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Simultaneous Sample Manipulation and Sensing Using Surface Acoustic Waves

Researchers at the University of South Florida and Sandia National Laboratories have developed a novel technology which has the ability to remove nonspecifically bound proteins from the surface of biosensors using surface acoustic waves (SAWs). The invention increases the functionality of existing technologies by providing a more accurate quantification of biological markers of diseases such as cancer, cardiovascular ailments, and many other conditions for which medical research shows over expression of specific proteins. This invention also allows for the detection of multiple biomarkers in a single sensor by the principle of differential detection.

A hexagonal device fabricated in 36° lithium tantalate allows for propagation of both Rayleigh and shear horizontal (SH) wave modes simultaneously. In this device, the Rayleigh acoustic waves stress the bonds between the sensing film and analyte forcing only the analyte with higher affinity for the sensing film to stay bound, while the SH SAWs are used for sensing.

This invention will lead to significant advances in biomarker detection in the form of robust, inexpensive, reusable point-of-care sensors. In turn, the progression and management of diseases will be much easier than what is currently possible, by not requiring visits to hospitals and laboratories. The reduction in turn-around time in sample analysis will be reduced to a point where near-real-time monitoring of biomarkers will be made possible. Array configurations of this concept will lead to quantification technologies for proteins and similar biomarkers in bodily fluids.

ADVANTAGES:

- **Removes non-specifically bound proteins**
- **Enables differential detection of multiple biomarkers**
- **Drastically reduces turn-around time in sample analysis of biomarkers**

Biomarker detection for Diseases Using SAWs

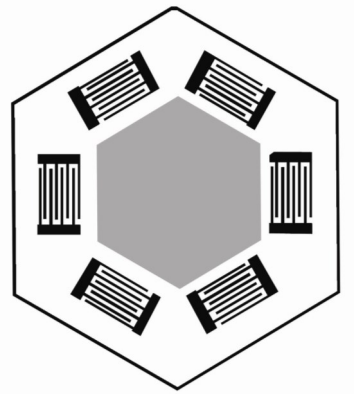

Illustration of hexagonal surface acoustic waves (SAW) device schematic

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