Office of Technology Transfer

Auburn University

Novel Particulate Biosensors

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Reference: MSP Sensors

Lead Inventors

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Status

- A U.S. non-provisional application (20050074904) has been filed
- Particles have detected down to **50 cells/mL** for three different targets

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or joint venture

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Overview

Auburn University is seeking a licensee or development partner for magnetostrictive particulate (MSP) sensors capable of wireless/remote, continuous, highly sensitive detection of multiple target biological/chemical agents in a variety of environments. This technology has potential applications in the following economic sectors:

- Homeland Security: testing people and monitoring sites for chem/biothreats
- Defense: on-site or drone-enabled continuous monitoring for chem/biothreats
- Food Safety: analyze food for pathogens (naturally or artificially introduced)
- Agriculture: monitoring plant health, fruit ripeness and insect infestation
- Environmental: monitor water samples for pathogens
- Medicine: rapid disease diagnostics, blood typing

Advantages

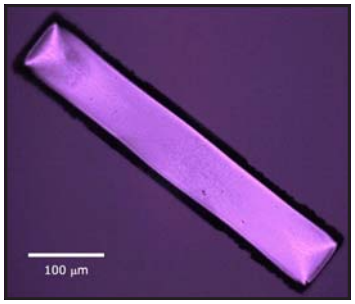
- Remotely powered with no electronics or wiring attached to the sensors, allowing sample to easily come into contact with sensors without significant manipulation
- Highly sensitive: 100- to 1,000-fold mass sensitivity enhancement over standard microcantilevers
- Near real time results, allowing for rapid, continuous, *in situ* detection
- Capable of detecting multiple targets simultaneously
- Particles are inexpensive and easily fabricated from commercially available materials
- Works with a variety of sample media: water, food effluent, blood or even air, thus expanding potential applications
- After detection, sensors can be easily concentrated and collected to allow for additional study of the bound pathogen

Description

The ability to identify the presence of a very small number of target proteins, bacteria, or spores in a small volume of liquid would greatly protect against bioterrorism and food safety threats, provide a more sensitive tool for medical diagnostics, and advance scientific research into the human genome. Current methods have the principal drawback in that the target species must be brought to the sensor surface for detection.

A biosensor may be formed by coating small particles of a magnetostrictive material with a biorecognition element such as antibody or phage. These MSP sensors exhibit a change in their magnetic resonance state when target pathogens bind with the biorecognition element. Detection is rapid and measured remotely.

The particles, which can range from a few nanometers to microns in size, are mixed, fluidized or distributed through the sample, effectively bringing the sensors to the target agent. The small size and large number of MSP sensors greatly increase the probability of binding with target pathogens, thereby increasing sensitivity and reducing detection time. Detection can be done *in situ* and continuously. After a detection event, the MSP sensors can be concentrated and collected using a magnetic field to easily enable further detailed analysis (e.g., PCR) of the bound pathogen.



Micrograph of a five micron thick MSP Sensor