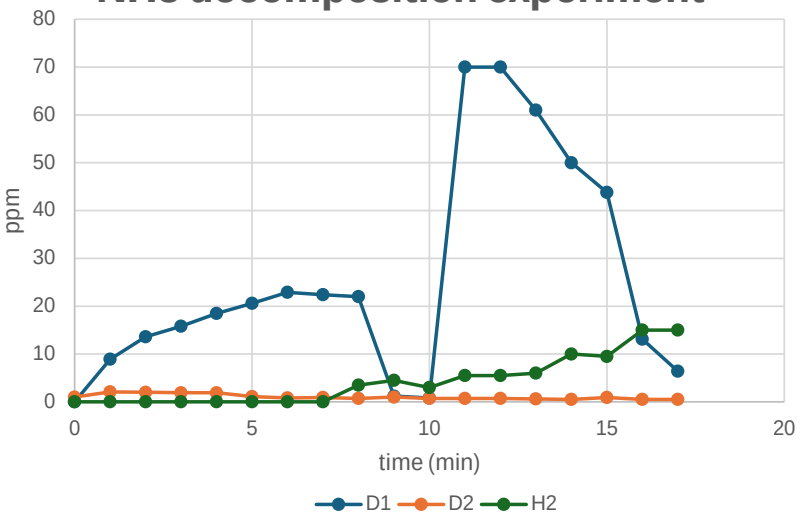
Environmental Selective Extractions



Application of Ion Imprinted Polymers for Selective Extraction of Trace Scandium and Yttrium in Titanium Dioxide Waste

F. Eaglestone-Blundell[1], T. Makanyire[2], M. A. Maregere[2] and J. Gonzalez-Rodriguez[1*]

[1]Department of Chemistry, University of Lincoln, Brayford Pool, Lincoln, UK.
[2]GSA Environmental Ltd (GSAe), Boole Technology Centre, Lincoln, UK.
*jgonzalezrodriguez@lincoln.ac.uk

Methods

Using computational methods such as DFT, a systematic elimination of monomers can be done to find monomers with a high affinity for template ions. The monomers selected for these calculations will have known synthetic routes that are compatible with IIP methods.

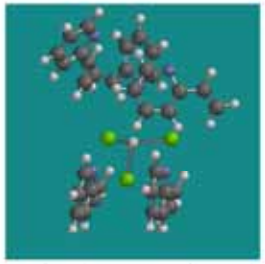


Figure 2. Monomer : template optimisation using DFT software

Figure 3. Scale-up of polymer synthesis for integration with GSAe pilot plant

Once the polymer has been synthesized, initial testing is undertaken using purer solutions of scandium and yttrium. If these experiments are successful, the polymers are scaled up and used with titanium dioxide waste solutions. The polymer and eluted solutions can be quantified using ICP-OES and X-ray fluorescence.

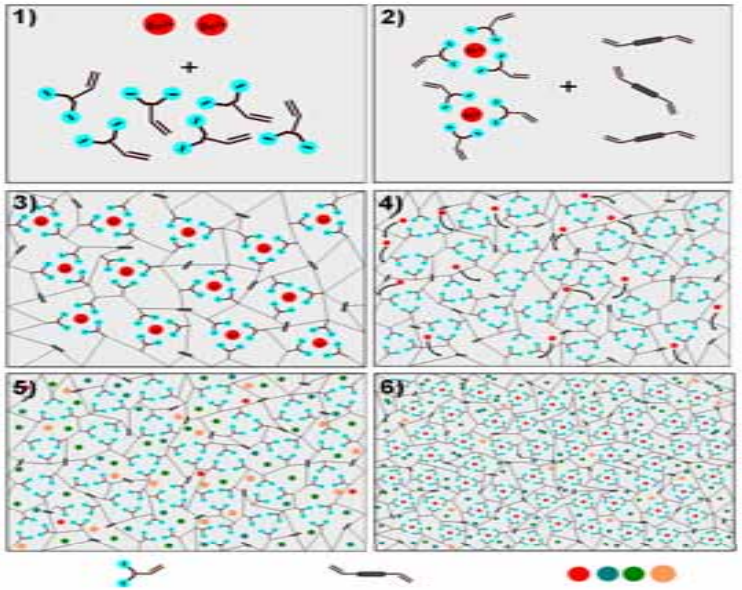


Figure 1. Diagram showing an example of the production of ion imprinted polymer with scandium and use with titanium dioxide waste solutions – **1)** Scandium ions and monomers in solution **2)** Pre-polymerization complex formation and cross-linking agent **3)** Polymerization and formation of an IIP **4)** Template removal from an IIP **5)** Introduction of titanium dioxide waste solution to the IIP **6)** Selective uptake of scandium with IIP

Dr Guzman Gil-Ramirez

- Use of biomaterials for the elimination of nitrates and ammonium in agricultural runoffs

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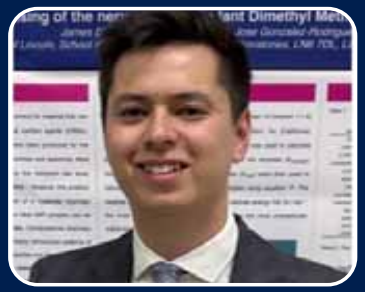
The Team

Prof Jose Gonzalez-Rodriguez

- Professor, Dept. of Chemistry
- PI
- Expertise: materials design and synthesis, analytical chemistry, environmental analysis, defence technology, sensors, multivariate analysis, forensic analysis, molecular and elemental analysis, computational chemistry, recycling, circular economy.

Dr Guzman Gil-Ramirez

- Senior Lecturer, Dept. of Chemistry
- Co-I
- Expertise: Synthetic chemistry, molecular interactions, chemical sensors, study of structure-property relationships. Interest in organophosphorous compounds and environmentally relevant anions such as nitrate or phosphate.



Dr James Disley

- Research Excellence Postdoctoral Research Fellow, Dept. of Chemistry
- Co-I
- Expertise: Analytical Chemistry, Material Science and Forensic Chemistry. Focusing on: Chemical Warfare, Terrorism, Agricultural issues, Filtering & Sensing, Polymer design and bio-renewable resources

The Problem

Excess nitrogen from agricultural is one of main causes of water pollution. Nitrate pollution levels are highest in East of England.

Nitrates and organic nitrogen compounds enter groundwater via run off from fields.

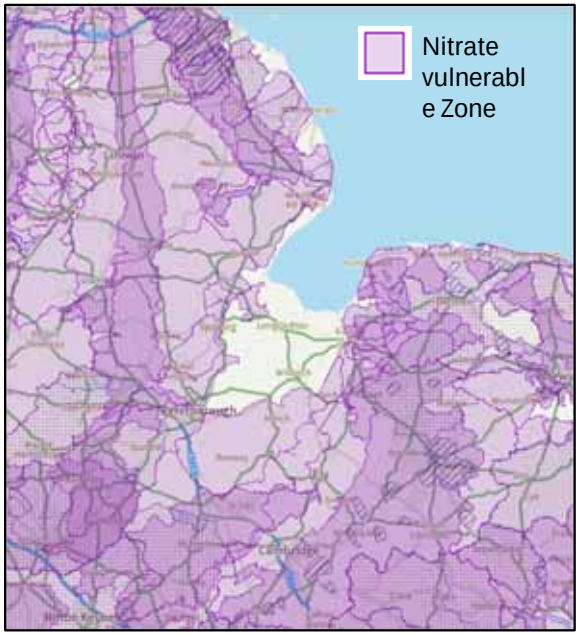
High concentrations of nitrate can cause:

- Risks to human health from drinking water.
- Eutrophication and acidification of water resources

Nitrogen Pollution Figures [1]	
Drinking water nitrate limit	50 mg/L
Drinking water ammonium limit	0.5 mg/L
N pollution (agricultural origin)	70 %
Approx percentage of N lost due to run off	45 %
Percentage of England that exceed limits	35 %

No. of breaches in 2023 [2]	
Nitrate Regulations	96 Breaches
Farming Rules for water	291 Breachers
Non-compliant	531 Farms
Warnings and fines issued	57 Farms

Penalty: Fine up to £50,000- or 12-months' imprisonment.



