Design Development of Acoustic Waves Based Sensitive Sensors for *Escherichia coli* O157:H7 Detection

Abstract

Food contamination has become critical issue and is being worse due to the insensitive detection devices. One of the dangerous food contaminations is by Escherichia coli (*E.coli*) O157:H7, one of the harmful bacterial pathogens which is distributed in soil, marine and estuarine waters, the intestinal tract of animals, or water contaminated with fecal matter. A small amount of *E.coli* with the dose fewer than 100 organisms in food products or water is enough to cause serious gastrointestinal illness to human. Hence, the ultra-high sensitive, label free biosensors have been designed in this research for the low concentration *E.coli* detection. Surface acoustic waves (SAW) devices have been initially developed and used for the high-volume low-cost TV component. Due to the ultra-sensitivity to the surface perturbation, SAW based devices have been modified to be sensors. Initially, SAW sensors were developed for gas detections and have been moving towards biological detections recently. Shear horizontal surface acoustic wave (SHSAW), one of the SAW based types is most suitable for the liquid based application as it has the advantage of acoustic energy is not being radiated into liquid. However, the main SHSAW design components are the operating frequency and wave length. These are strictly depended on the inter digital transducers (IDTs) design. Therefore, this paper is presenting the IDTs design concept and pattern development by using computer aid design (CAD) software.

Keywords; Acoustic Waves Based Sensors, Biosensor, E.Coli, Frequency, IDTs, SHSAW, Wave Length