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Multiplex Assembly of High-Fidelity DNA Molecules from Complex Mixtures of Synthetic Oligonucleotides

AzTE Case # M07-068

Inventors

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Invention Description

There is an ever-growing need for synthetic gene assembly. However, none of the currently-available protocols is suitable for robust, reliable high-throughput operation. PCR-based techniques are highly-dependent on the quality of the oligonucleotide raw materials, leading to high and inconsistent error rates. With new applications for synthetic genes appearing every day, there is a significant need for a high-throughput protocol which is robust (can use oligos of variable quality), reliable (consistently low error rates), and inexpensive (microarray synthesized oligos are acceptable).

Researchers at the Biodesign Institute of Arizona State University have developed a novel LCR- or PCR-driven protocol for multiplexed assembly of double stranded DNA from complex mixtures of unprecedentedly small amounts of synthetic oligos of variable quality. This protocol consists of three steps: intermediate block assembly, adapter cleavage, and full-length product assembly.

This protocol results in higher-quality DNA with virtually no errors, regardless of the quality of the starting oligo mixture. Because it is a microarray oligo-compatible method, this protocol has the potential for more rapid production of far lower cost genes.

Potential Applications

- Synthesis of double stranded DNA

Benefits and Advantages

- Error rate is extremely low and is unaffected by the quality of the starting oligo mixture
- Works with unprecedentedly low amounts of oligos
- Purification step is not required
- Potential to increase the production rate and reduce the cost of gene synthesis by a hundredfold

Intellectual Property Status:

Patent Pending

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