55% of England is designated as a Nitrate Vulnerable Zone (NVZ)[3], with 85% OF LINCAM being NVZ.

Estimated cost to the agricultural sector £44 - 65 million per year to comply with the NVZ regulations.

The UK must half its nutrient waste by 2030 to meet COP15 global agreement.

The UK must achieve '*good ecological status*' and '*good chemical status*' for all waterbodies by 2027.

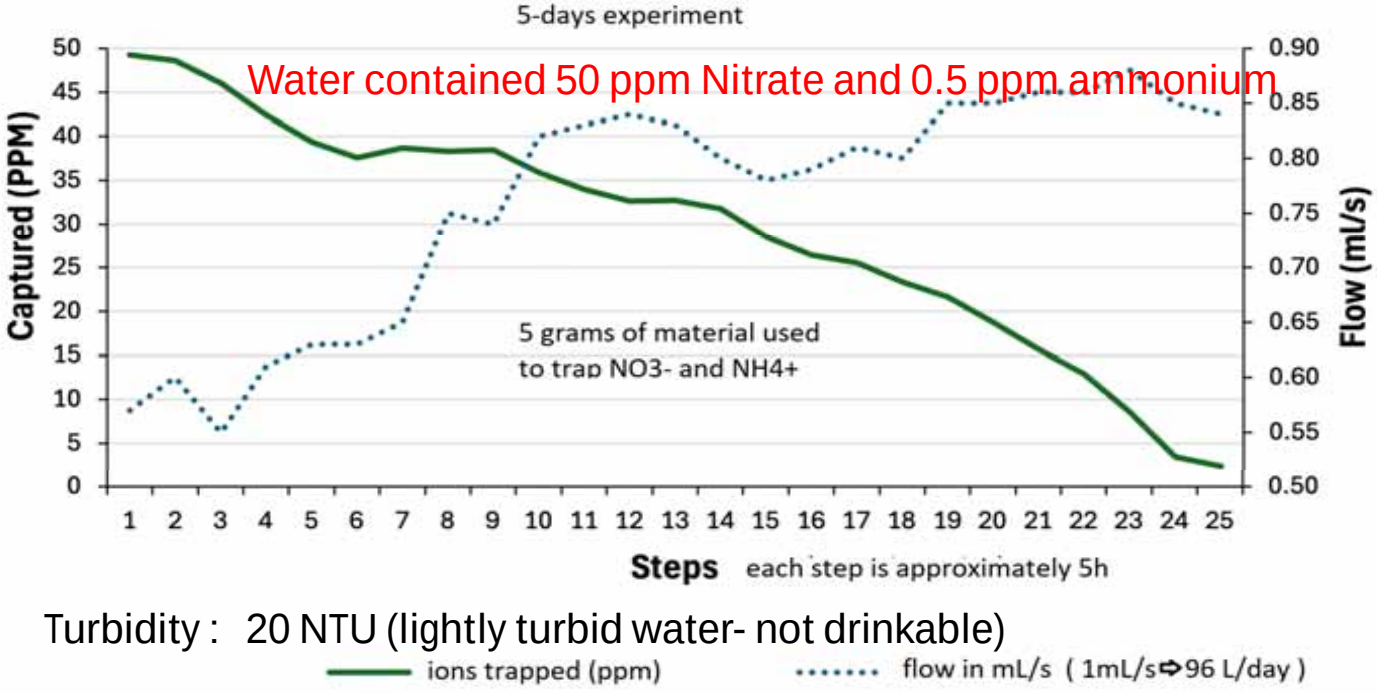
In 2019, only 16% of water bodies meet good ecological status and 0% meet good chemical status.

Summary

Problem: Nitrates and organic nitrogen compounds enter groundwater via agricultural runoff; polluting the environment and affecting human health.

Lack of effective solutions for NO_3^- and NH_4^+ removal

UoL USP: Functionalised biomaterials economically trap NO_3^- and NH_4^+



Turbidity : 20 NTU (lightly turbid water- not drinkable)

Dr Taghread Hudaib

- Phytochemicals to Photocatalysts: Innovating in Bioactivity& Environmental Chromatography

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Dr. Taghread Hudaib

Senior Lecturer in Pharmaceutical Sciences
PhD in Phytochemistry and Bioactivity of Natural Products
Expertise in biological and environmental activity of phytochemical, biological and volatile organic compounds (VOCs)
Research interests: Bridging analytical chromatography and biology to tackle health and sustainability challenges.

Research Areas & Current Projects

1. Phytochemical & Biomolecule Analysis:
GC-MS, SPME, derivatization for biomolecules from plants, bacteria, and biological fluids
Melatonin derivatization and levels in biological specimens (PhD student project)
2. Air Quality & Environmental Monitoring:
Analysis of VOCs, NOx, CO_2 in agricultural/urban settings:
PI on £1M Innovate UK(Decarbonising Agriculture-Synergistic nitrogen-fixing bacteria & photocatalysts)
3. Bioactivity of Natural Products:
Anticancer (PhD, tissue culture collaboration project)
Antiaging (Masters, insect models)
Antimicrobial (Undergraduate projects)

Dr Rob McElroy

- New routes to the synthesis of polyesters and polyurethanes

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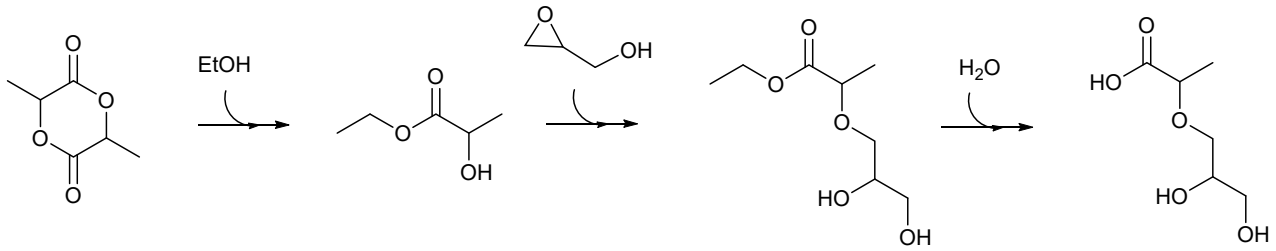
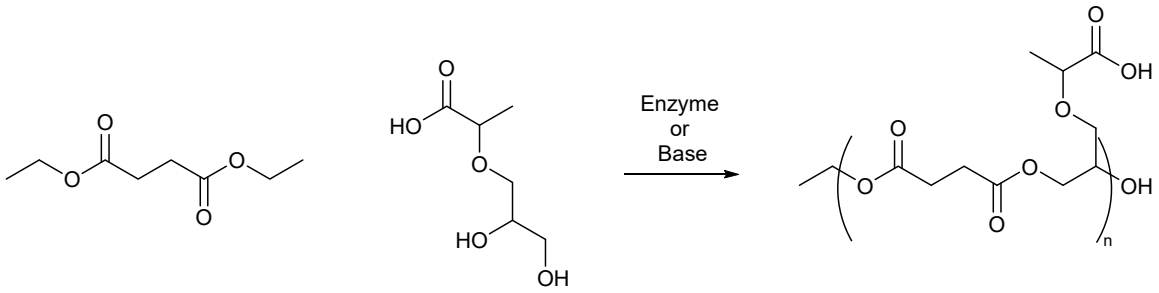
INDUSTRY & ACADEMIA NETWORKING DAY

