

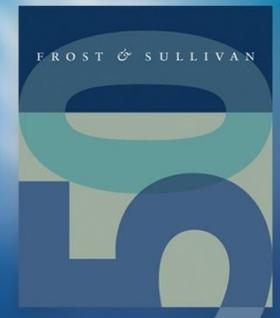
# Industrial Bioprocessing Alert (TechVision)



“Biofuel Enzymes”

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# INNOVATIONS IN BIOFUEL ENZYMES

# Weizmann Institute of Science, Israel

## *Lytic polysaccharide monooxygenases increases efficiency of lignocellulosic conversion*

### Problem Statement

Cellulosic biomass degradation is one of the major bottlenecks in the utilization of biomass for energy generation.

Studies have been conducted where large enzymatic systems suitable for cellulose breakdown have been characterized, but currently available technologies are not efficient for large scale adoption.

### The research

- Lytic polysaccharide monooxygenases (LPMOs) have been identified to increase the activity of cellulases to a great extent.
- Generally, aerobic organisms are found to have LPMOs, which do not enable the LPMOs to utilize the benefits of cellulosomal systems.
- In certain anaerobic microbes, cellulosomes are formed by assembly of ...
- .....
- .....

### Solution: Through the roots

Researchers at the Weizmann Institute of Science, Israel, have observed that increased release of sugars from cellulosic biomass is possible with the enhancement of LPMOs.

### Significance

- The system uses the synthetic biology approach where genetic engineering was done and the enzymes were able to achieve higher cellulose degradation.
- The research has the potential to increase the efficiency of lignocellulosic conversion technologies.



This technology is still at the lab stage. The feasibility of the technology applicability at a larger scale needs to be assessed and is expected to take a minimum of years to see field applications.

# BIOFUEL ENZYMES INDUSTRY

# Strategic Perspectives

## Key Market Trends

Increasing levels of biofuel production has resulted in improved awareness of biofuel enzymes.

Biofuel enzymes have been identified to be integral in tilting biofuel economics favorably.

Development of low cost and easy-to-use enzymes would be a major factor for consideration for technology developers.

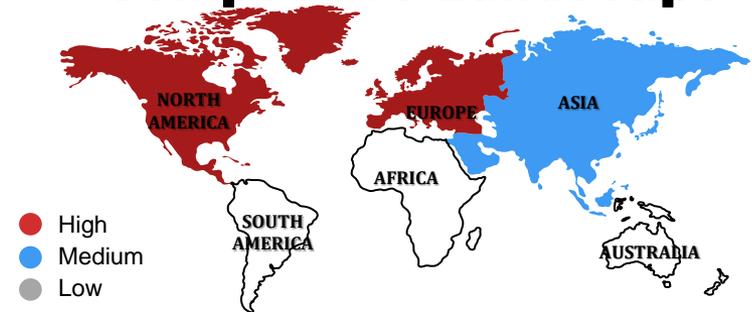
## Drivers

- ✓ Improved economics of biofuel production
- ✓ Increased ease of operation and reduced time of operation.
- ✓ ....

## Restraints

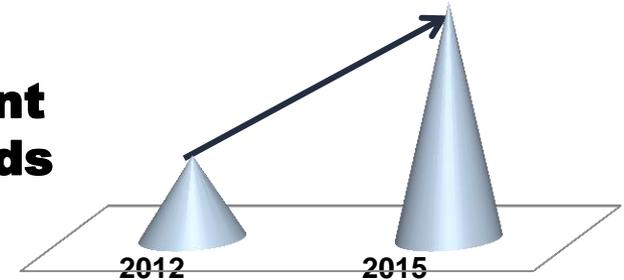
- ✗ Efficiency of conversion might be less than conventional methods.
- ✗ Cost of biofuel enzymes would be a restraint for adoption.
- ✗ ....

## Competitive Landscape



High level of growth is seen in North America and Europe as there is heightened biofuel demand in the region. In the Asia Pacific region, the biofuel market is gradually picking up and there is expected to be increased demand for biofuel enzymes in the region.

## Patent Trends



- A % increase in the number of patents published was seen from to .
- The United States dominates the patent arena with maximum patent applications.

# KEY PATENTS AND CONTACTS