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Combining novel biomass pretreatment with fermentation may overcome the limits on operating high-solids fermentations

The use of Co-solvent Enhanced Lignocellulosic Fractionation (CELFF) pretreatment with Simultaneous Saccharification and Fermentation (SSF) achieved very high ethanol yields and titers on corn stover.

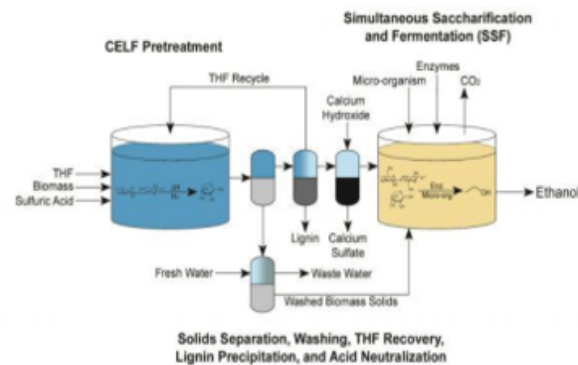


Image courtesy of Nguyen, University of California-Riverside

Diagram of a biomass conversion process that integrates CELF pretreatment with simultaneous saccharification fermentation (SSF) to produce ethanol.

The Science

This study illustrates how competing factors that limit ethanol yields at high solids fermentations are overcome by integrating newly developed Co-solvent Enhanced Lignocellulosic Fractionation (CELFF) pretreatment with SSF. These factors include typical pretreatment inhibitor, mass transfer, carbon limitations, nonoptimal temperatures and high enzyme loadings. Simultaneous saccharification and fermentation (SSF) can reduce cost of lignocellulosic ethanol production by consolidating process steps and reducing end product inhibition of enzymes compared to separate hydrolysis and fermentation (SHF). A long-standing limitation of SSF has been too low ethanol yields at the high solids loading of biomass needed during fermentation to realize sufficiently high ethanol titers favorable for more economical ethanol recovery