Dr Con Robert McElroy

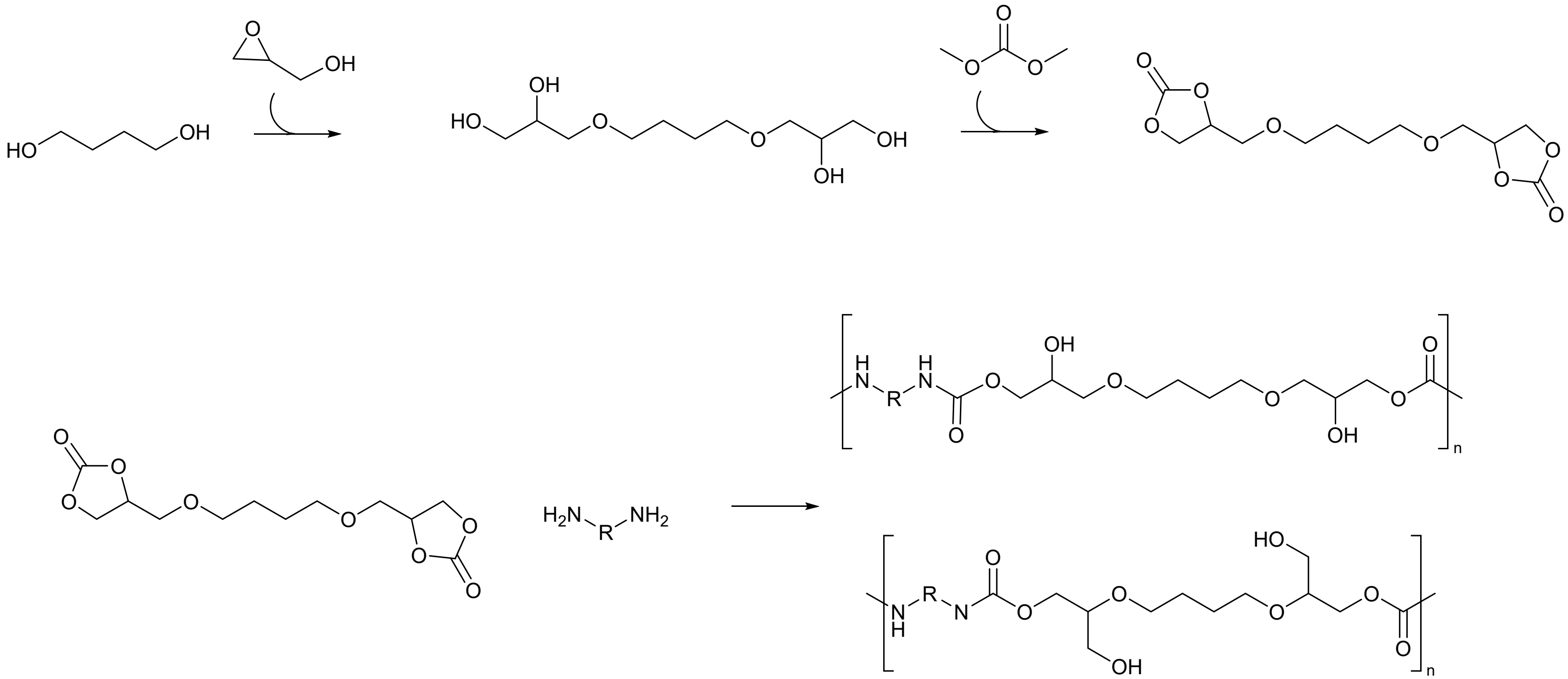
Production of diols



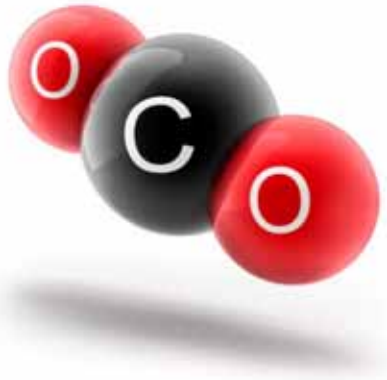
Polymerisation



Isocyanate free PUs



Why?



Dr Nikola Chalashkanov

- Novel sustainable materials for energy transition and how to predict their reliability and long-term performance

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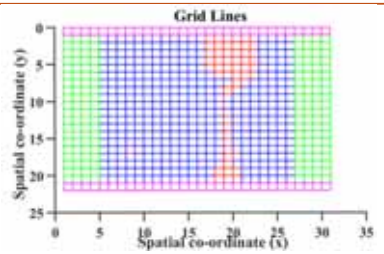
Dr Nik Chalashkanov *PhD, MEng, BEng, SFHEA, SMIEEE. MInstP*

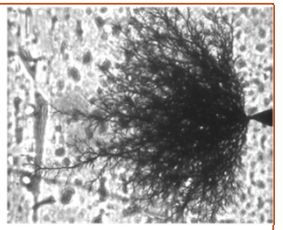
UNIVERSITY OF LINCOLN

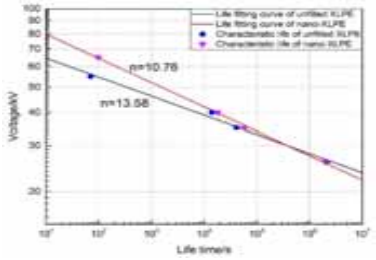
Personal and Technical Background

- Senior Lecturer in Electrical/Electronics Engineering
- Published 20 journal papers
- Published 32 conference papers
- 15 years academic experience

Research Interests/Projects







- Novel materials for electrical insulation
- Modelling dielectric response of nano-dielectrics
- Modelling electrical tree growth
- Modelling electrical ageing of insulation
- Developing new partial discharge recognition techniques for reliable condition monitoring of high voltage power plants
- Condition monitoring in HVDC systems
- Space charge accumulation in HVDC cables

Current Projects with Industry

- BioSusTOil - Developing sustainable insulation oil for power transformers via pyrolysis of biomass feedstock. – (PI) Supergen Bioenergy Hub project, UKRI, £99,606; April-September 2025
- Thermo-electrical ageing mechanisms in polymer-ceramic nanocomposites for energy storage applications (TEAMS) – (PI) project 852, Dutch Polymer Institute (DPI), P.O. Box 902, 5600 AX Eindhoven, the Netherlands, Funding: €280,000; March 2022 – August 2025

Email: nchalashkanov@lincoln.ac.uk **Website:** https://staff.lincoln.ac.uk/nchalashkanov

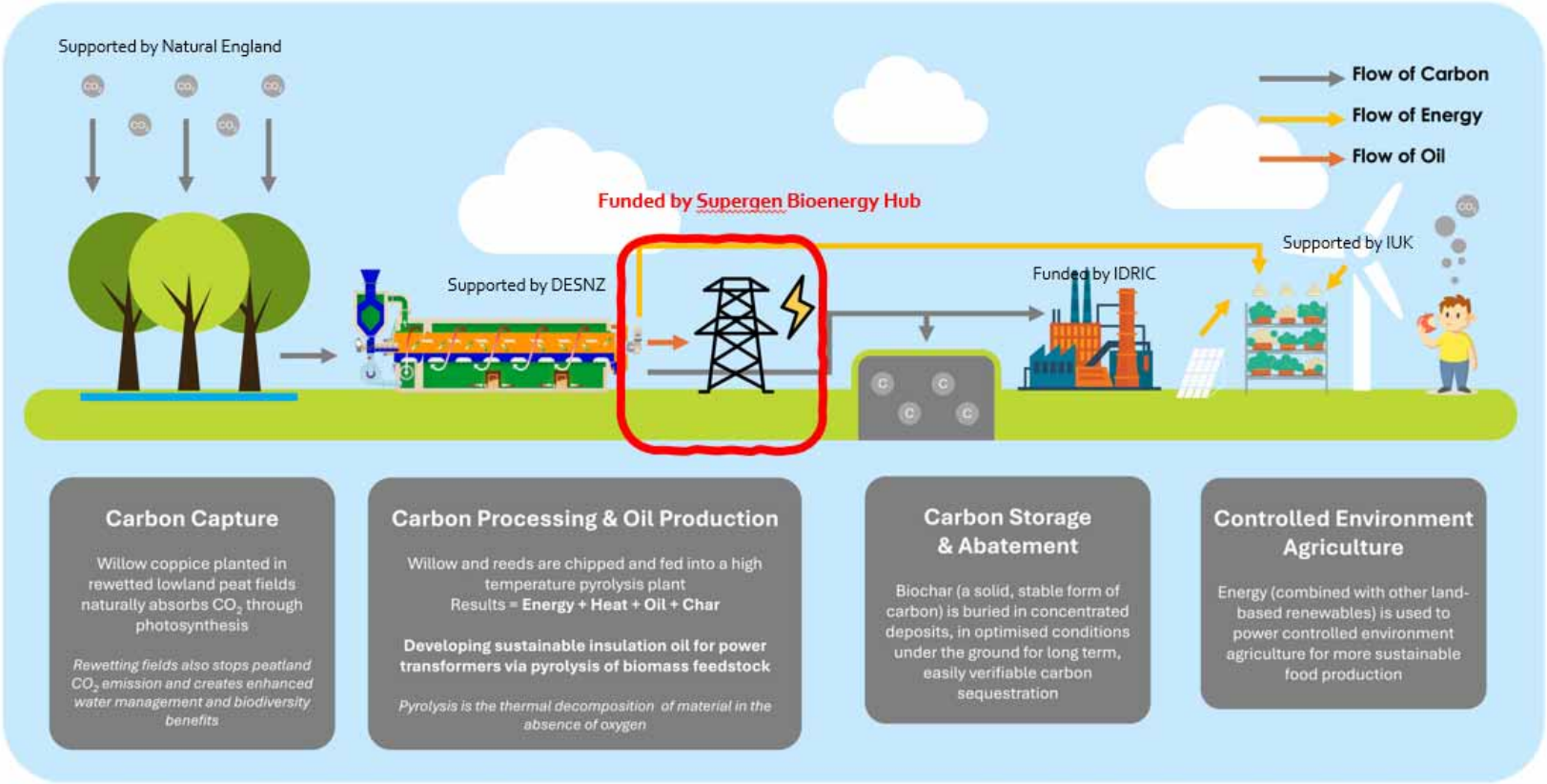
BioSusTOil - Developing sustainable insulation oil for power transformers via pyrolysis of biomass feedstock

Objectives:

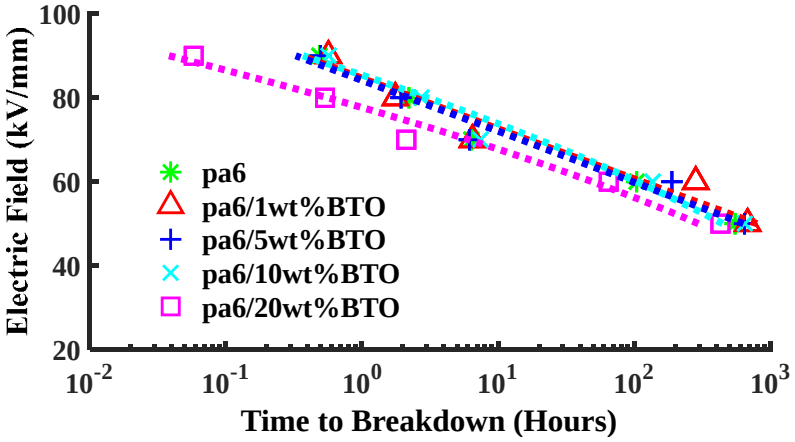
To produce. and characterise the bio-oil and explore its suitability to be used as power transformer insulation fluid.
Benchmarking the bio-oil with other conventional off-the-shelf insulation oils.
Testing the bio-oil in lab condition power transformers.

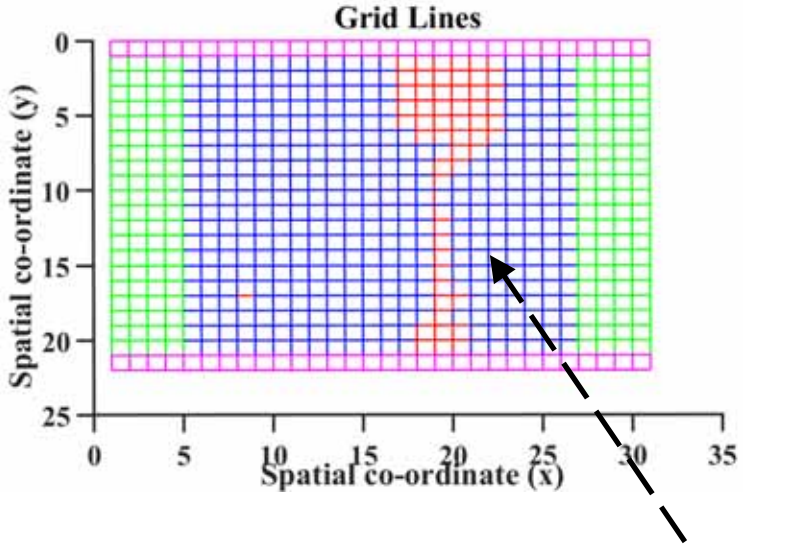
Impacts:

Decrease the reliance on petroleum oil resources to produce mineral oil-based insulation fluids and decrease the carbon footprint required to import the oil.
Significant step towards circular economy in agriculture and power generation industries.
Great potential to prevent deforestation of vulnerable ecosystems and support decarbonisation of the energy grid.



