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Reference: Chaotic Fermentor

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References

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A Novel Chaotic Fermentor for the Efficient Production of Fuel Ethanol

Overview

Auburn University seeks a licensee or development partner for a chaotic ethanol fermentor that improves the fermentation process performance of hard-to-ferment sugars produced from the hydrolysis of biomass, providing increases in ethanol production as high as 100 percent. This technology can be applied to any CSTR fermentation process that has oscillatory process characteristics. Our invention is most valuable to processes where microorganism efficiency is hindered by high concentrations of the fermented product.

Advantages

Efficient:

- Significant improvements in fermentation yield in a dynamic and continuous ethanol production process (with the use of a membrane); similar gains may be expected in other processes
- Dramatic cost reductions over steady-state fermentation

Flexible:

- Works with any oscillatory CSTR fermentation process
- Allows use of a wide range of microorganisms to ferment a broad range of sugars
- Integrates easily into current plant or operation methods

Description

Existing commercial fermentation processes are not cost effective to ferment all forms of sugars used in ethanol production. Our process addresses the fundamental challenges in the development of an efficient process by *chaotic* fermentation.

Current fermentor technologies are based on the assumption that steady-state operations are the most efficient and highest yielding. However, mathematical modeling has indicated that much greater ethanol yields are possible using chaotic operating conditions. These modeling predictions have been confirmed via experimental results. Our technology optimizes the yield by controlling the fermentation process with a fuzzy control system that could be incorporated into a software package.

In addition, a pervaporation membrane separation can be employed by this invention to further enhance the productivity of ethanol fermentation. The resulting increase in yield can reach 100 percent, generating a cost reduction approaching 50 percent. Any continuous, stirred-tank configuration that allows controlled oscillations can benefit from this chaotic processing of ethanol.

Status

- A U.S. patent application has been filed (20050170483)
- This invention has been successfully verified by simulation and experiment

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture