TECHNOLOGY

Porous Monolith Sensing Elements for Molecular and Biomolecular Detection

OVERVIEW

Background
In flow-through immunoassays, capillaries and microfluidic channels have side walls upon which are anchored particular antibody probes chosen to capture specific antigens present in a fluid being measured. Antigen capture efficiency is limited by the surface areas of the sidewalls available for immobilizing the antibody probes. These surface areas are typically flat and two dimensional.

Researchers at the University of Maryland have designed, built and tested a flow-through immunoassay capture surface constructed from porous polymer monoliths, in which the pores provide dramatically increased available surface area. Monoliths with different porosity, surface area, and flow resistance may be fabricated by controlling concentrations of monomers, solvents, and initiators, with polymerization of the monolith able to be initiated by heat or UV light. Monoliths can be functionalized with nano-particles to enable spectroscopic detection techniques like surface-enhanced Raman spectroscopy (SERS). High concentrations of antibodies and enzymes may then be anchored covalently to the monolith surface area and used for rapid, sensitive, and versatile immunosensing.

Advantages
High surface area for increased antigen-antibody interaction efficiency
Increased read-out sensitivity comparable to typical mass spectrometry
Fully customizable monolith characteristics
Ultra-compact, ultra-portable, low-cost and disposable sensing

Applications
In-field environmental and forensic analysis
Portable and inexpensive medical diagnostic tools
Pharmaceutical testing
Surface-enhanced Raman spectrometry (SERS)
Hazardous chemical/biological warning systems (military, industrial, environmental)

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Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Available for exclusive or non-exclusive license

CATEGORIES

- Sensors/Monitors
- Microfluidics

EXTERNAL RESOURCES

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