Rapid Easy Computationally Optimized DNA Self-Asembly: A Method for Producing a Synthetic Gene or Other Long Optimized DNA Sequences

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BRIEF DESCRIPTION

Researchers at the University of California, Irvine, have developed a method for the computational optimization of DNA sequences that encode their own correct self-assembly.

FULL DESCRIPTION

Researchers at the University of California, Irvine, have developed a method for the computational optimization of DNA sequences that encode their own correct self-assembly. Scores of short overlapping synthetic oligonucleotides are designed to hybridize correctly with great efficiency at a high temperature, while all competing nonproductive hybridization events are identified and disfavored. Sequence properties are optimized using a formal heuristic search. Long strings of mixed coding, regulatory, and intergenic regions may be hybridized into any plasmid expression vector and transformed into cells, or used directly as DNA templates to produce proteins in coupled in vitro transcription-translation systems.

SUGGESTED USES

The method is imminently suited for automation of such applications as rapidly producing the entire proteomes of organisms, and offers opportunities for improved self-assembly of two- and three-dimensional DNA nanostructures. It is rapid (no more than a few hours) and demands no more than mixing, heating, and cooling in solution with no purification steps.

BACKGROUND

It is often desirable to produce a synthetic gene that encodes a protein of interest and is optimized for desirable sequence properties, such as good translation kinetics for folding and expression in a target organism. However, most genes are far longer than the limits of accurate DNA synthesis. Thus, the rapid creation of tailored genes has not been convenient.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,262,031	08/28/2007	2002-328

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OTHER INFORMATION

KEYWORDS

DNA, oligonucleotides, protein expression, proteome, synthetic gene

CATEGORIZED AS

- **Biotechnology**
  - Bioinformatics
  - Genomics
  - Proteomics
- **Medical**
  - Gene Therapy
  - Research Tools
  - Therapeutics
- **Research Tools**
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