Pathogen Detection in Large Fluid Volumes

Auburn University is seeking a development or commercialization partner for a system to rapidly detect pathogens in large volumes of liquid, e.g., water, milk or juice.

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References:

Underlying sensor tech:
IEEE Sensors Journal
PCR Comparison:
Biosensors & Bioelectronics

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Reference: Fluid Filter

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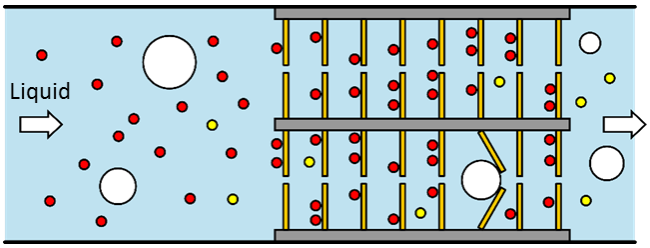
Overview: Food and water safety are an ongoing concern around the world. Current pathogen detection methods may take hours, or even require overnight shipping or incubation steps. This system allows for rapid, specific detection of target pathogens in large volumes of fluid. Envisioned applications include produce wash water, irrigation water, food effluent, and beverages such as milk or fruit juices. For example, an entire tank of produce wash water could be examined for salmonella, with results provided in a matter of minutes.

Advantages:

- **RAPID -** Pathogen detection conducted on the order of minutes
- **SENSITIVE -** Specific detection down to only a few CFUs per mL
- **NON-SAMPLING -** The entire fluid volume is tested, not select samples
- **RECOVERABLE** - Bound pathogens can be recovered for further analysis (e.g., PCR)

Description: Auburn's base technology utilizes magnetoelastic sensors. When placed in a magnetic field, these inexpensive sensors change their resonance frequency based on their mass. Thus, when coated with a biorecognition element such as phage or antibodies, a binding event can be easily detected based on a change in resonance frequency. This system has a 100- to 1000-fold mass sensitivity enhancement over traditional microcantilevers. When deployed in a pipe, these sensors can be used to test high volumes of liquid in a clogless filter. Detection is very rapid, with results on the order of minutes. Different sets of sensors can be deployed for multiplexing. Upon a detection event, pathogens can be recovered for further analysis.



Fluid filter schematic. A framed array of sensors deployed inside a pipe, with the target fluid flowing through it. Sensors can flex to allow debris (white) to pass through, preventing clogging. Target pathogens (red) bind to biorecognition elements on the sensors, while non-target pathogens (yellow) do not. Array can also be frameless.

Status:

- Framed filter: Issued US Patents 10,406,533 & 10,940,486, plus UK, FR & DE
- Pending US applications on a frameless filter: 20210086113 and 20210138483
- Related background IP: US 7,759,134; US 9,201,048; US 9,746,443; additional counterparts
- This technology is available for exclusive or non-exclusive licensing
- Detection demonstrated for multiple pathogens in multiple sample fluids
- The underlying sensor technology also has application for other detection methods, including with smaller samples and on surfaces

Early Stage — *Lab testing* — *Prototype* — *Market Ready*