USF Available Technologies

Technology Transfer Office

Integrated Thickness Shear Mode (TSM) Sensor and Surface Acoustic Wave (SAW) Device

Researchers at the University of South Florida have developed a unique device that combines a Thickness Shear Mode (TSM) Sensor and Surface Acoustic Wave device, which simultaneously senses concentrations in complex fluids as well as removes materials from the surface of the sensor.

Sensors have been used for the continuous monitoring of various parameters such as the pH changes, and O2 or CO2 concentration in bio-reactor, environmental or clinical systems. However, one of the most serious problems in such sensing systems is the surface fouling caused by various foreign materials such as proteins, cells and microorganisms, which induce a decrease in the sensitivity and lifetime of the sensors. Such surface fouling eventually leads to sensor failure as a consequence of the interruption of the analyte transport into the sensing layer. Therefore, it is vital to protect against or minimize the fouling of the surface of sensors caused by the build up of foreign materials.

Researchers at USF have devised a invention to address the issue through the integration of technologies that allow for simultaneous sensing and removal of material from the sensor surface. The sensing aspect of this device is accomplished through the use of a thickness shear mode sensor that is designed to operate from 2-100 MHz and is functionalized using known methods, both depending on the specific application. The Rayleigh waves are designed to operate at a significantly different frequency than the sensor thus no interference occurs. The removal function of the device can also be used to regenerate the surface of the sensor for repeated use.

ADVANTAGES:

- **Simultaneously senses and removes unwanted materials from surfaces**
- **Increased sensitivity**
- **Automatic regeneration**

Simultaneous Sensing and Removal of Analytes

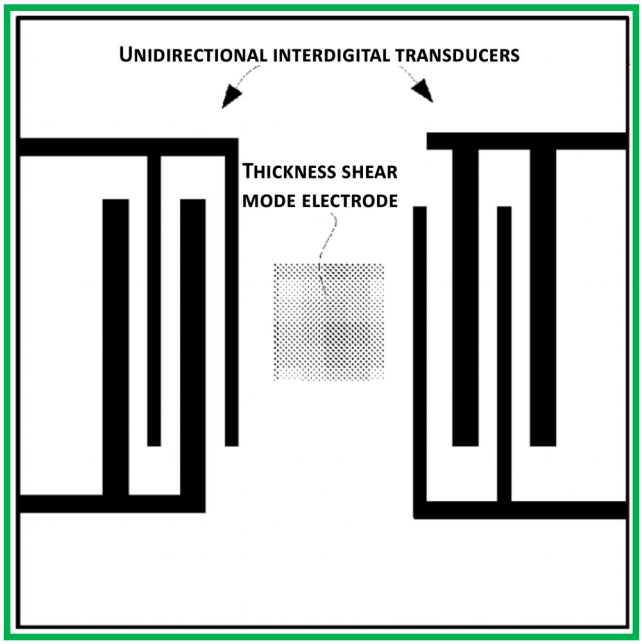

Diagram of a First Side of An Integrated TSM Sensor

Tech ID # 08A019 **Patent #: 8,018,121**

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