



# Cellulosic Biofuel, Chemical, and Ethanol Production

## Organism Design for Cellulosic Biofuel, Cellulosic Chemical, and Cellulosic Ethanol Production

**IP Status:** Issued US Patent; **Application #:** 12/264,044

### Bioreactor creates Designer Organisms that use Renewable Resources for Biofuel, Chemical, and Ethanol Production

The bioreactor creates "designer organisms" that utilize renewable resources to produce cellulosic fuels, cellulosic chemicals, and cellulosic ethanol. Microbe growing bioreactors are vital systems in the development of these organisms that must be able to consume a variety of feedstocks, survive the toxic by-products of the production process, and must withstand a variety of temperatures and conditions. Such robust organisms are a major focus of biofuel companies that are currently investing significant amounts of money into biotechnology research and the development of these organisms.

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## Organism Design for Optimal Cellulosic Biofuel, Chemical, and Ethanol Production

The bioreactor utilizes an organism design process for the creation of microbes that consume a variety of feedstocks, including C5 and C6 sugars and glycerol, to efficiently produce cellulosic fuels, cellulosic chemicals, and cellulosic ethanol. The quick formation of organisms (days) in the bioreactor allows for the production of fuels or chemicals at less cost than comparable systems (that take weeks to create the organisms). Additionally, the bioreactor provides the ability to continuously improve and maintain organism productivity even though a culture would naturally evolve away from maximum product production and towards maximum biomass production, resulting in microbes that produce less efficiently over time.

### Bioreactor for the Efficient Creation of Designer Microbes needed by Biofuel Companies

**Technology ID**

z02025

**Category**

Life Sciences/Industrial Biotech

Life Sciences/Research Tools

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For microorganisms to produce high concentrations of chemicals and biofuels desired by biofuel and other companies, they must be tolerant of the feedstock, various processing conditions, and the final product. Typical adaptation processes to develop tolerant strains involve serial dilution of growing cultures or genetic engineering. Serial dilutions, however, are very time inefficient because the culture spends much of the time at suboptimal growth rates due to the time required for consecutive dilutions.

#### **BENEFITS OF BIOREACTOR FOR ORGANISM DESIGN**

- Fast production of desirable organisms (days) versus months in comparable bioreactors
- Efficient, small, and low cost
- Continuously improve and maintain production efficiency even though cells in culture would tend towards maximum biomass production and away from maximum end product production
- No cloning, genetic engineering, or serial dilutions required
- No research and development staff required to run the bioreactor
- Microbes can consume diverse feedstocks including C5 and C6 sugars and glycerol
- Bioreactor can produce a diverse set of cellulosic fuels , cellulosic chemicals, and cellulosic ethanol
- Microbes tolerant of a wide range conditions including varying temperatures

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