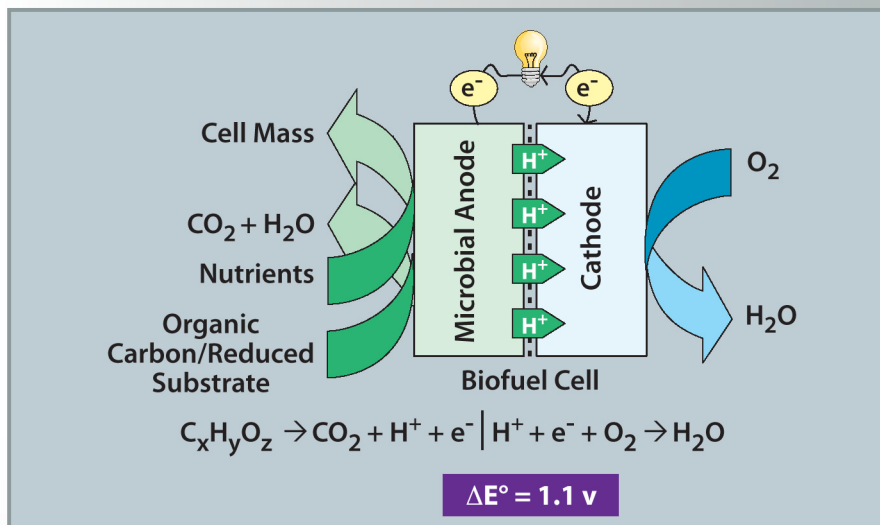


Microbial Fuel Cells for Recycle of Process Water from Cellulosic Ethanol Biorefineries

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Technology Summary

A method was invented at ORNL for removing inhibitor compounds from process water in biomass-to-ethanol production. This invention can also be used to produce power for other industrial processes.

Large amounts of water are used in the processing of cellulosic biomass materials, so it is highly desirable to recycle used process water at the end of the fermentation process. However, the waste water contains inhibitory compounds which interfere with ethanol production. Simply recycling this water to an earlier step has the negative effect of increasing the concentration of inhibitory compounds.

This invention offers a means of removing inhibitors from process water while also producing energy. By contacting this process water with an anode of a microbial fuel cell, the microbes oxidatively degrade one or more of the inhibitor compounds. Electric energy or hydrogen results from this process; the hydrogen can serve as a valuable reagent in the biorefinery or sold as a chemical/fuel.

Advantages

- Higher yields of ethanol from cellulosic feedstocks
- Ability to use high solids loading in fermentor to improve ethanol process economics in biorefineries
- Decreased water consumption
- Enables wastewater recycling
- Electricity or hydrogen generation
- Inexpensive
- Versatile

Potential Applications

- Recycling of wastewater from cellulosic ethanol fermentation
- Removal of inhibitors of the bio-fermentation process from water
- Bioenergy or bioelectricity production
- Applicable to cellulose to ethanol biorefineries

Patent

Abhijeet P. Borole, *Microbial Fuel Cells for Recycle of Process Water from Cellulosic Ethanol Biorefineries*, U.S. Patent Application 12/366,713, filed February 6, 2009.

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