

# A prototype 96-well plate assay for CBP was developed and validated

## Background

- As the ability to improve anaerobic cellulosic microbes and to develop modified biomass feedstocks occurs, there is an increasing need for high throughput screens which replicate larger scale Consolidated Bioprocessing (CBP) fermentations.

## Approach

- To develop a prototype high-throughput microplate assay to assess anaerobic microorganisms and lignocellulosic biomass in a rapid, cost-effective screen for CBP in a 96-well format with solid biomass substrates.

## Outcome

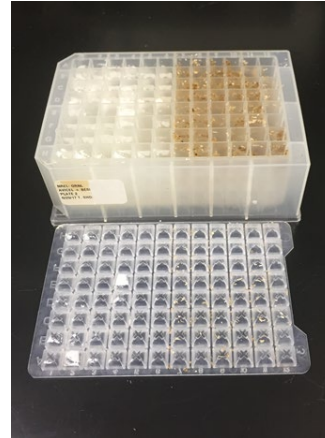
- *C. thermocellum* parent  $\Delta$ hpt strain deconstructed Avicel to cellobiose, glucose, and generated lactic acid, formic acid, acetic acid and ethanol.
- Fermentation products, in titers and ratios similar to larger scale fermentations, confirmed the suitability of a plate-based method for *C. thermocellum* growth studies.
- *C. thermocellum* strain LL1210, with gene deletions for key central metabolic pathways, produced higher ethanol titers in the CBP plate assay for both Avicel and switchgrass when compared to the  $\Delta$ hpt strain.

## Significance

- A prototype microplate assay system was developed that will facilitate high-throughput bioprospecting for new lignocellulosic biomass types, genetic variants and new microbial strains for biofuel production.
- This prototype will be adapted for use in the Center for Bioenergy Innovation (CBI).

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Gbemeloluwa B. Oguntimein, Miguel Rodriguez, Jr., Alexandru Dumitrache, Todd Shollenberger, Stephen R. Decker, Brian H. Davison, and Steven D. Brown. "Anaerobic Microplate Assay for Direct Microbial Conversion of Switchgrass and Avicel using *Clostridium thermocellum*," *Biotechnol. Lett.* (2017) DOI: 10.1007/s10529-017-2467-2



Example of 96-deep well plate loaded with Avicel and switchgrass substrates.

Ethanol production by *C. thermocellum* strain  $\Delta$ hpt and strain LL1210 with (A) Avicel as the substrate

