LICENSING OPPORTUNITY: CTRSD GATE AND PERFORMING CO-TRANSCRIPTIONAL ENCODING

DESCRIPTION

Problem

This technology should directly address current limitations in DNA-based strand displacement systems such as degradation in biological environments and single-use operation.

Invention

Scalable and programmable co-transcriptional RNA strand displacement (ctRSD) circuits. In ctRSD, circuit components isothermally self-assemble and execute programmed computations in a single transcription reaction. This is achieved through two new innovations: 1) the use of the HDV self-cleaving ribozyme to isothermally prepare kinetically trapped RNA strand displacement intermediates via transcription, and 2) a set of nucleic acid sequence design rules that allow mutiple RNA strand displacement sequences with similar performance to be readily created.

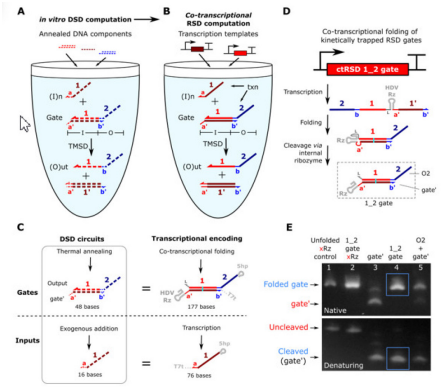
BENEFITS

Commercial Application

Real-time cell state monitoring through recognition of differential RNA expression patterns. This capability could be employed for real-time monitoring of cell-state to improve biomanufacturing processes or for real-time detection of cellular disease states. Nucleic acid pattern recognition has been demonstrated with DNA-based circuits in vitro but has never been demonstrated in living cells. Such a capability could introduce a new paradigm for engineering cellular sensing and response.

Competitive Advantage

The co-transcriptional RNA strand displacement circuits possess all the powerful computing features of DNA-based circuits but can be genetically encoded to address the limitations of DNA-based circuits in biological systems. This should ultimately allow co-transcriptional RNA strand displacement circuits to be encoded into living cells to enable the same programmability and functionality of DNA-based circuits for cellular engineering applications.



Depiction of co-transcriptional RNA strand displacement (ctRSD) design.

Contact: licensing@nist.gov

NIST TECHNOLOGY PARTNERSHIPS OFFICE

NIST Technology Partnerships Office
National Institute of Standards and Technology
100 Bureau Drive, Gaithersburg, MD 20899-2200