

Fermentation UK-India Status

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Existing project areas

- High value biorenewables – fermentation section
- Bioengineering of microbes and enzymes – separate topic (AD and fermentation)
- CO₂ to biochemicals – Algal based biorefineries – Separate topic
- Upscaling and Downstream processing of Industrially Important Enzymes
- Co-digestion of organic fraction (Foodwaste+Biomass etc)– for biogas
- Integrating Fermentation and Catalytic processes
- Metabolic engineering, Synthetic Biology of Microbes and Autotrophs
- Process monitoring and optimisation
- Carbon capture and utilisation
- Next generation manufacturing through synthetic biology
- Technology Optimisation for Production of Chemicals in various microbial hosts (Clostridia etc)
- Large-scale engineering and production of enzymes
- Engineered Autotrophs

Potential Feedstocks for fermentation

- Sugarcane and Sugarbeet
- Agri-residues – Straws Rice, wheat, maize, rice bran etc
- Food processing waste – Potato peels, edible oil waste
- CO₂, CO, CH₄, H₂

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Gaps in research field from funded projects

- **Fermentation scale-up**
 - Novel innovations in infrastructure,
 - Novel Bioreactors
 - Optimisation abilities at larger scale
 - Sensor technologies with Smart monitoring of processes
- **Hybrid technologies for metabolic efficiency and higher value generation** (one or more of the below technologies can be integrated)
 - Metabolic Flux Analysis guided optimisation of potential microbial strains with novel targets leading to enhanced fermentative products
 - Hybrid chemical and bioelectrochemical modules for efficient conversion of feedstocks
 - Scalable cell free systems for high value fermentative products
- **Hybrid feedstock based scalable technologies**
 - Supplementation of Biomass (Agri, Food, Woody biomass etc) with gaseous feedstocks (CO₂ recapture, H₂ from renewable energy, Electrons from renewable energy)
- **Technologies for energy and cost effective and multiple product recovery (Energy + higher value chemicals)**
- **Energy Storage technologies that are scalable with efficient storage and transport**

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Research needs to address gaps

- Current projects and interests of participants (Fermentation focus)
- Major industrial players (both UK and India)
- Each participant identify 3 gaps they feel are relevant for R&D – in Mural
- Ranking/prioritise the needs based on current gaps and identified areas

