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High throughput and precision cell sorting

Tech ID: 33444 / UC Case 2021-797-0

BRIEF DESCRIPTION

A novel method and device for high-throughput sorting of cells in suspension, particularly focusing on the separation of key cellular blood components of the immune system. The patent application presents a novel approach to high-throughput cell sorting, particularly suitable for applications in medicine and biotechnology where precise separation of cell populations is crucial.

SUGGESTED USES

·Medicines for the Treatment of Infectious Disease and Cancer: The ability to separate key cellular blood components of the immune system is directly applicable to the development of medicines for the treatment of infectious diseases and cancer. By isolating specific immune cells, researchers can study their functions and develop targeted therapies to boost immune responses against pathogens or cancer cells.

·Liquid Biopsy: Liquid biopsy is a non-invasive method for detecting and monitoring diseases such as cancer by analyzing biomarkers in bodily fluids like blood. The high-throughput cell sorting technology can enhance liquid biopsy techniques by enabling the isolation and analysis of rare circulating tumor cells or other disease-related cells from blood samples.

·Cancer Immunotherapy: Cancer immunotherapy harnesses the power of the immune system to target and destroy cancer cells. The technology can aid in the development and optimization of cancer immunotherapy treatments by enabling the isolation of specific immune cell populations, such as T cells or dendritic cells, for therapeutic purposes.

·Cell Manufacturing Processes: The technology can facilitate cell manufacturing processes, such as the production of cellular therapies or biologics. By efficiently separating and purifying specific cell populations, researchers and biopharmaceutical companies can improve the quality and consistency of cell-based products for therapeutic use.

·Bioengineering: The ability to selectively isolate and manipulate cells based on their size and electrical properties can advance various bioengineering applications. For example, researchers can use the technology to sort cells for tissue engineering, organ-on-a-chip platforms, or regenerative medicine approaches.

·Research and Development: The technology can also benefit basic research in fields such as immunology, cell biology, and biophysics. Researchers can use the high-throughput cell sorting system to study cell-cell interactions, cellular signaling pathways, and the behavior of specific cell populations under various conditions.

·Overall, the suggested uses of the technology span a wide range of applications in medicine, biotechnology, and research, highlighting its potential impact on advancing diagnostics, therapies, and scientific understanding in various domains.

FEATURES/BENEFITS

Features:

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

- » **Biotechnology**
- » Other
- » **Medical**
- » Devices
- » Diagnostics
- » Disease: Blood and Lymphatic System
- » Disease: Cancer
- » Other
- » Research Tools
- » Screening
- » **Research Tools**

1. Microfluidic Device: The technology utilizes a microfluidic device for high-throughput cell sorting, allowing for precise control and manipulation of cells in suspension.

» [Other](#)

» [Screening Assays](#)

2. Flow Vortex Technology: Flow vortices are created within the microfluidic chip to selectively trap cells based on size, enabling efficient separation of cell populations.

3. Array of Electrodes: An array of electrodes is integrated into the microfluidic platform, enabling discrimination between cells of equal size but different electrical properties.

RELATED CASES

2021-797-0

4. Label-Free Sorting: The sorting technique is label-free, eliminating the need for expensive reagents typically used in magnetic activated cell sorting methods.

5. Combination of Technologies: The technology combines flow vortex technology with dielectrophoresis (DEP), providing a unique and innovative approach to cell sorting.

6. High Throughput: The system is designed for high-throughput sorting of cells, allowing for the rapid isolation of specific cell populations from heterogeneous mixtures.

7. Selective Trapping: Cells are selectively trapped based on size using flow vortices, enabling the isolation of target cell populations while allowing smaller cells to flow through.

8. Selective Discrimination: Discrimination between cells is achieved based on both size and electrical properties, enhancing the specificity and purity of the sorted cell populations.

Benefits:

1. Enhanced Specificity: The technology enables the specific isolation of target cell populations with high purity, minimizing contamination from non-target cells.

2. Improved Viability: By maximizing cell viability during the sorting process, the technology preserves the functional integrity of isolated cells for downstream applications.

3. Versatility: The technology is versatile and can be applied to various applications in medicine, biotechnology, and research, including cancer therapy, liquid biopsy, and cell manufacturing.

4. Cost-Effectiveness: The label-free sorting approach reduces the need for expensive reagents, making the technology more cost-effective compared to traditional sorting methods.

5. Non-Invasive: The technology can be applied to non-invasive diagnostic techniques such as liquid biopsy, enabling the detection and monitoring of diseases using minimally invasive methods.

6. Innovation: The combination of flow vortex technology and DEP represents a novel and innovative approach to cell sorting, potentially leading to advancements in the field of microfluidics and biotechnology.

7. Research Advancement: The technology facilitates research in various fields, including immunology, cell biology, and biophysics, by enabling the study of cell-cell interactions and cellular behaviors under controlled conditions.

8. Potential Therapeutic Applications: The technology has potential therapeutic applications in the development of medicines for the treatment of infectious diseases, cancer, and other medical conditions by enabling the isolation and manipulation of specific immune cell populations.

TECHNOLOGY DESCRIPTION

This technology presents an innovative approach to high-throughput cell sorting, leveraging a microfluidic platform integrated with both flow vortex and dielectrophoresis (DEP) technologies. By combining these techniques, it achieves precise and label-free separation of cells in suspension based on both size and electrical properties. This method offers enhanced specificity, viability, and versatility, making it particularly valuable for applications in medicine, biotechnology, and research. Its potential for advancing diagnostics, therapies, and scientific understanding positions it as an attractive candidate for licensing by individuals or organizations seeking to innovate in the field of life sciences.

STATE OF DEVELOPMENT

Prototype developed

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20220387999	12/08/2022	2021-797

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ New Microwell Plate Configurations to Increase Microwell Density
- ▶ Multi Layered Microfluidic Devices For In Vitro Large Scale Perfused Capillary Networks
- ▶ Controlled 'One-Cell-One-Bead' Encapsulation in Droplets
- ▶ Microfluidic device for multiplex diagnostics / Microfluidic devices and methods
- ▶ Microfluidic Device for Cell Separation Using Dielectrophoresis and/or Magnetohydrodynamics
- ▶ On-Demand Cell Encapsulation Using On-Demand Droplet Generation and Impedance-based Detection
- ▶ High-throughput Microfluidic Research Platform for Performing Versatile Single-Cell Molecular Timed-Release Assays within Droplets

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