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Nanoarrays for single-cell RNA Expression

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Inventors

John Chaput
Assistant Professor
The Biodesign Institute
Arizona State University

Hao Yan
Professor
The Biodesign Institute
Arizona State University

Stuart Lindsay
Professor
The Biodesign Institute
Arizona State University

Peiming Zhang
Associate Research Professor
The Biodesign Institute
Arizona State University

Invention Description

A variety of medical ailments can be characterized by the presence of specific nucleic acids, proteins, and lipids that are generated during the course of the ailment. Multiplexed and sensitive detection of these molecules is of great importance in the medical diagnostics field. Current technologies designed to detect biological events coded by specific macromolecules typically consist of chip-based or particle-based platforms incorporating a large number of designed probes for proteins and nucleic acids. Chemically synthesized DNA oligonucleotides can self-assemble into ordered nucleic acid tiling arrays with controlled distances and fixed spatial orientations. These arrays can be used in a variety of biomedical applications.

Researchers at Arizona State University have developed a method for making nanoscale arrays from self-assembly of DNA in such a way as to expose single stranded probes. The array orientation and probe can be imaged by atomic force microscopy. More importantly, several improvements were implemented allowing the arrays to be used directly inside the contents of single cells or with very small volumes of sample. These improvements enhanced the inventions ability to detect RNA expression of a single cell, with accuracy.

Potential Applications

- This technology can be used for a variety of applications involving detection of different biological molecules:
    - Medical Diagnostics – Identify biological molecules associated with medical problems, organ and disease specific arrays
    - Proteomics – Expression profiling
    - Genetic assays – Gene expression, SNP profiling, nucleic acid sequencing

Benefits and Advantages

- Versatility – Allows simultaneous identification of proteins, nucleic acids, and lipids from a single sample solution.
- Ease of Use – Water solubility, fast binding kinetics of molecular probes to targets, rechargeability for repeated use, and small sample volumes make this technology easy to use

Intellectual Property Status:

Patent Pending

Contact

Yash Vaishnav, PhD, MBA

Vice President

Business Development, Life Sciences

Arizona Technology Enterprises, LLC (AzTE)

P: 480.884.1648

F: 847.971.2871

YASH@AZTE.COM

HEALTHSCIENCES@AZTE.COM