Thermo-electrical ageing mechanisms in polymer-ceramic nanocomposites for energy storage applications (TEAMS)





- Breakdown tests were conducted at **80°C temperature**.
- **Electric fields** versus **time to breakdown (log scale) in hours**.
- The lifespan of PA6/20 wt% BTO samples is shorter compared to all other samples across all electric fields.
- At lower electric fields, a specific amount of nanofillers enhances the lifespan compared to neat PA6, possibly because these nanofillers act as charge traps in a DC electric field.
- Individual breakdown patterns and time to breakdown can be estimated from the ageing model

Dr Souvik Roy

- Electrochemical tools for waste upcycling

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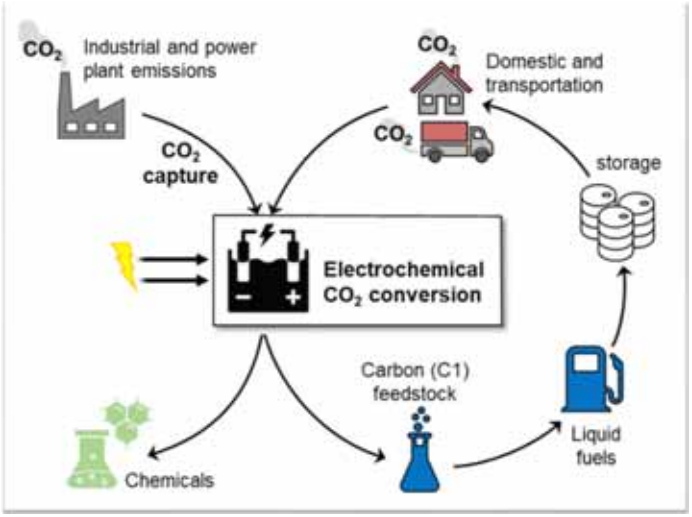
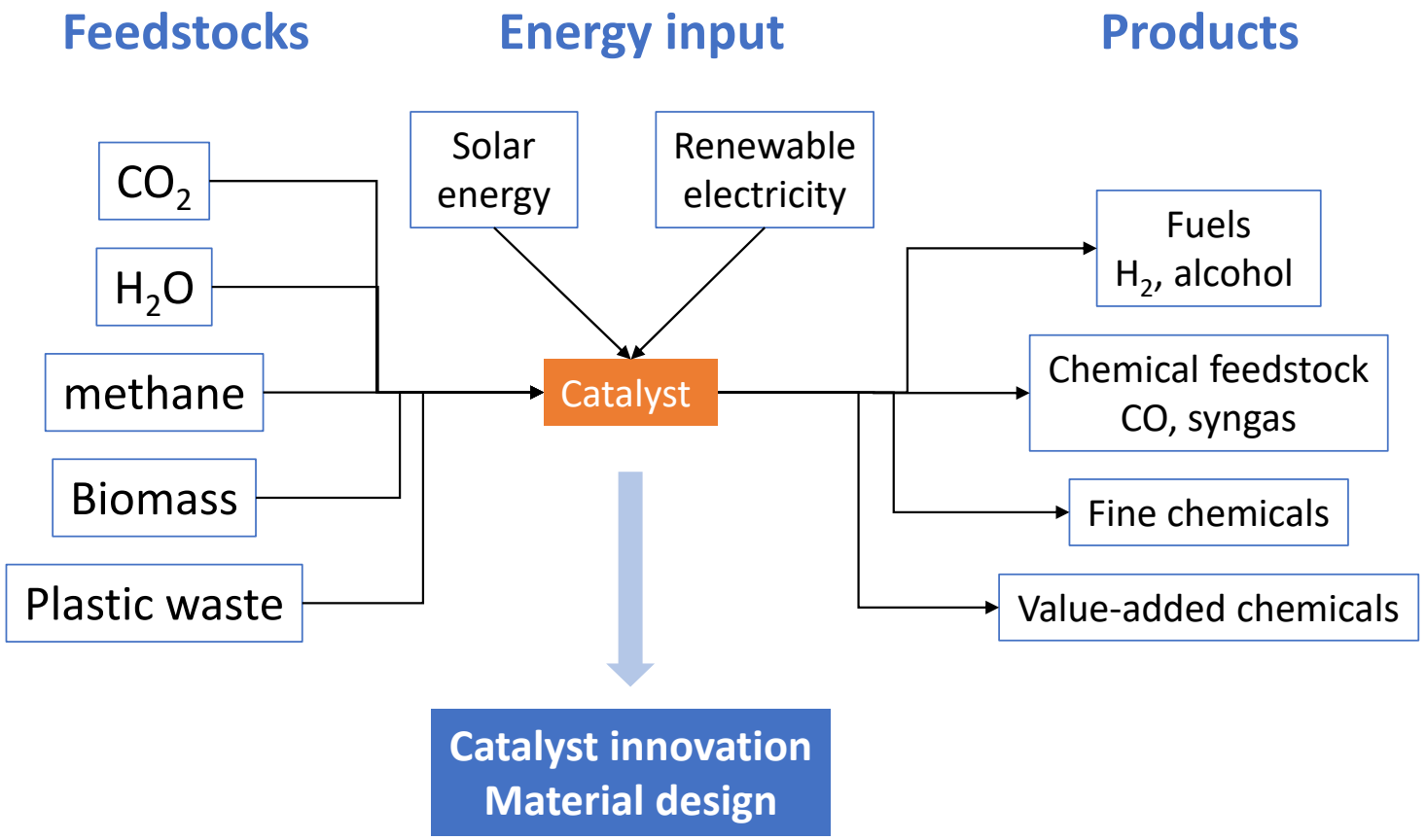

CO_2
Industrial and power plant emissions
CO_2
Domestic and transportation
CO_2
CO_2 capture
storage
Electrochemical CO_2 conversion
Carbon (C1) feedstock
Liquid fuels
Chemicals


Feedstocks
Energy input
Products
CO_2
H_2O
methane
Biomass
Plastic waste
Solar energy
Renewable electricity
Catalyst
Fuels H_2, alcohol
Chemical feedstock CO, syngas
Fine chemicals
Value-added chemicals
Catalyst innovation
Material design

Co-electrolysis of CO_2 and PET to produce value added products

Formate + terephthalic acid (monomer)

1M KOH (+EG)

