Duke University
Office of Licensing & Ventures
Technology Opportunity

Elastomeric Particles for Acoustic Bioseparations and Cellular Sorting

File# 210/12 PCT

Application

Duke University is seeking a company interested in commercializing a novel method of generating functional, monodisperse silicone particles with tunable mechanical and acoustic properties. Duke Researchers have recently devised a method for rapidly generating large quantities of uniform particles with tunable sizes, properties, and surface functionality. Due to their rapid synthesis compared to microfluidic-based approaches, and their low production cost, these monosized particles hold enormous potential for industrial applications in producing inks, paints, foods, cosmetics, slurries, fillers, etc.

A leading medical application of these particles is in a new generation of cell sorting technologies. In research, biotechnology, and medicine, techniques to rapidly sort cells of different types from a native biofluid (*e.g.*, peripheral blood) play a crucial role in the diagnosis and treatment of disease. Existing techniques such as fluorescence activated cell sorting (FACS), magnetic activated cell sorting (MACS), and magnetophoresis are the current standards for capturing and isolating cells. However, significant shortcomings of these techniques include limited throughput, high cost, and serial (cell-by-cell) sorting or non-continuous separations. Consequently, simultaneous achievement of high throughput and high purity has become a major roadblock, particularly when extracting rare cell populations (*e.g.*, hematopoietic stem cells, prenatal cells, or circulating cancer cells) from complex biofluid mixtures.

Using these elastomeric particles, researchers at Duke University have created a novel cell sorting system that is a viable, and potentially superior, alternative to all previous cell sorting systems. Elastic particles can stably bind to cells for rapid acoustic separation. Particles targeting specific cell surface antigens can be loaded into a sample, whereupon cells of interest will rapidly bind and separate from other non-labelled cells in a continuous, high-throughput fashion when in the presence of an acoustic standing wave. This approach enables low cost implementation of sorting, improved screening rates, and a decrease in the complexity of operation compared to previous techniques. A closely related biomedical application of the new particles is their use as platforms for immunosensing, immunoseparation and molecular diagnostics. This invention is also well suited the development of tunable particles for a host of versatile industrial applications.

Technology

Researchers at Duke University have developed a method for synthesizing functional, monodisperse, and mechanically tunable particles. This approach enables general solutions which are implementable over a broad range of conditions, applications, and devices.

Intellectual Property

Patent application (PCT) filed.

Elastomeric Particles

for Acoustic Bioseparations and Cellular Sorting

File# 210/12 PCT

Inventors

Gabriel P. López, 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.

C. Wyatt Shields IV is a Ph.D. student in Biomedical Engineering at Duke University, NSF graduate research fellow, and fellow of the Triangle MRSEC. Wyatt is actively developing new methods for synthesizing monodisperse elastomeric microparticles from bulk synthesis with tunable acoustic and biochemical properties for rapid, on-chip cell sorting devices. He hopes to create an acoustic-based platform for next generation diagnostic and therapeutic devices.

Leah M. Johnson, Ph.D. is a Hartwell Foundation Postdoctoral Fellow at Duke University. Dr. Johnson is engaged in designing new bio-separation techniques using acoustic-responsive polymeric microparticles. Her research interests involve designing and implementing new approaches for bioanalytical and biosensing applications using materials science.

Lu Gao is a Ph.D. candidate at Duke University in Mechanical Engineering. Lu is engaged in designing new cell sorting devices. His research includes the use of external fields (e.g., acoustic and magnetic fields) for on-chip cell handling and manipulation for novel medical device design.

Contact

For further information regarding this opportunity, please contact:

Duke University Office of Licensing & Ventures
C. Robert Hallford, MS, MBA
PO Box 90083
Durham, NC 27708
tel (919) 681-7579
fax (919) 684-8867
rob.hallford@duke.edu