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PreFerS CENTRE FOR PRECISION FERMENTATION AND SUSTAINABILITY

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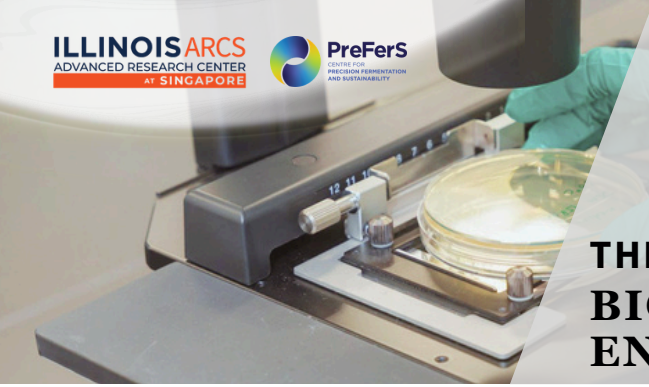

THRUST 2
BIOPROCESS ENGINEERING

Integrating downstream processing and predictive modeling to maximize production yields of target products of microbial fermentation while meeting techno-economic analysis and life-cycle assessment standards.

In industrial biotechnology, strain engineering and bioprocess engineering are the foundations of precision fermentation. This thrust focuses on Bioprocess Engineering to optimize Titer, Rate, and Yield (TRY) of a target product of microbial fermentation, enhancing economic viability while reducing waste and environmental burdens. Downstream processing (DSP) is implemented and optimized to efficiently purify high-value food ingredients from the microbial fermentation process. By integrating predictive modeling and experimentation, this approach maximizes the production yields of food ingredients and minimizes waste in conjunction with techno-economic analysis (TEA) and life-cycle assessment (LCA) benchmarks.

The Challenge

The production of food-grade ingredients requires a high level of hygiene and a sanitary environment. The addition of antibiotics or chemical inhibitors is not permitted due to the risk of product contamination. The challenge is further implicated as precision fermentation is typically conducted under aerobic conditions, where it can be more inherently prone to contamination. Hence, ensuring food safety, product consistency, and environmentally friendly processes is paramount to the scale-up process.

he development of food-grade DSP is therefore crucial to isolate and purify food ingredients from microbial cells and fermentation broth, and the final product will need to meet the safety and quality requirements for long-term human consumption.

The Solution

Conducting metabolic and bioprocess engineering with non-conventional yeast strains enhances the understanding of their unique metabolic capabilities, the complexity of microbial ecosystems, and their respective ecological roles.

1. Focus on the applications of microbial consortia in food production to enhance the sensory properties and nutritional quality of the final products.
2. Design efficient methods to resolve issues in microbiology.
3. Evaluate the dynamics of microbial consortia in food fermentation to derive novel strategies for precision-fermented foods and ingredients.

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