

## Development of an Aptamer-Molecularly Imprinted Polymer Based Electrochemical Sensor to Detect Pathogenic Bacteria

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**Abstract :** Pathogenic bacteria and the diseases they cause have become a global problem. Their early detection is vital and can only be possible by detecting the bacteria causing the disease accurately and rapidly. Great progress has been made in this field with the use of biosensors. Molecularly imprinted polymers have gain broad interest because of their excellent properties over natural receptors, such as being stable in a variety of conditions, inexpensive, biocompatible and having long shelf life. These properties make molecularly imprinted polymers an attractive candidate to be used in biosensors. In this study it is aimed to produce an aptamer-molecularly imprinted polymer based electrochemical sensor by utilizing the properties of molecularly imprinted polymers coupled with the enhanced specificity offered by DNA aptamers. These 'apta-MIP' sensors were used for the detection of Staphylococcus aureus and Escherichia coli. The experimental parameters for the fabrication of sensor were optimized, and detection of the bacteria was evaluated via Electrochemical Impedance Spectroscopy. Sensitivity and selectivity experiments were conducted. Furthermore, molecularly imprinted polymer only and aptamer only electrochemical sensors were produced separately, and their performance were compared with the electrochemical sensor produced in this study. Aptamer-molecularly imprinted polymer based electrochemical sensor showed good sensitivity and selectivity in terms of detection of Staphylococcus aureus and Escherichia coli. The performance of the sensor was assessed in buffer solution and tap water.

**Keywords :** aptamer, electrochemical sensor, staphylococcus aureus, molecularly imprinted polymer

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