Public Abstract
First Name:Shibajyoti
Middle Name:
Last Name:Ghosh Dastider
Adviser's First Name:Mahmoud
Adviser's Last Name:Almasri
Co-Adviser's First Name:
Co-Adviser's Last Name:
Graduation Term:SS 2011
Department:Electrical Engineering
Degree:MS
Title:MEMS BIOSENSOR FOR DETECTION OF ESCHERICHIA COLI O157:H7 IN FOOD PRODUCTS

Escherichia coli O157:H7, is one of the most common pathogens that has caused several outbreaks in recent years. In 2010-11 there were 5 outbreaks of E.coli and thousands were victim of it. Thus there is an immediate need for sensors capable of rapid detection of this pathogenic strains of E.coli.

To effectively detect the presence of E.coli O157:H7 a MEMS based biosensor has been proposed, designed and fabricated. This sensor detects the presence of E.coli bacteria using Impedance Spectroscopy. It consists of planar interdigitated array of microelectrodes (IDAM) and a microchannel. The surface of the microelectrodes is modified using goat anti-E.coli polyclonal IgG antibody and As soon as the E.coli bacterium cells get recognized it binds to the antibody. This binding changes the dielectric property of the electrodes, resulting in an impedance change. The change in impedance is measured using an impedance analyzer. Another variation of this biosensor has been designed and proposed in this thesis. This design consists of two arrays of 3-dimensional electrodes and a microchannel with multiple inlets and outlets. In this design the first array of interdigitated electrodes is used to separate unwanted objects from the sample using dielectrophoresis. The second array of 3-dimensional microelectrodes acts as a detection array.

From the analysis it was found that the biosensor is sensitive to varying concentration of E.coli samples and the lowest detection limit of the biosensor is 3x103CFU/ml. Also it was established that the total detection time for this biosensor is less than 30 minutes which is rapid compared to the conventional ways of detection.