AEM

1M KOH

$CO + H_2$

CO_2

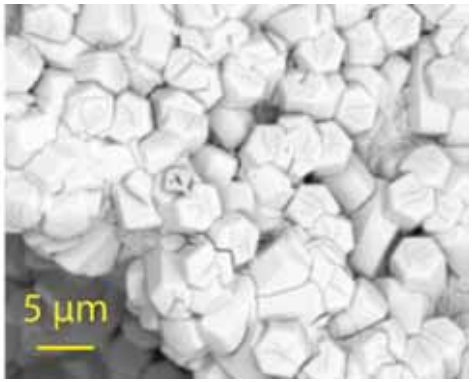
CP|CoPPc

NF|Co-MOF-74

PET hydrolysate

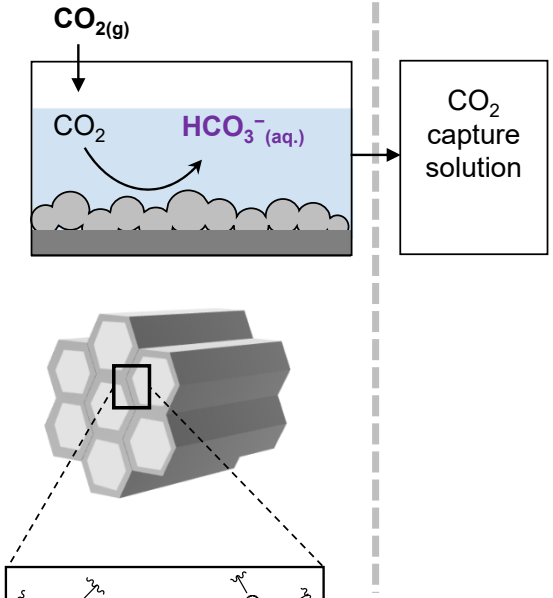
CO_2 recycling
CO_2-to-liquid fuels

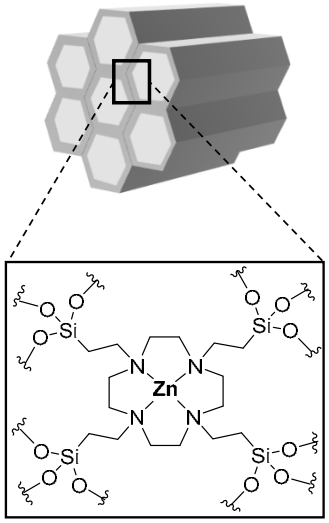
closing the plastic loop& upcycling

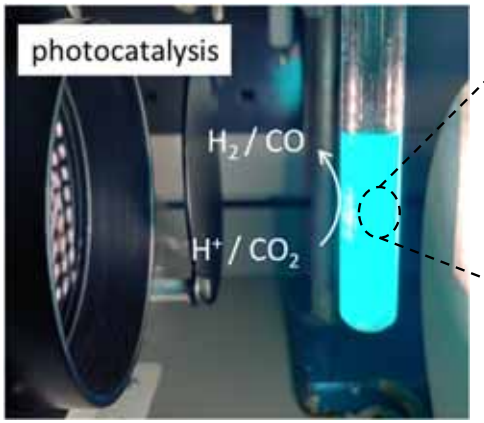


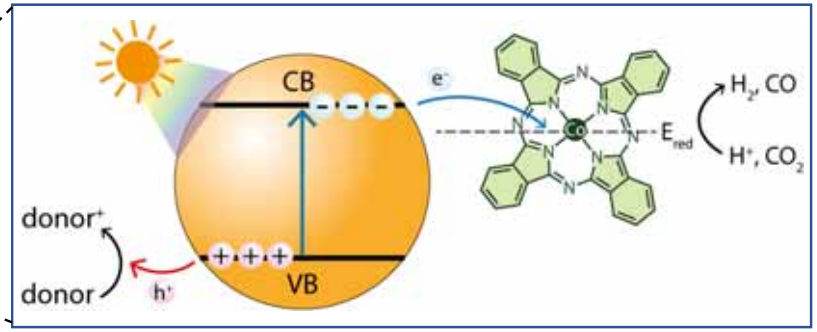
CO_2 capture and solar-driven CO_2 conversion

