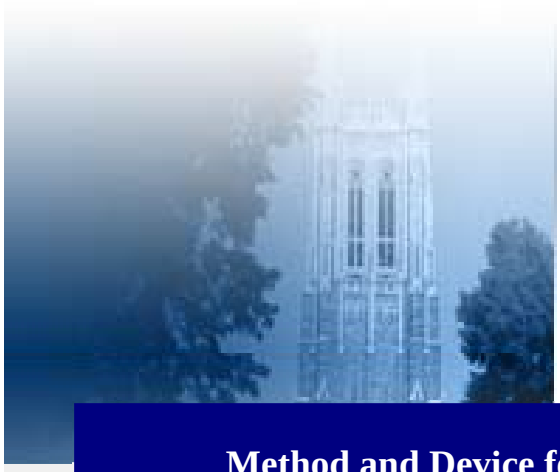

Duke University
Office of Licensing & Ventures
Technology Opportunity

Method and Device for Acoustically Enhanced Magnetophoresis for Rapid Cellular Sorting (AeMACS)

File # 4070

Application

Duke University is seeking a company interested in commercializing a novel method and device for high throughput, low cost, continuous and high purity cell sorting. In scientific research, biotechnology industry and medical diagnosis, techniques to rapidly sort different types of the cells from a blood sample play a fundamentally important role. Existing techniques such as centrifugation, FACS (Fluorescence Activated Cell Separation), MACS (Magnetic Activated Cell Separation) and magnetophoresis have been widely used for the past few decades. Major shortcomings of these techniques include that they are low throughput, high cost, non-continuous (batchwise), or lack automatic collection mechanisms, and multiplexing capabilities. Thus, simultaneous achievement of high throughput and high purity has become the bottleneck, particularly when extracting a certain group of cells at low concentrations from complex cellular mixtures (*e.g.*, specific lymphocytes, progenitor cells, prenatal cells or circulating cancer cells from the other peripheral blood cells). Although cell sorting has become a large market, the existing limitations of the technology have limited its use for point-of-care diagnosis, cell therapy and biological and biomedical research.

Magnetophoresis is frequently used to facilitate cellular sorting in a microfluidic channel, and it has shown several advantages including low cost and commercial availability of biofunctionalized magnetic beads. However, the conventional magnetophoresis suffers from low throughput. The bottleneck in magnetic separation is due to the strong non-linearity of magnetic forces applied within the cell suspension. The cells furthest from the magnet experience the least amount of force, and thus limit the flow rate.

Researchers at Duke University have developed a new mechanism and devices to dramatically improve the throughput of continuous magnetic cell sorting. The Duke approach enables low cost implementation and decrease in the complexity of operation. The invention increases throughput by orders of magnitude, allows continuous sorting and automatic collection to provide a new generation high-purity cell sorting system.

Technology

Researchers at Duke University have developed high throughput cellular sorting system. The Duke approach enables general solutions which are implementable over a broad range of conditions, applications and devices / equipment.

Intellectual Property

Invention disclosure filed.

Method and Device for Acoustically Enhanced Magnetophoresis for Rapid Cellular Sorting (AeMACS)

File #

Inventors

Gabriel P. Lopez, Ph.D., is a Professor of Biomedical Engineering and Professor of Mechanical Engineering and Materials Science at Duke University. He also serves as Founding Director of the National Science Foundation's Research Triangle Materials Research Science and Engineering Center (Triangle MRSEC). Dr. Lopez's primary professional interests lie in research and education in biomaterials science and engineering, bioanalytical chemistry and biointerfacial phenomena.

Benjamin B. Yellen, Ph.D., is an Assistant Professor of Mechanical Engineering and Materials Science at Duke University. He is also a faculty member of the Triangle MRSEC. Yellen's work investigates applications of electricity and magnetism in medicine, energy, and the environment. One of his research focuses is developing nanoscale magnetic manipulation and tracking technology to observe the motion of colloidal particles immersed in aqueous or ferrofluidic medium.

Lu Gao is a Ph.D. candidate in the Mechanical Engineering & Material Science at Duke University and research fellow at the Triangle MRSEC. Lu is engaged in research to better understand how colloidal particles interact with acoustic field and magnetic field in microfluidic devices. His ultimate goal is to facilitate new generation of point-of-care diagnostic devices.

David M. Murdoch, MD, is an Assistant Professor of Medicine in the division of Pulmonary Medicine at Duke University. Dr. Murdoch's work focuses on objectively assessing immune reconstitution as it pertains to infectious diseases, autoimmune condition, and transplant immunology. His work includes the assessment of compartmental immune responses, including the development of novel single cell assays designed to comprehensively profile such responses on limited specimen samples.

Contact

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