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U.S. Department of Agriculture
National Institute of Food & Agriculture

SunGrant INITIATIVE
South Central Region

Engineering Biocatalysts Consortium for Efficient Conversion of Lignocellulosic Biomass and Greenhouse Gas Mixture to Fuels

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Project Goal

The overall goal of this study is to increase butanol yield by more than 30%, producing as much as 40 g/L butanol or 90 g/L total ABE, thus, improve process economics via an integrated novel conversion process.

Objectives

1. Develop butanol fermentation in two-stage continuous stirred tank reactors and co-culture experiments using engineered inhibitor-tolerant strains of Cb and inhibitor-tolerant and butanol–overproducing strains of Cc.
2. Develop LDMIC-tolerant Cb and Cc strains with improved capacity to convert switchgrass hydrolysates, CO2 and H2, to butanol, and improve butanol yield and process economics.
3. Compare the life cycle environmental impacts of petroleum and cornbased butanol and jet fuel production pathways (Oklahoma State University) to those from switchgrass using traditional ABE fermentation and novel co-fermentation of sugars, CO2 and H2, into butanol with new LDMIC-tolerant biocatalysts.

Expected Project Outcomes

Successful completion of this project will allow the development of the novel process for butanol production from lignocellulosic biomass using LDMIC-tolerant strains of Cb and Cc with high yield and carbon conversion efficiencies compared to use of current technologies.

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