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Microfluidic Device for Cell Separation Using Dielectrophoresis and/or Magnetohydrodynamics

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CONTACT

Alvin Viray
aviray@uci.edu
tel: 949-824-3104.



INVENTORS

- » Flanagan, Lisa A.
- » Lee, Abraham P.
- » Marchenko, Svyatoslav
- » Monuki, Edwin S.
- » Wang, Lisen

OTHER INFORMATION

KEYWORDS

microfluidic, DEP, dielectrophoresis, magnetohydrodynamics, MHD, cell separation

CATEGORIZED AS

- » **Biotechnology**
- » Other
- » **Medical**

BRIEF DESCRIPTION

Researchers at the University of California, Irvine have developed a microfluidic device that has a combination of side wall and planar electrodes designed to generate magnetohydrodynamics (MHD) and dielectrophoresis (DEP) forces on cells in solution. The MHD and DEP forces can separate a heterogeneous population of cells based on their different dielectric properties and sizes.

FULL DESCRIPTION

The device comprises of a main channel with two side walls and a bottom surface. A plurality of vertically-oriented electrodes is disposed on the first wall and on the second wall opposite to the first wall. As cells flow down the channel containing the two side walls, the electrodes are used to generate DEP and MHD forces vertical to the main stream of the flow. Different cell populations will be subjected to different forces from the opposing electrode arrays affecting the separation of different cell populations and thus resulting in lateral separation of the cells. The cells then can be separated by DEP switching to direct them either into additional channels for further separation or wells for collection.

SUGGESTED USES

This device may be used to separate heterogeneous cell populations for research, diagnostic, and treatment purposes.

ADVANTAGES

Cells can be separated laterally along the channel direction and then automatically directed to the downstream channel branches for collection or further separation. Unlike FACS, the cells are not required to be modified for separation.

STATE OF DEVELOPMENT

Prototypes have been made.

TESTING

Prototypes have been shown to separate different populations of cells.

RELATED MATERIALS

» This invention has a patent pending and the pending patent is published as US 2007/0125941

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,964,078	06/21/2011	2006-426

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ New Microwell Plate Configurations to Increase Microwell Density
- ▶ Controlled 'One-Cell-One-Bead' Encapsulation in Droplets
- ▶ Microfluidic device for multiplex diagnostics / Microfluidic devices and methods
- ▶ On-Demand Cell Encapsulation Using On-Demand Droplet Generation and Impedance-based Detection
- ▶ High throughput and precision cell sorting
- ▶ High-throughput Microfluidic Research Platform for Performing Versatile Single-Cell Molecular Timed-Release Assays within Droplets

- » Devices
- » Diagnostics
- » Research Tools

» **Research Tools**

- » Other

» **Sensors & Instrumentation**

- » Scientific/Research

» **Engineering**

- » Other

RELATED CASES

2006-426-0

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5270 California Avenue / Irvine, CA
92697-7700 / Tel: 949.824.2683



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