Bayesian Statistical Methods for Rapid Protein Engineering of Enzymes

Technology #m10-080

Fungi class cellulase candidates to produce ethanol biofuels from biomass

This technology addresses a method for sequencing cellulase candidates for development of industrial enzymes, currently a time costly process with low success probabilities. The method sequenced four ancestral celllobiohydrolases enzymes to be resurrected from fungi predicted to display optimal properties based on their molecular and evolutionary biology. The selectivity of these four cellulases was determined using a fast and economically efficient computational selection system. The enzyme candidates are believed to be optimal for development of enzymes to be used in harsh industrial environments such as high temperature or low pH.

A faster and more economically efficient selection promising candidates with active, heat resistant, and insensitive industrial enzymes

Currently, the biofuel industrial needs highly stable and active cellulases that can withstand harsh conditions in ethanol production and processing. Developing these ideal cellulases with desirable enzyme chemistry is a time-consuming trial-and-error approach. Previous work demonstrated that enzymes from an ancient enzyme superfamily called thioredoxin are suitable with ideal enzymatic properties suitable for industry. This technology utilizes a time and economically efficient computational reconstruction algorithm to optimize ancestral cellulase protein sequences from main industrial fungal cellulase classes. Given the prevalence of cellulases in trades such as including food processing, textile industry, laundry detergents, and pharmaceuticals, this technology has large implications for improving processes across a diverse field of industrial processes.

Lead Inventor:

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Applications:

- Production of cellulosic ethanol
- Laundry detergents
- Commercial food processing, such as coffee bean drying
- Manufacturing and processing of pulp and paper
- Wastewater treatment
- Pharmaceutical products

Advantages:

- Selection system provides high efficiency in successful candidate sequencing
- Selection system operates on an economical cost efficient algorithm
- Sequenced cellulases could be more active, heat resistant, and pH insensitive than existing products
- Outcomes of identified cellulases from same ancestral strain hold potentials for future industrial enzyme development

Patent information:

Patent Pending

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Related Publications:


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