Thermophilic Isobutanol Production in *Geobacillus thermoglucosidasius*

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Project Goals: The BioEnergy Science Center (BESC) is focused on the fundamental understanding and elimination of biomass recalcitrance. BESC's approach to improve accessibility to the sugars within biomass involves 1) designing plant cell walls for rapid deconstruction and 2) developing multitalented microbes for converting plant biomass into biofuels in a single step (consolidated bioprocessing). BESC research in biomass deconstruction and conversion targets CBP by studying model organisms and thermophilic anaerobes to understand novel strategies and enzyme complexes for biomass deconstruction.

Consolidated bioprocessing using thermophilic microorganisms has a potential to provide the lowest cost for biological conversion from lignocellulosic biomass to biofuels. However, potential problems of thermophilic production of biofuels include the enhanced toxicity of the product and the volatility of intermediates at high temperatures. To test the feasibility of thermophilic production of higher-chain alcohols, we used *Geobacillus thermoglucosidasius* as a test organism for isobutanol and n-butanol production. We engineered key enzymes for thermostability, identified promoters, and conducted preliminary expression optimization. We successfully achieved isobutanol production in *G. thermoglucosidasius.*

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