**Using a designer synthetic media to study inhibitors effect in biomass conversion**

The biofuels industry has devoted significant efforts to converting lignocellulosic substrates into sugars that can be fermented into biofuels or other bioproducts. However, one of the major bottlenecks for cost-effective conversion in biorefineries has been the fermentation inhibition of yeast or bacteria by pretreatment degradation products. In order to engineer microbial strains for improved conversion, it is important to understand the inhibition mechanisms that affect the fermentative organisms in the presence of a lignocellulosic hydrolysate. One way in which these processes can be understood is by developing a synthetic hydrolysate media with a composition similar to the one that will be found after pretreating lignocellulosic biomass. Researchers in the DOE’s Great Lakes Bioenergy Research Center characterized the plant-derived decomposition products present in AFEX-pretreated corn stover hydrolsate (ACH), and a synthetic hydrolysate (SH) was formulated based on that ACH composition and further used to evaluate the inhibitory effects of various families of decomposition products during fermentation using a strain of Saccharomyces cerevisiae 424A (LNH-ST). The SH did not entirely match the performance of the ACH; however, the major groups of inhibitory compounds were identified and used for further evaluation and comparison. Their characterization showed that the compounds present in ACH that were most inhibitory to fermentation were nitrogenous compounds, especially amides, though this result they found to be associated to a concentration effect, given that nitrogenous compounds were the most abundant. However, when comparing inhibition due to amides in AFEX pretreatment versus inhibition due to carboxylic acids and other compounds resulting from dilute acid or steam explosion pretreatments, they discovered that amides are significantly less inhibitory to both glucose and xylose fermentation, which means that ACH would be easily fermentable by yeast without any further detoxification.

**References:** Tang X, daCosta Sousa L, Jin M, Chundawat SPS, Chambliss CK, Lau MW, Xiao Z, Dale BE, and Balan V. “Designer synthetic media for studying microbial-catalyzed biofuel production”. Biotechnology and Biofuels (2015). Doi: 10.1186/s13068-014-0179-6.

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