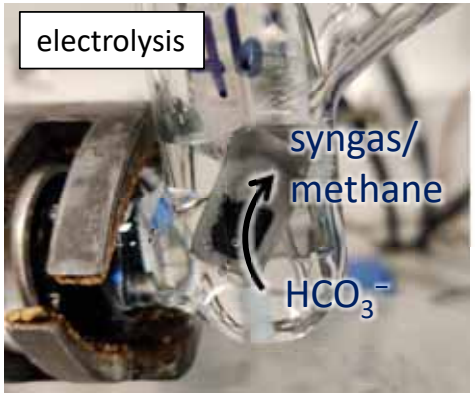
CO_2 capture process

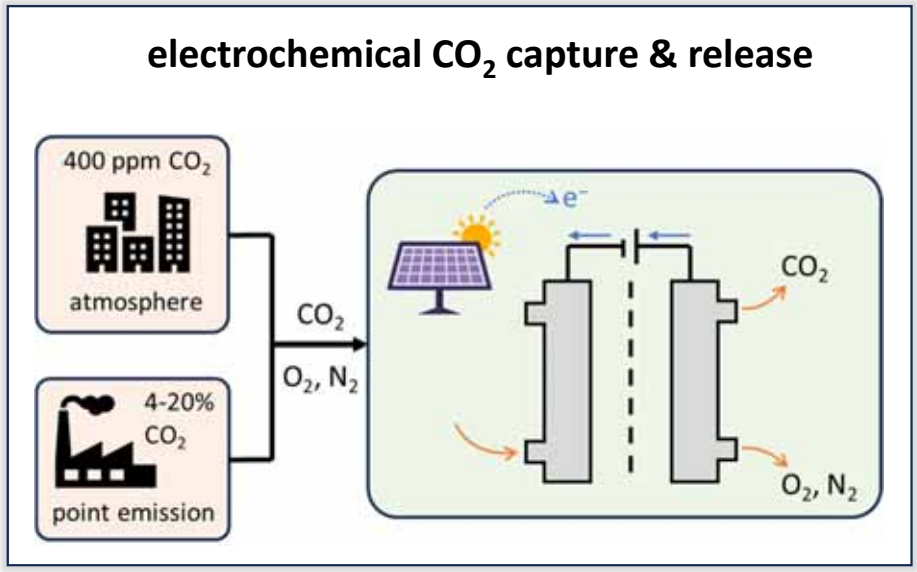












Dr Graham Pattison

- Fluorine for medicines and materials

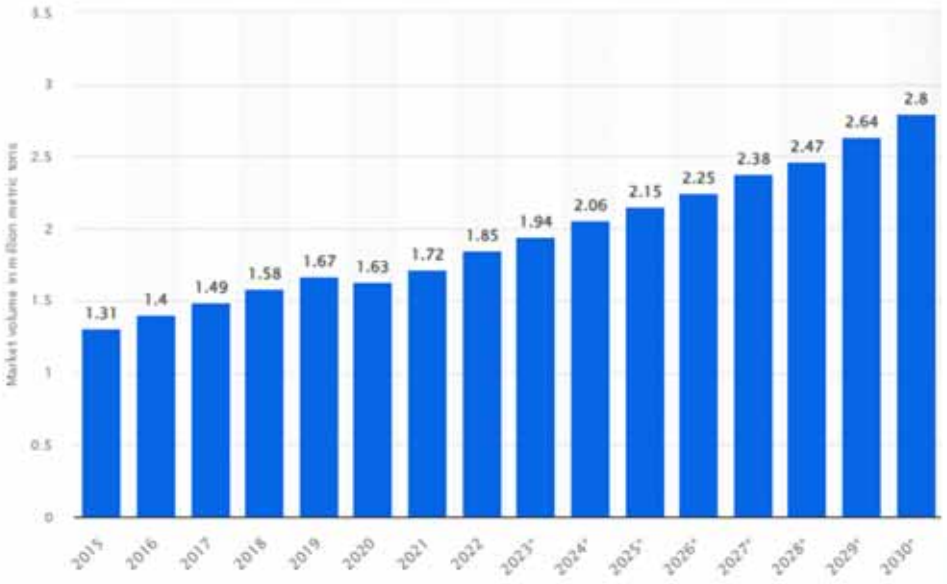
BRIDGE

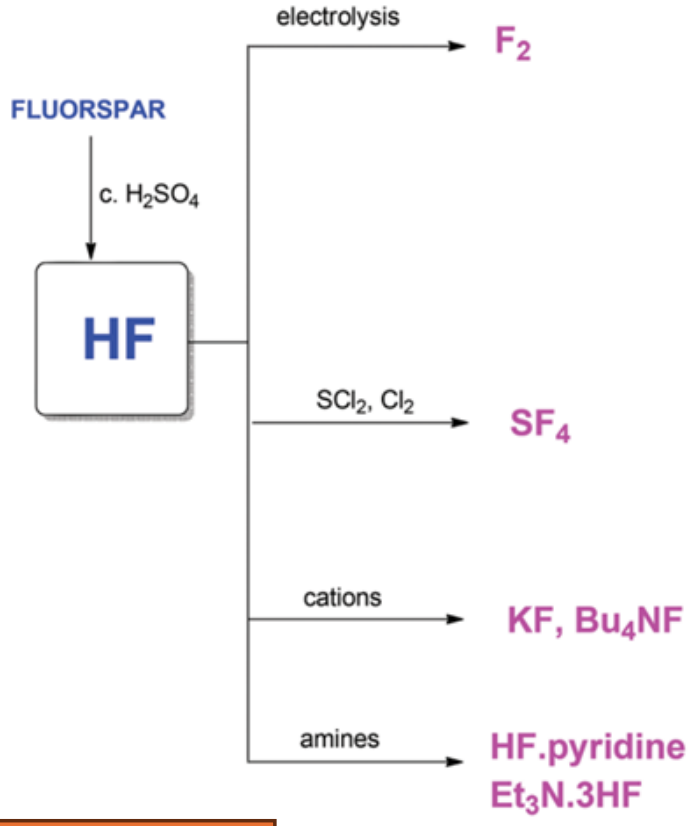
Towards a Circular Economy for Fluorine

Fluorochemicals
- Market Valued at $26.5 billion in 2023
- Growing at 4.4% per year

Fluorspar
- Over 8.7 million tons mined in 2023
- Global reserves of 418 million tons
- Demand increasing due to EV batteries

Demand for HF is growing

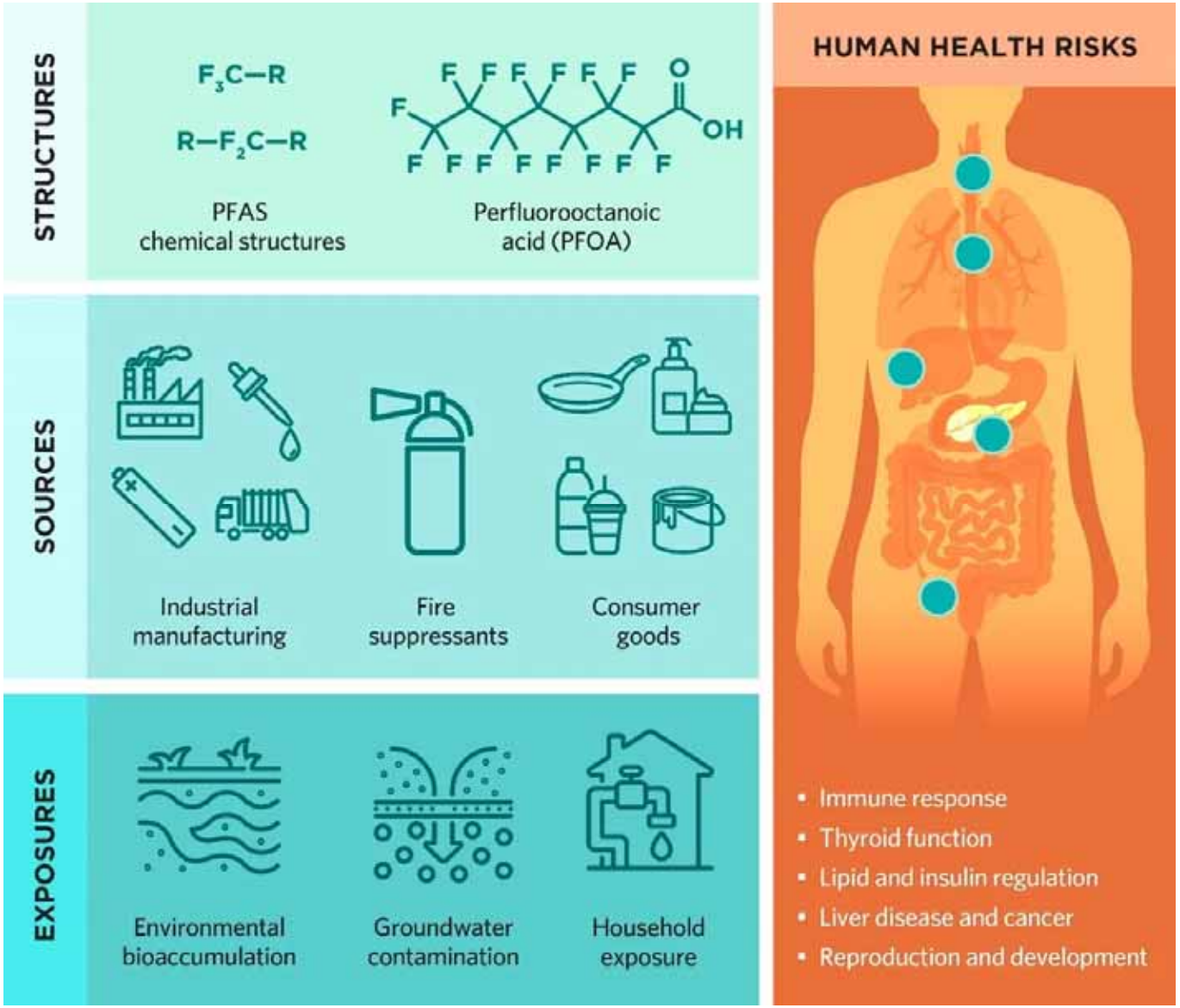




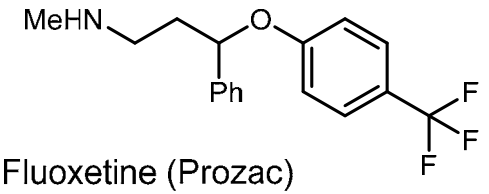
PTFE
- We use 0.3 million tons per year
- Only 3.4% is recycled

Can we recycle the fluorine from fluorochemicals?

