

Cofermentation with Cooperative Microorganisms for More Efficient Biomass Conversion

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Technology Summary

It is well known that biomass has primarily two sources of fermentable carbohydrates, cellulose and hemicelluloses. Research has been underway for decades aimed at both depolymerizing these complex carbohydrates and fermenting them to products of interest such as fuels and chemicals. Common approaches are the addition of enzyme to carry out the hydrolysis (depolymerization) and include a microorganism that can ferment some or all the resulting simple sugars. Various microorganisms have different capacities to breakdown these complex carbohydrates and ferment the resulting sugars to fuels and chemicals. Here we have shown that two microorganisms that normally would not co-exist due to differences in temperature optimums can be grown with one at suboptimal temperature, and together, they uniquely convert biomass to fermentation chemicals more rapidly and efficiently than either microorganism could accomplish alone. Additionally the two microorganisms provide different depolymerizing enzymes so act synergistically to more efficiently breakdown the biomass carbohydrates, while leaving lignin intact. Also, these microorganisms can be grown on biomass sequentially providing initial biological "pretreatment" at one temperature and a more complete fermentation with the second microorganism as the other temperature.

Advantage

- More rapid, complete and effective hydrolysis and fermentation of biomass carbohydrates

Potential Applications

Rapid and efficient conversion of biomass to any fuel or chemical but especially

- lactic acid
- acetic acid
- ethanol
- enriched lignin

Patent

Application in preparation

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