UNIVERSITY OF WYOMING
RESEARCH PRODUCTS CENTER

Enhanced Fermentation through Destruction of Mitochondrial DNA

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Patent Status:
Patent Pending

Description of Technology

New sustainable energy sources such as biofuels or ethanol-based fuels have become an increasingly important alternative to petroleum energy. The budding yeast *Saccharomyces cerevisiae* is routinely used in fermentation processes that produce these biofuels and other high-value products. This particular yeast is capable of fermentation in the absence or presence of oxygen. During ethanol production, glucose gets converted to ethanol through the process of glycolysis. As glucose diminishes, yeast engage in cellular respiration to extract energy from alternative carbon sources, which leads to the end of the industrial fermentation cycle.

The present technology introduces methods for increasing ethanol production of yeast through genetic modification. This enhanced fermentation is induced by the destruction of the mitochondrial DNA in yeast using a restriction enzyme. When the enzyme is expressed it targets the mitochondrial DNA and destroys the genomes capable of cellular respiration which further triggers increased fermentative output. This enzyme expression is condition-dependent and only occurs when the level of oxygen reaches a certain level or is in the presence of anaerobic conditions. Yeast cells lacking mitochondrial respiration produce end products at higher levels than yeast with intact respiration functions.

Applications

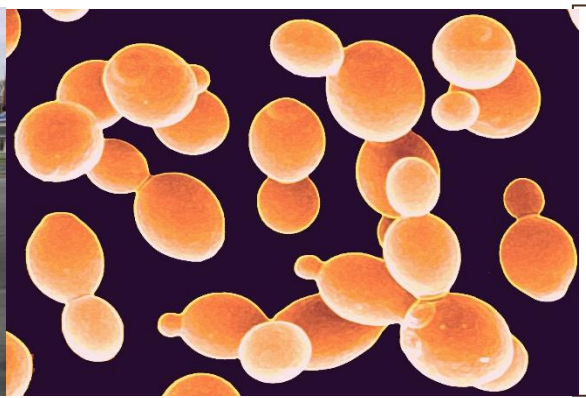
Condition-dependent yeast that is modified to ferment diverse sugars can further produce advanced biofuels such as ethanol, isobutanol, or other high-value bio-based chemicals within the industry.

Features & Benefits

- Capable of increased ethanol production in yeast
- Yeast become condition-dependent
- Cost-effective

Market Opportunity

Use of genetically-engineered strains enable more efficient conversion of sugars into biofuels and other high-value bio-based chemicals. This efficient conversion method is capable of driving down operating costs in the industry with more efficient consumption of the feedstock used in fermentation, whether it is derived from cellulosic biomass, corn or other sources.



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