Apparatus and Signal Processing Technique for Real-Time Label-Free High-Throughput Cell Screening

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SUMMARY

UCLA researchers in the Department of Bioengineering have invented a novel apparatus for real-time label-free high-throughput cell screening.

BACKGROUND

Cell protein content measurement can be used in many biomedical applications such as blood doping detection, infection monitoring , drug development and screening, studies of necrosis and apoptosis, cell cycle progression and differentiation, and in cancer diagnostics. Current methods for cell protein concentration measurement include electrical methods based on dielectrophoresis, mechanical methods based on microchannel cantilevers, and optical methods based on scattering patterns, emission spectra of external cavity lasers, and holographic and phase microscopy. These methods are either inherently too slow for high-speed flow cytometry applications or require feedback mechanisms to provide necessary precision. Furthermore, size-based classification can also be used for label-free identification of cells of interest in a suspension stream. However, due to significant overlap of size ranges between most mammalian cells, size-based technologies require additional layers of parametric gating to be useful as a diagnostic tool.

INNOVATION

UCLA researchers led by Prof. Bahram Jalali have developed a fast and high-precision optical cell density and size measurement method based on serial time-encoded amplified microscopy (STEAM). To eliminate the need for labeling, they introduce a label-free imaging-based flow cytometer that measures size and cell protein concentration simultaneously either as a stand-alone instrument or as an add-on to conventional flow cytometers. Cell protein concentration adds a parameter to cell classification, which improves the specificity and sensitivity of flow cytometers without the requirement of cell labeling.

APPLICATIONS

This technology has applications in both the clinical and research setting, as characterization of cell populations can be informative on disease or metabolic state.

STATE OF DEVELOPMENT

Prototype exists and been has been used to measure and separate two distinct classes of cells.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,903,804	02/27/2018	2014-077

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Apparatus And Method For Optically Amplified Multi-Dimensional Spectrally Encoded Imaging
- Apparatus And Method For Multiple-Pulse Impulsive Stimulated Raman Spectroscopy
- Ultrafast Differential Interference Contrast Microscopy

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INVENTORS

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OTHER INFORMATION

KEYWORDS

flow cytometer, cell sorting, FACS, STEAM, serial time-encoded amplified microscopy, cell quantification, high-throughput cell quantification, label-free, label-free cell screening, cell screening, real-time

CATEGORIZED AS

- **Biotechnology**
  - Health
  - Other
- **Medical**
  - Devices
  - Diagnostics
  - Research Tools
- **Sensors & Instrumentation**
  - Biosensors
  - Medical

RELATED CASES

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