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Cell-Free Biomanufacturing for Low-Cost Sustainable Chemical Production

Stanford researchers have found a cell-free biomanufacturing process that can make valuable chemicals more efficiently than traditional fermentation. The technology converts glucose, carbon dioxide, and hydrogen into succinic acid, a building block for recyclable plastics such as poly(butylene succinate). Because the production system continuously adds raw materials, separates the target chemical as it forms, and recycles useful remaining materials back into the process, it produces chemicals faster, at lower cost, and with higher product quality than current microbial fermentation methods. The approach also uses carbon dioxide as an input, creating a path to lower-carbon chemical manufacturing and helping sustainable chemicals compete with petroleum-based products.

Stage of Development: Proof of concept: The inventors have shown feasibility but still need to demonstrate longer production runs and larger-scale operation.

Applications

- Sustainable chemical manufacturing
- Production of succinic acid
- Recyclable plastic production

Advantages

- Lowers sustainable polymer production costs
- Produces chemicals faster than traditional fermentation
- Uses carbon dioxide as a raw material

- Improves product quality

Innovators

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