

Impedance Based Biosensor for Agricultural Pathogen Detection

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Abstract : One of the major limitations on food resources worldwide is the deterioration of plant products due to pathogenic infections. Early screening of plants for pathogenic infections can serve as a boon in the Agricultural sector. The standard microbiology techniques has not kept pace with the rapid enumeration and automated methods for bacteria detection. Electrochemical Impedance Spectroscopy (EIS) serves as a label free bio sensing technique to monitor pathogens in real time. The changes in the electrical impedance of a growing bacterial culture can be monitored to detect activity of microorganisms. In this study, we demonstrate development of a gold interdigitated electrode (gold IDE) based impedance biosensor to detect bacterial cells in real on-field crop samples. To calibrate our impedance measurement system, nutrient broth suspended Escherichia coli cells were used. We extended this calibrated protocol to identify the agricultural pathogens in real potato tuber samples. Distinct difference was seen in the impedance recorded for the healthy and infected potato samples. Our results support the potential application of this Impedance based biosensor in Agricultural pathogen detection.

Keywords : agriculture, biosensor, electrochemical impedance spectroscopy, microelectrode, pathogen detection

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