Richard P. Feynman Center for Innovation

Technology Snapshot

Technology Licensing Opportunity

Los Alamos NATIONAL LABORATORY

Smart Microbial Cell Technology

A high throughput screening platform for enzymes and whole cell biocatalysts

Value Proposition

Researchers at Los Alamos have developed a high throughput enzyme and whole cell biocatalyst screening platform to efficiently navigate through large sequence space. Current technologies allow building of large DNA libraries (diversity > 10^7), but current low throughput methods make it possible to test only a minute fraction (<0.1%). The Smart Microbial Cell Technology allows rapid screening of the large library to increase the chances of capturing rare gain-of-function events that result in improved enzymes and biocatalysts.

Technology Readiness Level 4

IP Information for S-133542

U.S. Patent No. 11,739,318

Contact Information

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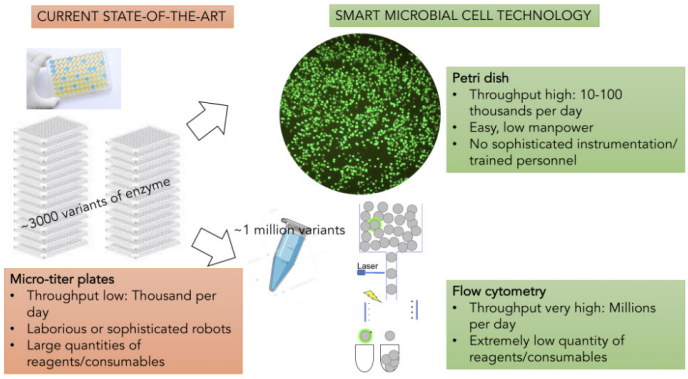
Overview

The current bottleneck in biocatalyst discovery, engineering and evolution is the absence of any high throughput screening method to scan through genetic sequence space in an expedited manner.To enhance the throughput, sophisticated instruments including liquid handling robots might be required and a need of high quantity of reagents, consumables and manpower is inevitable. This technology reduces labor due to its simplicity and high throughput. Enzyme screening is also possible via visualization of colonies on a dish.

Advantages

Enzymes and whole cell biocatalysts are indispensable



for multiple areas such as diagnostics, food and beverage and research and biotechnology. Biocatalysts can provide a sustainable route for producing replacement chemicals, fuels and industrial precursors. Smart Microbial Cell Technology helps optimize the screening for biocatalysts to enhance throughput, reduce the use of reagents and manpower and make the processes more economical. Moreover, this technology enables improvements in biocatalysts for stability, reduced product inhibition and catalytic efficiency.

- Enhanced throughput, screening and catalytic efficiency
- Orders of magnitude reduction in the amount of reagents used
- Significant cost reduction in manpower needed
- Suitable for resource constrained environment
- Direct enzyme activity measurement

Technology Description

Smart Microbial Cell Technology uses a custom-made sensor-reporter gene circuit. Based on the activity of the enzyme and the product formed, the sensor-reporter circuit becomes activated to give a correlated fluorescence response, which can be visualized on a petri dish under blue light and yellow filter. The technology, when coupled to a flow cytometer, can quantify the fluorescence and sort the cells based on the fluorescence at single cell level. A million variants of enzyme can be screened in a single sitting.

Market Applications

- **Food and Beverage**
- **Animal Feed**
- **Diagnostics**
- **Cleaning Products**
- **Biofuel**
- **Research and Biotechnology**

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