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Technology Transfer Center

Optical Configuration Methods for Spectral Scatter Flow Cytometry

Summary

Scientists at the National Cancer Institute (NCI) seek licensees or co-development partners for a multispectral detection method capable of discriminating different Molecular NanoTag components. The capacity to discriminate further increases the sensitivity of detection for NanoTag molecules. Adaptations of this technology could also apply to incorporate spectral scatter detection in other cytometric and microfluidic systems.

NIH Reference Number

E-008-2018

Product Type

- Research Tools

Keywords

- Optical Configuration, Molecular NanoTag, Flow Cytometry, Multispectral Detection, High-throughput Characterization, Jones

Collaboration Opportunity

This invention is available for licensing and co-development.

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Description of Technology

Multi-parameter flow cytometry has been extensively used in multiple disciplines of biological discoveries, including immunology and cancer research. However, the disadvantage of traditional flow cytometry platforms using excitation lasers and fluorescence detectors is spectral overlap when using multiple dyes on the same biological sample. Metaethical compensation of spectral overlap could only be effective to a certain degree. Mass cytometry is advantageous compared to flow cytometry but is pricey and requires highly skilled operators.

The inventors from the National Cancer Institute (NCI) developed a new flow cytometry protype using molecular NanoTags. NanoTags are nano-sized cytometric labels detectable

individually or quantitatively enumerated based on their intrinsic light scattering or fluorescence properties. They are modularly designed to embody distinctive light scattering, fluorescence, and epitope specificity properties. Because NanoTags are modular, they can be comprised of different nanomaterials – each with identifiable and distinctive light scattering spectral properties across a wide range of wavelengths. Using the unique property of NanoTags, the inventors have tested three unique configurations. Configuration #1, “Spectral Scatter Cytometer,” is designed for full spectral scatter flow cytometry and would implement a supercontinuum white laser providing illumination at all UV-visible wavelengths. Configuration #2, “Co-linear Laser Alignment,” involves the co-linear alignment of at least two monochromatic lasers onto the core stream of standard flow cytometry. Configuration #3, “Spatially Separated Lasers with Slit Apertures,” involves a white-light laser, with its wavelengths spatially separated or part of standard, multi-monochromatic laser flow cytometry. Configuration #3 has the potential of being built to stand alone or add on to existing flow cytometers, providing high-throughput sample characterization with improved resolution.

The inventors are constructing a prototype system and seek licensing or co-development opportunities from commercial flow cytometry platforms to optimize the invention for use in combination with their proprietary platforms.

Potential Commercial Applications

- High-throughput sample characterization with flow cytometry
- Adaptable for other cytometric and microfluidic systems for enhanced detection
- Next generation cytometers’ configuration

Competitive Advantages

- Enables single molecule detection in flow cytometry
- Identifying, quantifying and separating different subsets of extracellular vesicles and viruses
- Enable enhanced development of biomarkers, diagnostic and imaging products

Inventor(s)

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Development Stage

- Prototype

Patent Status

- **U.S. Patent Filed:** U.S. Patent Application Number 16/756,420, Filed 15 Apr 2020
- **PCT:** PCT Application Number US2018/057128, Filed 23 Oct 2018
- **U.S. Provisional:** U.S. Provisional Patent Application Number 62/575,988, Filed 23 Oct

2017

Related Technologies

- E-238-2015 - Molecular Nanotags for Detection of Single Molecules

Therapeutic Area

- Infectious Diseases
- Immune System and Inflammation
- Cardiovascular Systems

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