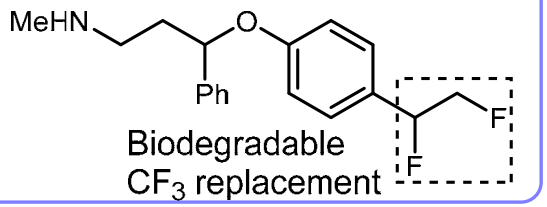
Replacement of PFAS ‘Forever Chemicals’



More biodegradable fluoro-pharmaceuticals



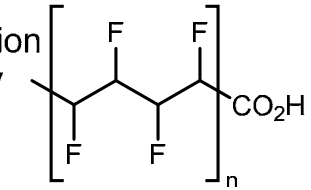
Fluoxetine (Prozac)
- Accumulation in drinking water



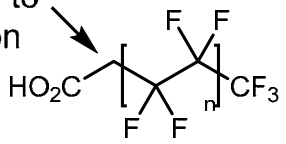
Biodegradable CF_3 replacement

Replacements for PFAS 'forever chemicals'

Partial fluorination - more easily degraded



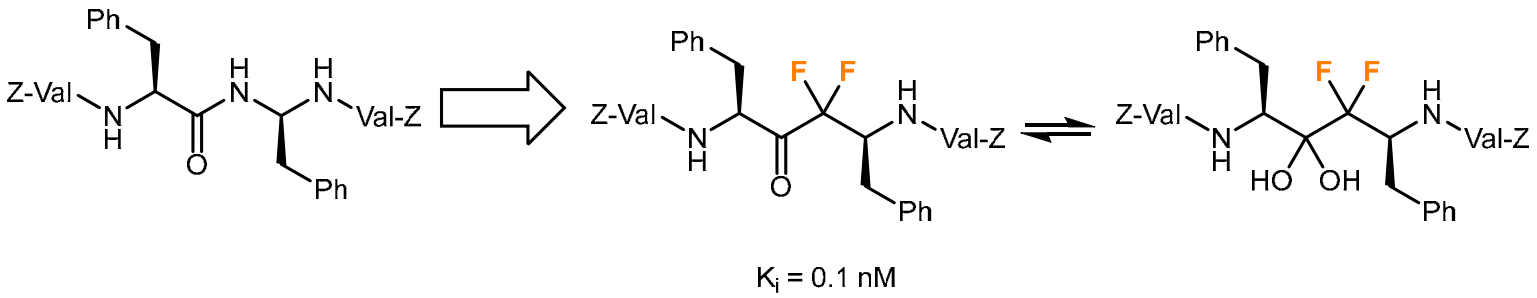
Designed vulnerability to degradation



Fluorine for Medicine

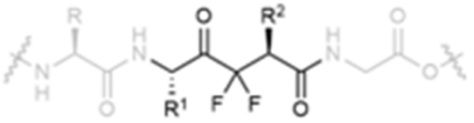
Fluoroketones - Transition-state mimics

HIV-Protease Inhibitor



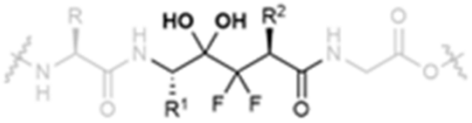
K_i = 0.1 nM

Fluoro-ketone peptides



Fluoro-ketone

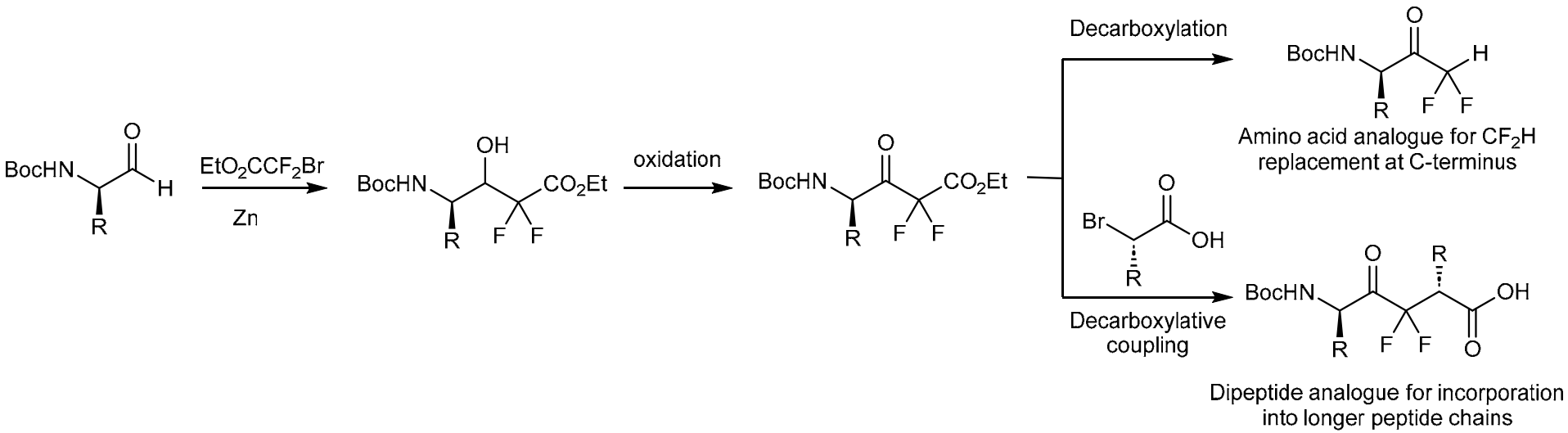
- stable to hydrolysis
- increases lipophilicity and bioavailability



Readily hydrated

- transition state mimic of hydrolysis

Synthesis of fluoro-ketone peptides



Dr Lynda Skipper

- Heritage science and cultural heritage conservation at the University of Lincoln

BRIDGE

Heritage Science and Cultural Heritage Conservation

Dr Lynda Skipper FIIC - Senior lecturer in Conservation of Cultural Heritage & BA Programme leader
lskipper@lincoln.ac.uk

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Research and consultancy

LINCOLN CONSERVATION

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- Lincoln Conservation straddles **industry** and **academia**, working with commercial clients whilst being wholly part of the University of Lincoln.
- We are a **conservation** and **research** consultancy operating within and beyond the **heritage** sector.
- Our team includes accredited and academically trained conservators, scientists and cultural historians with over 20 years of industry experience.
- Looking to collaborate with partners requiring our **skillset**, **equipment** and **expertise**.
- We specialize in:
  - **Practical conservation**
  - **Material analysis**
  - **Digital heritage**
  - **Material culture**
  - **National and international policy and standards**
  - **Outreach and education**
  - **Climate change in heritage**

Examples of projects and expertise

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Cultural heritage resilience

- Climate Risk Assessment for heritage assets - testing and application of CRA approaches for heritage based on IPCC framework.
- Adaptation planning and policy at national and local level e.g. research to inform the Irish climate change adaptation plan for built and archaeological heritage.
- Research and application of values based and community focused methodologies.
- Use of indicators and monitoring to track climate impacts and adaptation progress e.g. the Legacy Indicator Tool for monitoring change in surface weathering effects over time.
- Bioreceptivity and environmental monitoring in heritage structures.

Understanding, conserving and preserving heritage

- Practical conservation – ICON accredited easel painting conservator, decorative surfaces and objects.
- Digital heritage – creating 'digital twins' for virtual immersive experiences, and object recording, reconstruction and replication.
- Public discourse and outreach on contested heritage and decolonization of curriculums
- Material culture through heritage science and material analysis – uncovering hidden pasts.
- Are new materials safe to use on heritage objects, and/or how do we conserve new materials?

Contact us!

- Our team includes:
  - Rhiannon Clarricoates ACR
  - Dr Jim Cheshire
  - Phillipa McDonnell
  - Dr Lynda Skipper FIIC
  - Dr Philip Skipper
  - Dr Cathy Daly

- Lincoln Conservation is wholly owned by University of Lincoln, United Kingdom.
- info@lincolnconservation.co.uk
- 01522 835055

Consortia Building

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