TECHNOLOGY

PDMS (Silicone) Microbeads for Real-Time Sensing Applications

OVERVIEW

Poly(dimethysiloxane) (PDMS), also called silicone, is an inert elastomer that serves as a key component in a range of lubricants, sealants, and medical products, and it is widely used in the fabrication of microfluidic chips using soft lithography techniques. PDMS microparticles have a high permeability which allows them to readily absorb selected agents from their local environment, functioning as separation and/or sensing elements. Previously the production of uniform, microscale PDMS beads by conventional (bulk) methods has proven to be challenging. For example, the high viscosities of typical PDMS prepolymer formulations together with the low surface energy of PDMS makes the generation of stable emulsions in aqueous solution impractical, and as such, PDMS precursor droplets tend to aggregate or coalesce.

Researchers at the University of Maryland have developed a new technique for the production of monodisperse PDMS microbeads. A microfluidic flow-focusing mechanism is used to create droplets of PDMS precursors in a continuous aqueous phase bearing a surfactant. As a result, this technology is able to generate stable, non-coalescing droplets, which are then collected and thermally cured off-chip. Ultimately, a population of inert, monodisperse PDMS microbeads is produced, and these could be useful in a variety of applications. For example, the integration of an oxygen-sensitive phosphorescent dye into the polymer microbead matrix has been demonstrated, resulting in dye-bearing PDMS microbeads capable of sensing the concentration of oxygen in the surrounding medium in real time.

Advantages
Stable Synthesis in Water
Non-coalescing droplets
High-permeability Microbeads
Uniform Droplet Size

Applications
Chemical/Molecule Sensors
Microfluidic Fabrication
Medical Devices
Lubricants
Sealants
Cosmetics

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Available for exclusive or non-exclusive license

CATEGORIES

- Microfluidics
- Chemical

EXTERNAL RESOURCES

PS-2011-076